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Editors
Tan Yigitcanlar, Peter Yates, Klaus Kunzmann

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1. Knowledge city; 2. Knowledge-based development;
3. Knowledge-based urban development; 4. City planning
3RD KNOWLEDGE CITIES WORLD SUMMIT
MELBOURNE, AUSTRALIA
16-19 NOVEMBER 2010
FROM THEORY TO PRACTICE

EDITORS
TAN YIGITCANLAR, PETER YATES, KLAUS KUNZMANN
FROM GOVERNOR

As Governor of Victoria and as Patron of the Third Knowledge Cities World Summit, I warmly welcome you all to Melbourne.

Over its history of 175 years, Melbourne has been known for its love of sport and events, as well as building a great reputation for its support of the arts, literature and knowledge. Based on its world-class universities and galleries, its citizens have benefited from the integration of this knowledge base into its economic, social and cultural life, enriching not only its residents and workers, but all who have a stake in a city with a vibrant knowledge culture. The Melbourne 2010 Knowledge Cities World Summit will explore the concept of how exciting and creative theories can be realised in practice. The summit program has been shaped with a focus on providing attendees with a substantial mix of academic and practitioner presentations and workshops giving an expansive overview of knowledge cities at work. This summit will also bring together leaders who understand how to shape cities into creative spaces that can offer a better quality of life to their citizens as they cope with the many challenging of modern life.

I am proud to welcome you to Melbourne, a globally recognised knowledge city, for this exciting event.

Professor David de Kretser, A.C.
Governor of Victoria

FROM LORD MAYOR

On behalf of the City of Melbourne, welcome to the Third Knowledge Cities World Summit. We are proud to host an event that brings together eminent international speakers, with expertise in developing knowledge cities.

Academics and practitioners have been invited to share ideas on what makes a knowledge city; focusing on moving from theory to practice. We all have a stake in the influence of these ideas on urban development and communities. Integrating all aspects of a city’s economic, social and cultural life underpins a successful knowledge city; and Melbourne has many strengths on which to build.

Melbourne is a global educational and research destination, hosting leading biotechnology institutes and major teaching hospitals, and eight major universities. A renowned destination for arts, culture, sport and major events, increasingly we will be regarded as a city based on knowledge. Meanwhile, Melbourne enjoys a reputation as one of the world’s most liveable cities. Our city’s museums and galleries, whether large or small, host impressive collections of local and international works. Visitors enjoy exploring the city’s chic laneway boutiques and cafes, and Spring reveals our parks and gardens at their best. I wish you every success during the Summit, and invite you to enjoy all that Melbourne has to offer.

Robert Doyle
Lord Mayor
FROM KCWS 2010 CHAIRS AND SUMMIT PROCEEDING EDITORS

'Knowledge' is a resource, which relies on the past for a better future. In the 21st century, more than ever before, cities around the world depend on the knowledge of their citizens, their institutions and their firms and enterprises. The knowledge image, the human competence and the reputation of their public and private institutions and corporations profiles a city. It attracts investment, qualified labour and professionals, as well as students and researchers. And it creates local life spaces and professional milieus, which offer the quality of life to the citizens that are seeking to cope with the challenges of modern life in a competitive world.

Integrating knowledge-based development in urban strategies and policies, beyond the provision of schools and locations for higher education, has become a new ambitious arena of city politics. Coming from theory to practice, and bringing together the manifold knowledge stakeholders in a city and preparing joint visions for the knowledge city is a new challenge for city managers, urban planners and leaders of the civic society. It requires visionary power, creativity, holistic thinking, the willingness to cooperate with all groups of the local civil society, and the capability to moderate communication processes to overcome conflicts and to develop joint action for a sustainable future.

This timely Melbourne 2010 – The Third Knowledge City World Summit makes an important reminder that ‘knowledge’ is the key notion in the 21st Century development. Considering this notion, the summit aims to shed light on the multi-faceted dimensions and various scales of building the ‘knowledge city’ and on ‘knowledge-based development’ paradigms. At this summit, the theoretical and practical maturing of knowledge-based development paradigms will be advanced through the interplay between the world’s leading academic’s theories and the practical models and strategies of practitioners’ and policy makers’ drawn from around the world.

As chairs of The Melbourne 2010 Summit, we have compiled this summit proceeding in order to disseminate the knowledge generated and shared in Melbourne with the wider research, governance, and practice communities. The papers in the proceedings reflect the broad range of contributions to the summit. They report on recent developments in planning and managing knowledge cities and ICT infrastructure; they assess the role of knowledge institutions in regional innovation systems and of the intellectual capital of cities and regions; they describe the evolution of knowledge-based approaches to urban development in differing cultural environments; they finally bridge the discourse on the knowledge city to other urban development paradigms such as the creative city, the ubiquitous city or the compact city. The diversity of papers presented shows how different scholars from planning cultures around the world interpret the knowledge dimension in urban and regional development.

All papers of this proceeding have gone through a double-blind peer review process and been reviewed by our summit editorial review and advisory board members. We cordially thank the members of the Summit Proceeding Editorial Review and Advisory Board for their diligent work in the review of the papers. We hope the papers in this proceeding will inspire and make a significant contribution to the research, governance, and practice circles.

Tan Yigitcanlar
KCWS 2010 Chair and
Summit Proceeding Editor

Peter Yates
KCWS 2010 Chair and
Summit Proceeding Editor

Klaus Kunzmann
KCWS 2010 Chair and
Summit Proceeding Editor
## Summit Program

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### Wednesday 17 November

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| 0830 – 1000| Welcome to Country, Indigenous Performance and Summit Opening  
**Official summit opening by Governor David de Kretser and The Hon Lord Mayor Robert Doyle**  
Summit introduction by summit co-chairs **Dr Tan Yigitcanlar, Mr Peter Yates, Prof Klaus Kunzmann**  
**Opening session panel**  
Chair: **The Hon Alex Chernov AO QC**, University of Melbourne, Australia  
Panel: **Prof Margaret Gardner AO**, RMIT, Australia; **Prof James Powell**, Ambassador for Social Entrepreneurship Director Smart City Futures, UK; **Prof Göran Roos**, Intellectual Capital Services, Finland; **Dr Marcus Spiller**, SGS Economics and Planning, Australia  
**Room 219** |
| 1000 – 1030| Morning tea                                |
| 1030 – 1200| Knowledge, Creative, Intelligent Cities, Regions and Societies  
**Chair:** **Dr Kathy Alexander**, City of Melbourne, Australia  
**Keynote Speakers:**  
**Prof Javier Carrillo**, World Capital Institute, Mexico  
**Dr Tan Yigitcanlar**, Queensland University of Technology, Australia  
Panel: **Dr Cathy Garner**, Manchester: Knowledge Capital, United Kingdom; **Dr Patrick Greene**, Museum Victoria, Australia; **Mr Brendan McClements**, Victorian Major Events Company, Australia  
**Room 219** |
| 1200 – 1300| Lunch                                      |
|            | Sponsored by **RMIT University**          |
| 1300 – 1430| Knowledge Assets and Capital Systems  
**Chair:** **Mr Martyn Myer AO**, The Myer Foundation, Australia  
**Keynote Speakers:**  
**Prof Carol Lin**, National Chengchi University, Taiwan;  
**Prof Joris Van Wezemael**, University of Fribourg, Switzerland  
Panel: **Mr Greg Callaghan**, Telstra, Australia; **Ms Lucy Turnbull**, Turnbull and Partners Ltd, Australia; **Mr Evan Thomley**, Better Place, Australia  
**Room 219** |
| 1430 - 1445| Delegates opportunity to move between sessions (15 mins) |
# SUMMIT PROGRAM

**Wednesday 17 November**

Parallel sessions will showcase academic and practitioner presentations within the summit theme *From Theory to Practice*

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<td>S Garlick A ‘capabilities’ solution to the flight of human capital from Australian</td>
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<td>M Farhangi Towards The Knowledge City of Tehran, Challenges and Opportunities</td>
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<td>R Hu Measuring Concentration of Knowledge-based Economy in Central Sydney in 1996-2006</td>
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| 0830 – 1000 | **Creativity, Innovation, Technology and Learning Communities**  
Chair: The Hon Richard Alston, Australia  
Keynote Speakers:  
Prof Bjorn Asheim, University of Lund, Sweden  
Assoc Prof Mark Lorenzen, Copenhagen Business School, Denmark  
Panel: Ms Michelle Gallaher, BioMelbourne Network, Australia; Mr Glenn Wightwick, IBM Australia Development Laboratory, Australia; Mr Peter Williams, Deloitte Digital, Australia  
Room 219 |
| 1000 – 1100 | MAKCi (Most Admired Knowledge Cities) award ceremony                       |
| 1100 – 1130 | Morning tea                                                               |
| 1100 – 1400 | Melbourne Leaders’ Forum, invite only                                      |
| 1130 – 1230 | **Parallel session 6.1**  
Chair: K Manley  
Creativity, innovation and learning communities  
Room 219  
**Parallel session 6.2**  
Chair: Z Nedovic-Budic  
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Room 216  
**Parallel session 6.3**  
Chair: G Searle  
Higher education and research institutions and development  
Room 217  
**Parallel session 6.4**  
Chair: W Ritter  
SPECIAL SESSION Insight into Israel  
Room 215  
**Workshop 6:** Postgraduate and early career workshop  
Room 218  
**Moderator:** Dr Tan Yigitcanlar |
| 1130 – 1230 | M Corrales  
From Absorptive Capacity to Best Practices to Mobilize Knowledge and Open Innovation  
G Gibbs  
The Victorian Platform Technologies Network: Biomedical research facilities improving access, outcomes and innovation  
A Taibah and K Youssef  
Knowledge cities through ‘open design studio’ educational projects: the case of Jeddah City  
Z Weinstein  
Housing Policy in the Israeli Project Renewal  
**R LaSalle:** A structured approach to Innovation Opportunity Capture and Systematic Thinking  
C Wong  
Managing creativity and its challenges: case of the film industry  
B Garcia  
Borderland Tele-Centres: Learning and Connectivity at the edge  
D Morgenstern  
Rehovot as a model for knowledge towns in Israel  
**B Horn:** Knowledge in the City: yours, mine or ours – Museum Victoria and the role of creative cultural infrastructure in the life of Melbourne knowledge city  
G Osborne and L Wheeler  
Hume Global Learning Village: A Creative Learning Community  
K Grant  
The University as a City-Builder: A Case of Ryerson University’s Master Plan  
A Aharoni  
Holon the Children’s City |
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MELBOURNE CONVENTION CENTRE
16-19 NOVEMBER 2010
FROM THEORY TO PRACTICE

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Amro Taibah, King Abdulaziz University, Saudi Arabia
Arun Kumar, Queensland University of Technology, Australia
Ashantha Goonetilleke, Queensland University of Technology, Australia
Awais Piracha, University of Western Sydney, Australia
Azime Tezer, Istanbul Technical University, Turkey
Blanca Garcia, El Colegio De La Frontera Norte, Mexico
Bruce Wilson, RMIT University, Australia
Charlotte Scarf, AHURI, Australia
David Charles, Curtin Business School, Australia
Dean Forbes, Flinders University, Australia
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THE 3RD KNOWLEDGE CITIES WORLD SUMMIT

MELBOURNE CONVENTION CENTRE
16-19 NOVEMBER 2010
FROM THEORY TO PRACTICE

PLENARY SESSION PAPERS
Combining design and high-tech in knowledge cities: the case of Eindhoven

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Abstract

Theories of urban competitiveness have had disagreeing views about the most important factors influencing city growth and development. The business-oriented view has focused on economic qualities, assuming that proximity of firms and institutions generates (technological) innovation. The people-oriented perspective claims that the socio-spatial qualities of a place have become the most important factor for urban competitiveness in the current economic context.

The awareness of the nature of knowledge-based development, in which cultural considerations become much more important, has led to new notions considering the importance of attracting both firms and investments, and human capital for urban competitiveness. In practice, however, these comprehensive notions are not so easy to implement, and local strategies tend to engage in business-oriented approaches.

The present work focuses on ways to combine these apparently opposing theoretical views, by presenting the case of Eindhoven, in the Netherlands. Eindhoven has performed a great achievement incorporating the creative design sector into its traditional high-technology production sector. This paper will describe the role of the main stakeholders – government, firms, research sector – in producing this strategic shift towards the creative design sector. It will pay attention to both the organizational changes as well as the significant spatial transformations that the city of Eindhoven is realizing in its attempt to materialize its objective of transforming from a traditional industrial region into a “top-technology and design region”.

The success of Eindhoven in reinventing itself to become a design destination and the high-tech capital of the Netherlands shows that it is possible to bridge the difficulties to combine these two apparently separate sectors, implementing strategic actions to improve a place’s socio-spatial qualities. Findings from the approach taken by Eindhoven, specifically in the field of strategic planning and urban projects, may serve as inspiration and be broadened into recommendations for other (high-tech) cities and regions with similar ambitions and aims.

Keywords – knowledge cities, design, high-tech, knowledge economy, Eindhoven.

Paper type – Academic Research Paper

1 Introduction

Academics have held disagreeing views about the most important factors influencing city growth and development to achieve urban competitiveness. The traditional view is
the business-oriented one, which focuses on economic qualities, stating that cities should attract new firms and institutions. It assumes that their proximity generates (technological) innovation. The people-oriented perspective that became popular during the last decade states that cities should attract human capital, the most important factor for competitiveness. This perspective claims that the socio-spatial qualities of a place have become a key issue for urban competitiveness in the knowledge-based economy. Issues linked to the creative city or the creative class popularized by Charles Landry (2000) and Richard Florida (2002) have been widely discussed, criticized and studied in the US and European cities.

Gradually, it has become clear that both firms and people are important, so comprehensive views are gaining ground. Many cities worldwide have developed policies to nurture local creativity. But the practice shows that many of the requirements and conditions of the social climate for creative environments are fuzzy and difficult to achieve or to measure (Trip, 2009). Accordingly, most local policies still tend to engage in the business-oriented perspective, easier to implement in practice (Kooijman and Romein, 2007).

The present work focuses on ways to combine business and people oriented perspectives in the practice, by presenting the case of Eindhoven, a city with a high-tech profile which is the economic engine of the Netherlands. Aware that the synergy between high-technology and creative sectors has become crucial in the international competitiveness of knowledge-based regions, Eindhoven has performed a great achievement incorporating the creative design sector into its traditional high-tech production sector. The main features of these initiatives can serve as inspiration for other cities with similar ambitions.

The paper is organized in six sections. The next one addresses the main assumptions of the business-oriented, the people-oriented, and the comprehensive perspectives of urban growth and development. The third section will describe the problems of implementing the comprehensive approaches. Eindhoven’s main features is the focus of the following section, while the fifth goes deeper into the aspects related to the design orientation of Eindhoven. The last section presents the main conclusions.

2 Theories of urban growth in the knowledge era

The transcendental shift from locally-bounded urban economies into complex knowledge-based economies of global reach has visibly enriched the academic debate in urban and regional economics. Important subjects in this debate have been the identification of the driving forces for city growth and urban competitiveness. Due to the nature of the changes, there is academic agreement about the importance of knowledge, technology and innovation for the success of cities. However, the discussion is not settled and there are disagreeing views about the most important factors influencing knowledge and innovation. For urban professionals, the topic is of great relevance. “Knowledge-based development requires special attention because, as society becomes more knowledge-based and the role of knowledge increases, the basic nature of development changes, particularly in cities where knowledge resources are concentrated.” (Knight, 1995, 225).

Two main views can be distinguished in the theoretical discussion, the business-oriented and the people-oriented perspectives, considering financial capital or human capital, respectively, as the main engine of growth of cities and regions. Due to these
different views, the dichotomies between (high-tech) innovation and (design) creativity; industrial districts and creative cities; hard and soft factors; and cluster of firms and talented people have been frequently mentioned in the urban literature.

2.1 The business orientation to knowledge-based development

Some scholars highlight the importance of the ‘hard’ factors that are linked to high technology and a strong business orientation to local urban development. Storper (1997) claimed that in the new economic paradigm – which established itself in the mid-1980s and 1990s – technology, organizations (firms and production systems) and territories became the ‘holy trinity of regional economics’. Figure 1 shows how these three factors would work, without any reference to people’s aspects.

![Figure 1. The ‘holy trinity’ of the heterodox paradigm of regional economics (Source: Storper, 1997)](image)

For spatial planners and urban researchers, the focus on territories is the usual way to approach the topic. Spatial strategies to promote technological innovation based on the scale advantages produced by agglomeration or clustering of economic activities have been among the most common tools by which cities and regions have attempted to improve their local economies. ‘Neo-Marshallian nodes’ (Amin and Thrift, 1992), ‘technopoles’ (Castells and Hall, 1994), ‘milieux of innovation’, ‘technology districts’, ‘high-tech spaces’ and ‘science parks’ can be counted among this type of spatial strategies. Cluster theory (Porter, 1998), which considers regional clusters of linked industries and institutions in certain (high-tech) production sectors as crucial for success in territorial competition, also belongs to a spatial perspective for technological innovation. These stress the role of technological spillovers in generating growth, something easier to achieve in urban agglomerations.

Some other scholars have relativized the importance of territories claiming that the most important factor is a process of interactive learning to promote the exchange of knowledge within and between local clusters. To be able to transform knowledge into innovative goods and services there should be easy interactions between producers of
theoretical knowledge (research) and practical knowledge (industry). This would depend upon relationships based on mutual trust, but also on the ‘most fundamental aspect of proximity’: face-to-face contact, indispensable for the exchange of ‘tacit’ knowledge (Storper and Venables, 2004).

Furthermore, those who focus on governance issues have found that governments can promote innovation by gearing the cross-fertilization of theoretical knowledge and practical knowledge with policy instruments. Such processes – which focus on university–industry–government relations – have been called a ‘triple helix’ interaction because they do not respond to linear process but to interactions among the constitutive elements (Etzkowitz, 2003). Indeed, the role of institutions in promoting long-term economic growth has also attracted considerable academic attention (Glaeser et al., 2004; Acemoglu et al., 2004). “Institutional thickness” has been considered as the secret ingredient of competitive places (Amin and Thrift, 1995). Formal and informal institutions can indeed shape the local business climate to promote interactive learning and mutual trust, for example; they can improve labour force participation and effort levels; and they can seize new opportunities and adjust to changing technological and economic contexts (Storper, 2010).

The imperative of striving for a sustainable kind of urban development, however, has made urban planners cautious about approaches that are too much biased towards the role of firms, organizations, and the economic aspects of growth and development, considered incomplete and unsatisfactory to explain city growth and development. On the other hand, the awareness of the growing importance of consumer markets and demand-driven activities in the new economic context, has increased the academic interest toward the symbolic and cultural aspects of economic development.

2.2 The people-orientation to knowledge-based development

Although Jane Jacobs (1961) gave an impulse into cultural considerations in economic thought – when she advocated diversity as a driven force for urban prosperity in “Death and Life of Great American Cities” – cultural considerations were generally neglected in urban economics until relatively recently (Kunzmann, 2004). However, the new century witnessed a ‘cultural turn’ in the social sciences (Amin and Thrift, 2007). Paying attention to the role of cultural industries in UK cities, Hall (2000) advocated the marriage between arts and technology. Gradually, people-oriented approaches for urban development and competitiveness became widely held.

This new focus came from the US, linked with empirical studies addressing the role of human capital as driver of urban growth in US metropolitan areas. Glaeser and Shapiro (2001) stated that during the 1990s cities with strong human capital grew faster than those without it. In “The Rise of the Skilled City”, Glaeser and Saiz (2003) identified the presence of high-skilled workers, as the main predictor of competitiveness and productivity growth.

But later, “a virus called creativity” (Kunzmann, 2004) entered the scene. This was most visible after Richard Florida’s (2002) book on the creative class became an international best seller and received many prizes. Since then, great academic attention is being paid to creativity issues and their impact on the growth of cities and regions. According to Florida, the main drivers of economic growth are original ideas. What cities should do then is nurturing their creative class, the producers of economic value in the form of new ideas, is
Bohemians and artists – including writers, graphic designers, actors, musicians, painters, dancers, etc. – are the most important members of this ‘creative class’. They constitute the super creative core, along with ICT workers, engineers, and social scientists. The second group consists of creative professionals, in charge of implementing the ideas of the first group. The latter includes managers, financial and commercial experts, advocates and technicians.

These assumptions change the traditional logic of urban competitiveness: instead of attracting firms, cities should attract creative people. This implies that in the new economic context jobs follow people: creative individuals increasingly choose their place of residence first and then they look for work or start a business of their own (Florida, 2002). A city’s success is then linked to the cross-fertilization of ideas and tacit knowledge arising from the effects of face-to-face contacts between creative workers (Storper and Venables, 2004).

Other important scholars that have spread the creative city ideal are Landry (2000) and Clark et al. (2004), who focuses on the role of amenities. It is now more accepted that cultural, artistic, media-related, recreational, and leisure functions boost the local economies. An emphasis on “quality of place” and high-quality amenities is considered necessary for urban competitiveness. It is the way to attract knowledge-intensive workers, who have different spatial demands and consumption patterns than manual workers, and attach great importance to “third places” (neither home nor office) to meet. Cafés, pubs, terraces, cultural events, etc., and other similar spaces acquire a new dimension in the ‘experience economy’

Even if creativity and many of its “urban components” are quite elusive concepts, Florida’s thesis was rapidly appropriated by urban practitioners and city officials. In the US and Europe, many industrial centres in decay have attempted to rebrand themselves as creative places. “In the beginning of the twenty-first century, culture and creativity have become key concepts on the agenda of city managers, development agents and planners, who are desperately searching for new foundations in city development with dwindling city budgets.” (Kunzmann, 2004, 384).

But in academic circles Florida’s arguments have been object of great controversy. Several authors have questioned the validity of the data Florida presents to support his thesis; criticized the lack of detail of his explanations; and pointed out the problems of direction of causality of his approach (Glaeser, 2005; Peck, 2005; Montgomery, 2005; Rausch and Negrey, 2006). Recently, Kotkin (2010) has argued that the notion that attracting more talented people will in the long term produce greater economic effervescence would be one of the most damaging misconceptions in urban studies. “…this argument, or at least many applications of it, gets things backward. Arts and culture generally do not fuel economic growth by themselves; rather, economic growth tends to create the preconditions for their development.” (Kotkin, 2010: 2).

2.3 Comprehensive approaches to knowledge-based development

In the new economic context the future of cities and regions depends on both knowledge-intensive and creative economic activities. Striving for urban competitiveness should include concepts linked to the business orientation – as high-technology, agglomerations, clusters, entrepreneurship – and the people orientation – such as amenities, high education, etc. – in an environment characterized by organizational capacity (Malecki, 2002). In a similarly comprehensive view, Storper (2010) has recently
examined the literature on specialization, human capital and institutions as main factors for city growth in the knowledge economy. He states that the New Economic Geography model considers the causes of urban growth to be “fully simultaneously two-directional.” (2010: 2032). This means that jobs follow people, who in turn search for the benefits of large urban (home) markets. At the same time, people follow jobs because firms concentrate at these large urban markets, which allows them to produce more efficiently with economies of scale.

Besides these considerations, new environmental and social challenges have made urban planners and designers aware of the need of a proper balance between the economy, the social and the environmental aspects of city growth. Knight (1995) was among the firsts to link knowledge-based development and sustainability issues. Outlining the policy and planning implications for cities, he claimed that knowledge-based development – understood as the transformation of knowledge resources into local development – may be the best foundation for sustainable development.

The growing interest to issues linked to knowledge-based development has produced several studies which pay explicit attention to the necessary criteria for the successful development of knowledge cities. Ergazakis et al. (2004) have proposed six different categories: technological, strategic, political, environmental, societal and financial criteria (see Figure 2).

![Figure 2. Success factors related to the Knowledge City concept (Source: Ergazakis et al., 2004)](image)

In their study about European cities in the knowledge economy, Van Winden et al. (2007) have advanced seven criteria: knowledge base, industry structure, quality of life, diversity, accessibility, social equity and urban scale. These are considered the foundations to develop human capital and knowledge-based industries, which should be supported by local organising capacities (see Figure 3).
Figure 3. Cities in the knowledge economy: a framework of analysis (Source: Van Winden, 2007)

With an attention to sustainable development, Yigitcanlar (2009) narrows down to three pillars for knowledge-based urban development: society (including quality of life, human and social development and intellectual capital), economy (competitive, creative, innovative and knowledge-based) and environment (sustainable urban development, triple bottom-line sustainability and unique identity) (see Figure 4).

Figure 4. The three pillars of knowledge-based urban development (Source: Yigitcanlar, 2009)

With a similar attention toward sustainability issues, Fernandez-Maldonado and Romein (2010) state economic, social and organizational qualities as main criteria (see Figure 5). Acquiring a good level of quality in each criterion should lead to producing prosperity, delivering projects for all people.
Figure 5. A conceptual framework for sustainable development for cities in the knowledge economy (Source: Fernandez-Maldonado and Romein, 2010).

Besides the academic studies on the necessary conditions for knowledge cities, many cities have also launched initiatives that are labelled as Knowledge Cities, which follow a wide scope of approaches to achieve their goals. In practice, however, most of these initiatives are still focused on the development of spatial business-oriented strategies, as Technopoles, hoping to eventually evolve into a distinctive Knowledge City (Martínez, 2006).

3 From theory to practice

Putting such comprehensive frameworks into practice is not such an easy endeavour. Many former industrial centres have embraced Knowledge City or Creative City initiatives as a way to deal with their problems of economic reconversion. But this requires much more than only re-branding themselves into fashionable slogans. The main question is how have these new notions been translated into policies?

At European level, the Lisbon Agenda does not specifically support creative city development: “it strongly emphasizes knowledge and innovation, but not creativity as the link between.” (Trip, 2009:14). At national and regional level, technological innovation is also the main concern in most economic policies.

At local level there is more attention to these issues, however. But even if cities may elaborate a comprehensive and balanced approach, the implementation of this kind of strategies is generally based on business-oriented interventions. In the Netherlands, where Florida’s message was particularly well received at local level, Kooijman and Romein (2007) examined the implementation of the creative city concept in local urban policy. They concluded that despite the growing awareness of the importance of cultural and creative aspects among city officials, “the implementation of Florida’s ideas has remained limited in the urban policy of the four largest Dutch cities. … Instead, the policy core lays most emphasis on giving explicit, direct support to businesses and creating a ‘business climate’, as opposed to a ‘people-climate’.” (2007:32-33).

This economic orientation occurs because the hard infrastructure (airports, digital links, high-tech spaces) can be established almost anywhere, but the establishment of the ‘soft’ infrastructure – an environment conducive to creativity – is a lengthy and slow process without guarantee of success (Baum, et al., 2008). Many of the elements of creative cities remain imprecise and as such difficult to achieve in practice. How to
capture and measure the “intangibles” associated to creative milieus such as tolerance, identity, authenticity, image, atmosphere, etc.? The main advocates of the creative city notion have not given a special emphasis on how to put their ideas in practice (Kooijman and Romein, 2007). While Florida (2002, 2005) tends to repeat the advice given in 1961 by Jane Jacobs, he does not really address how his ideas actually work in practice (Trip, 2007).

Besides the elusive nature of the elements linked to the creative city strategies, there are two other issues which pose specific problems for the urban practice, especially in those cities and regions which do not possess strong assets for knowledge-based development. These concern the proper urban scale, and path dependency.

Baum et al. (2008) have posed a relevant question regarding the possibilities of success of lower-tier cities in the knowledge economy. With evidence from Australian cities, they show that creative cities cluster settle in major metropolitan regions (Sydney, Melbourne and Camberra). Urban concentration is not only promoting the growth of the creative industries, but also an important element promoting local specialisation. “Generally speaking, geographical concentration and local specialization are highly present in newer or more innovative activities, or those that depend on hard-to-imitate skills or knowledge.” (Storper, 2010: 2028). In this context, smaller cities have greater difficulties.

Another thorny problem is for those cities without a strong tradition on industrial production or creative activities. Path dependency means that once local economies get a critical mass in a certain specialization, they get a self-reinforcing structural character. Evidence from industrial areas shows that their growth may also be driven by fortuitous events. But there is no clarity about how to get into this development path (Storper, 2010). This theoretical uncertainty has also important implication for the planning practice in less advantaged cities and regions.

The next sections show the case of Eindhoven, a Dutch city which has had a singular success reinventing itself and by combining its technological base with the creative design sector.

4 The reinvention of Eindhoven as a knowledge city

The Netherlands belongs to the most economically advanced countries of the western hemisphere, and has strong assets in the transition toward the knowledge era. It has a very open economy, in which knowledge-intensive economic activities constitute a large and growing proportion. The Dutch population is highly urbanized and internationally oriented, and has a high education level. Its universities enjoy a good reputation at international level. The country also enjoys a well-developed ICT infrastructure and is among the best digitally connected countries of the world.

The Netherlands’ largest concentration of high-technology firm is remarkably located outside the Randstad, the largest urban network of the country, which includes the four largest cities: Amsterdam, Rotterdam, The Hague and Utrecht. It is located in the Eindhoven region. The city of Eindhoven is the fifth largest city of the Netherlands (209,172 residents in 2007), located in the province of North Brabant, close to the borders with Belgium and Germany. At approximately 100 km of the Randstad, Eindhoven is the leading city in the second largest urban network, Brabantstad (see Figure 6).
Thanks to an active regional partnership between companies, knowledge institutions and governments, and the presence of research labs – such as those of Philips, TNO and Eindhoven Technical University – Eindhoven has become the Netherlands’ most important place for technology innovation. In 2004, the Dutch government appointed it as national ‘Brainport’, the main location for the development of a regional innovation system (Ministerie van VROM, 2005), which provides it with additional public funds, granted with the objective to strengthen the Netherlands as a dynamic and competitive economy.

4.1 Industrial origin and evolution

By Dutch standards, Eindhoven is a relatively young city. Eindhoven’s industrial development at the beginning of the 20th century was driven by a local firm: Philips Electronics, which settled there in 1891. Philips’ economic success made the city expand rapidly. Currently, Eindhoven still shows a decentralised pattern due to its origins in 1920, when five neighbouring villages were incorporated as suburbs.

Although its economic base has grown and diversified, Philips is still a dominant firm in Eindhoven, which is why it is still known in the Netherlands as Philips company town. Eindhoven calls itself the City of Light (Lichtstad) after Philips’ initial business: a factory for incandescent lamps. With the hardware production sections and laboratories of Philips Electronics and other important electronic firms, Eindhoven scores the highest on high-tech industry employment and R&D activities in the Netherlands.

After the war, Eindhoven developed into the most important industrial centre of the Netherlands. As many other industrial centres, it was affected by a process of de-industrialization since the 1980s, which caused job losses in the city and the whole region. Philips declared 6000 workers redundant, and DAF (vehicle manufacturer) 2500, while other firms closed, what deeply affected the region’s economic situation.

The process of restructuring of the regional economy was developed with the support of successive regional programmes. The first was the Stimulus programme (1993) for job
creation and strengthening of the industrial fabric, partly funded by the European Union. To face the industrial downturn, a regional approach was sought, in which Eindhoven worked together with other municipalities in the region. “The 34 municipalities in the Eindhoven region matched the European subsidies with a contribution of 11.50 Dutch guilders per inhabitant per year to create jobs in the area. Such a high municipal contribution to regional cooperation is unique in the Netherlands.” (Van der Veer, 1998:42).

After Stimulus finished, the main regional stakeholders – in government, industry, and research and education – decided to cooperate closely with the objective to continue with the process of transition of Eindhoven’s traditional industries toward into a knowledge-based and high-tech centre. In 2001, the Horizon programme replaced Stimulus, focusing on industrial innovation, reduction of shortages of skilled labour, diversification of the knowledge industry, and international branding. These two programmes produced a significant economic restructuring and economic recovery, upgrading its industrial structure to make it more high-tech and in line with its knowledge base.

The current structure of the regional economy consists of a few large firms – such as Philips, DAF and ASML (a joint venture of Philips and ASM International dedicated to electronics) – working closely with medium- and small-scale suppliers of specialized knowledge and design, and knowledge institutes. In Eindhoven only, the numbers of firms, institutes and jobs increased with one-third to a half between 1995 and 2000, and has increased a bit further in more recent years.

One of the best assets of Eindhoven is its organizational capacity, embodied in the high synergy between business, university and local government (Fernandez-Maldonado and Romein, 2010). The so-called triple helix is a very positive feature of this city-region, in which “personal and institutional networks are very dense; there is a shared feeling of local pride and identity.” (Van Winden et al., 2007: 542). This close collaboration between the main regional stakeholders has been institutionalized in the Foundation Brainport (Stichting Brainport). This has elaborated an ambitious and comprehensive programme, “Brainport Navigator 2013” (Stichting Brainport, 2005), whose mission is to promote economic and social development toward a high quality of life for people in the region and, through this, to achieve a sustainable and globally competitive region.

This programme has replaced Horizon, and aims to the development and completion of the value chains of spearhead sectors. These are life-tech (life sciences, medical technology), high-tech systems (ICT, micro-electronics, nanotechnology, automotive and mechatronics) and creative industries.

4.2 Eindhoven’s position in the knowledge economy

Confronted with the challenges that cities have in the knowledge economy, Eindhoven has many advantages but also some clear disadvantages. According to the typology elaborated by van Winden et al. (2007) for European cities in the knowledge economy, Eindhoven is considered a Star Nicheplayer. This typology considers two main criteria to define typologies of knowledge cities: urban scale and progress towards the knowledge economy. The Star Nicheplayer qualification of Eindhoven means a clear advantage in terms of knowledge base and economic base and a certain disadvantage in terms of urban scale.
Indeed, these two features characterize Eindhoven’s development. On the one hand, it has great assets, due to the high quality of its industrial, economic, and knowledge base. It has the highest innovation index among the Dutch provinces. Its city-region is where most of the private R&D expenditures of the Netherlands is located (45 percent of the national R&D expenditures). Further, the level of synergy between high-level education and high-tech local firms is remarkable. An examination of university-industry co-authored research publications among the 350 largest research universities worldwide concluded that the Eindhoven Technical University (TU/e) had the largest percentage of co-authorship with industry (Tijssen et al., 2009).

Eindhoven’s synergy is, however, much more than co-authored publications. “The technical university is considered highly important by local high-tech firms as a partner for contract research and as a supplier of new staff and trainees. Also, it is the cradle of new businesses and start-ups. The environment for these new firms is favourable, as the urban region has a rich pool of potential clients, suppliers and dedicated service providers. Several well-functioning business support networks are in place, with active participation of the local technology sector and academic institutions.” (Van Winden et al., 2007: 538).

On the other hand, Eindhoven has evident problems related to its modest urban scale and its location outside of the Randstad. In the knowledge economy proximity matters for access to and exchange of ideas. But Eindhoven does not possess the advantages of agglomeration required for attracting creative sectors. The 125 km that separates it from Amsterdam are not much, which is why some creative people that work in Eindhoven decide to live in Amsterdam. Furthermore, in the Netherlands, Eindhoven has the image of a provincial city, due to its development from several villages. This is also because its city centre lacks the historic architectural heritage that characterizes most Dutch cities, which constitutes an additional constraint to attract creative workers.

5 The marriage of technology and design in Eindhoven

In the knowledge era, the synergy between technology and design has become crucial for international competitiveness. Economic growth does not only depend on high technology, but also the ability to incorporate cultural knowledge and design distinctiveness into products and services. The awareness of these new economic trends has led to attempts to combine technology and design not only at the level of the urban economy but within the high-tech sector itself. A gesture that illustrates this design orientation was done in 2004 by Philips Electronics, when it decided to change its traditional motto ‘Let’s make things better’ – which referred to technical innovation – into ‘Sense and Simplicity’, which refers to those “soft aspects” of everyday life.

The new orientation of the Eindhoven city-region’s economy stems from the deep awareness of its own strengths and weaknesses. Eindhoven’s technologically advanced production industry is very much export-oriented. Its export orientation and specialization makes it vulnerable to the usual fluctuations of the global economy. To tackle these issues, the production structure has been gradually diversifying. The existing clusters strive towards the completion of their value chains. This means a R&D starting point, but also includes the design, testing, producing, marketing and distribution of advanced goods.

The concept of design in Eindhoven is, then, a comprehensive notion that includes industrial design, artistic design, as well as the design of innovative ways to tackle their own development problems. The orientation toward the creative sector in Eindhoven has
not been the fruit of fashionable urban trends that may be valid in large metropolis, but
difficult to implement in different contexts. Eindhoven’s design orientation is a necessity
coming from its endogenous economic development and as such it has a certain tradition.

Two design institutions of international prestige constitute solid foundations of
Eindhoven’s design orientation. The first is the Design Academy Eindhoven (DAE), the
former design school of Philips, alma mater of the most well-known Dutch designers, and
where many prestigious designers teach. Recently, the Ministry of Culture has granted the
Design academy a monetary prize as one of the three institutions of ‘international
excellence’ in the Netherlands. The second design asset of Eindhoven is precisely Philips
Design, the design department of Philips Electronics, which is one of the largest and
longest-established design organizations in the world. It counts with more than 400
workers which work not only for Philips but also for other prestigious brands as Nike,
Levi’s, Orange and Securitas (Van de Sande, 2005).

Another asset in this option for design is the consensual character of this orientation.
Local government, educational institutes and firms in Eindhoven agree with this strategic
shift toward design, so the changes required for this orientation have developed at the
level of institutions, which are now delivering concrete spatial interventions.

5.1 Organizational changes

There are many public and private efforts of stakeholders to support the design
orientation of Eindhoven, trying to link Eindhoven’s national and international image
with creative design. However, the city does not try to do it by attracting designers with
cafés and discotheques, but, more seriously, by showing the other side of design:
designers, processes, links with technology and innovative materials, and good
communication. “Policy makers, business sector, the Technical University, TNO
Industry, the Design academy, everybody in Eindhoven invests in the design dance” (Van
de Sande, 2005: 3).

The largest projects are coordinated by Design Connection Brainport, the agency of
the Brainport Foundation in charge of giving an impulse to the dynamics of the design
sector. The local business sector, the creative industry, and knowledge institutes work
together in this agency for the implementation of the programme ‘Design in Brainport
2005 – 2010’. Its mission is to reinforce the position of Eindhoven’s city-region in the
field of design in combination with technology. Design Connection Brainport manages
several projects in three main areas (Design Connection Brainport, 2010):
• get connected – aimed at giving designers, firms, technology institutes, and market
  partners the opportunity to meet and develop new ideas for innovative products;
• get noticed – aimed at showing the design strengths of the region at international
  level; and
• get support – aimed at assisting design starters on their way to entrepreneurship.

An important activity under the umbrella of the Design Connection Brainport is the
organization of the Dutch Design Week (DDW), for the ninth time in 2010. This is an
annual nine-day event to show Dutch design and Eindhoven design to the world. The
DDW hosts lectures, workshops, fashion shows, seminars, and design exhibitions. These
include the Graduation projects of the Design Academy Eindhoven, and the award
ceremony of the Dutch Design Awards (DDW, 2010). The DDW attracts an international
audience that grows every year.
Another important supporter of design activities in Eindhoven is the Foundation ALICE, Creative Connection Eindhoven. This is a local lobby group for the creative and cultural industries which emphasizes the technology-design synergy. In 2003, a study on the creative sector was conducted in the Eindhoven region at the initiative of ALICE. It found that the creative industries provide employment for at least 30,000 people (8% total regional employment), while the construction sector employs 7% and the education and ICT sectors provide 5.5% of jobs each (ALICE, 2010).

ALICE provides information – mainly through electronic media – about the many other design and creative initiatives as well as about design education, clusters, festivals, organizations, subsidies and support, and European art spaces. Main subjects are architecture, art, writing and publishing, film and video, (leisure) software, music, television and radio, performing arts, advertising and industrial design.

The Eindhoven Council, on the other hand, has also developed a cultural policy, “Total culture” (Cultuur totaal), launched in 2008. “Total culture encourages the contribution of culture to the top position of the city, accommodates talent and brings broad social groups in contact with art and culture.” (Commissie Cultuur Totaal, 2010:3). The council decided that art, music, design and urban activities would be the spearheads of the cultural policy.

5.2 Socio-spatial transformations

Eindhoven eagerly wants to attract creative people and visitors with a good quality of place. Despite its lack of urban atmosphere, the region has an attractive regional landscape. In 2005, the Architecture Centre Eindhoven (ACE) organized “Eindhoven SUPERvillage” – an exhibition, a publication and several workshops – (ACE, 2005). Its objective was to identify the most adequate residential environments to make Eindhoven an internationally competitive region. They recommended strengthening the existing characteristic of the regional landscape, combining a gradual scale of urban and rural environments in a fine-grained network of medium-sized towns, villages and open land.

But the centre still struggles with its provincial image and the lack of architectural heritage. An attempt to change this image is formulated in ‘Eindhoven as a city with an attractive heart’ policy. This is one of the four spearheads of the city’s vision for its future development, which aims to attract mobile investment capital and skilled knowledge-workers, and to retain young people after graduation (Gemeente Eindhoven, 2004b).

Eindhoven may not have a rich medieval past, but it has a rich industrial past, which in the current economic context is also regarded as a valuable asset for quality of place. Therefore, the spatial strategy has been to redevelop the city centre and to reuse the Philips’ obsolete factory buildings for residential and cultural purposes. The new living spaces will bring to Eindhoven the “urban atmosphere” that it needs.

The transformation of Eindhoven has been developed in three phases. The first one was the redevelopment of the Stadhuis (Municipality) and its surroundings, to provide them with more urban quality. The second phase consisted on the renovation of the White Lady (Witte Dame), a large (white) building in the centre of Eindhoven. The White Lady, built in the 1920s, used to accommodate Philips’ factory of incandescent lamps, the initial business of Philips. It is an emblematic building for the city and its residents, due to its former use – the origins of the city development – and because its “Light Tower” dominates Eindhoven’s urban landscape.
As a result of the de-industrialization process, the building became empty in the 1980s. It was saved from demolition by artists and designers who made a redevelopment plan which stated that the main functions should be related to design, ICT or culture. In this way, the most important design icons of Eindhoven, the Design Academy and Philips Design were accommodated in the White Lady (see Figure 7).

Figure 7. The White Lady and its Light Tower (Own archive).

The third phase, currently developing, is the most spectacular. It concerns the reuse of Strijp-S, an industrial area of 27 hectares close to the city centre, which began in 2004. The entire area used to be part of the Philips industrial complex, a forbidden area for those who did not work there. The regeneration of Strijp-S is turning the area into a mixed-use complex of residential (2500-3000 dwellings), 90,000 m² of office space, and 30,000 m² of commercial, cultural and leisure facilities. The redevelopment of Strijp-S is also the fruit of cooperation between private and public partners. Park Strijp Beheer is the developer, in which the municipality and Volkers Wessels construction firm participate (Van Geel, 2009).

Figure 8. Strijp-S, the former Philips complex (Source: Strijp-S, 2010)
The Clock Building (Klokgebouw), is another emblematic building of Eindhoven, which was assigned to the function of “culture factory” due to its large-scale halls that provide great spatial possibilities. It has been the first phase of the transformation of Strijp-S and it currently accommodates more than a hundred creative businesses. Woonbedrijf, a local housing corporation, is now offering 198 dwellings – most of them for rent – in the E area along the Kastanjelaan. The building activities began in June 2010. Furthermore, TRUDO has plans to offer “industrial lofts” in the SAN and SBP buildings.

Another historic building of Strijp-S that will be renovated is the old Philips’ NatLab (Natuurkunde Laboratorium/Physics laboratory), opened in 1922, and where Albert Einstein worked as guest. In this building, the Queen Wilhelmina gave her first radio speech in 1927 (Van Geel, 2009).

Strijp-S has several ambitious initiatives (see Figure 9). One of the most interesting is Light-S linked to Eindhoven’s City of Light motto. Strijp-S aspires to become a unique environment to show the role of public lighting and the latest innovations in the field to the visitors and residents. The new lighting solutions will create experiences that are related to the individual characteristics of the area. Light-S is a collaboration of Park Management Strijp, NRE Network and the City of Eindhoven, in which Philips Design designs the lighting. (Strijp-S, 2010).

![Figure 9. The main initiatives of Strijp-S (Source: Strijp-S, 2010)](image)

Furthermore, Strijp-S has become an important place for events, concerts and festivals. It is an important place for the Dutch Design week, but also for Flux/S, an annual international art festival, and STRP, an annual festival linking art and technology.

Besides these three important steps towards the improvement of the quality of place of Eindhoven, the municipal department of Art and Culture has developed the concept ‘Eindhoven laboratory city’. Among the different initiatives, it includes efforts to acquire empty buildings and to make these available for starting businesses in the creative and cultural sector (Gemeente Eindhoven, 2004a).

But private initiatives are also providing accommodation and work space for artists and students. In December 2008, the HCZ building, another former Philips building which was vacant, was occupied by a group of young artists with the idea was to use the building not only for residential purposes but to convert it into a huge cultural stronghold. The organizers then followed a strict selection procedure to avoid persons that might use the building for other uses that would not combine with the cultural purposes. There are now 120 users of the 360 rooms (11,000 m²). The users – students of the Design
academy, of the Technical University, artists of different disciplines and some families – are well organized and pay a low monthly fee for maintenance (de Graaf, 2009).

These different initiatives, at regional, local and neighbourhood scale, show that the aim of turning Eindhoven into a city that properly receives and attracts the creative sector is shared by all sectors of society. As such, it has great possibilities to succeed.

6 Conclusion

In the last years, knowledge-based urban development strategies have attempted to implement policies which give attention to both economic and socio-spatial aspects of city growth and development. However, some of the elements related to the socio-spatial aspects are difficult to implement in practice. To change and improve the “urban atmosphere” of a city in order to become attractive to creative workers is not only a matter of improving the commercial and entertainment functions of the city and branding it as creative. The practice shows that this should be the matter of a long-term strategy supported by all sectors of society.

This is precisely the case of Eindhoven, whose efforts in that direction are highly commendable. Eindhoven’s strategy and corresponding projects and initiatives to make the city a design capital are not the fruit of top-down decisions, but are firmly embedded in dense and close networks among stakeholders from the different elements of the Triple Helix. Eindhoven has experience in overcoming its own problems, and was able to reinvent itself as a high-technology region after de-industrialization processes deeply affected its economy in the 1990s and 1980s. This has given stakeholders and residents the necessary confidence and experience to undertake new endeavours, such as the orientation to the creative sectors.

Despite their natural modesty, residents and stakeholders of Eindhoven exhibit a regional pride that motivates them to cooperate towards their clear and common objective to make Eindhoven a “top-technology and design region”. The interviews with the different stakeholders rapidly revealed their awareness of the region’s strengths and weaknesses in the new economic context. Design is widely considered as the instrument to improve the local knowledge-based development. There is a clear consensus about the position and ambitions of Eindhoven within this new context, a fact which has facilitated the orientation toward the design direction.

Eindhoven has put an enormous amount of energy to implement urban projects that are gradually improving its attractiveness and “urban atmosphere” by mixing residential, work and cultural functions. At the same time, the agencies and organizations in charge to put Eindhoven in the map of design at national and international level and to link the creative sector with high technology have done a good job.

Thanks to the multiple public and private efforts, Eindhoven is gradually becoming an international attraction point in the field of design. It has a dense network of associations and organization dedicated to link technology and design. Local stakeholders note that students of the Design academy do not immediately leave the city as in the past (Van de Sande, 2005). The share of workforce in the creative sector in Eindhoven has increased, being among the highest in the ranking of Dutch cities (Marlet and van Woerkers, 2007). This suggests that, despite that this is a slow and difficult process, the strategic orientation towards design has already achieved an own development dynamic in Eindhoven.

The case of Eindhoven can serve as inspiration for other cities and regions with similar characteristics. But to implement the lessons learned from the Eindhoven case in
other realities, however, a special care should be given to other indispensable elements of Eindhoven’s success story, such as the strong regional identity and the organizational qualities of the region.

References


Creativity, innovation and the role of cities in the globalising knowledge economy

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Abstract
The purpose of the paper is to present a broad theoretical view on the growing importance of cities and city regions in the globalising knowledge economy. When diversity in the economy more and more is replacing specialisation as the main driver of prosperity, the urbanisation economies of cities rather than the localisation economies of industrial clusters becomes the engine of economic growth. This implies that the promotion of creativity and innovation have to transcend the more limited perspective of just productivity improvement and, consequently, have to be in focus of business strategies of firms as well as of economic policies of nations and regions in developed economies.

The paper draws on a wide theoretical literature from economic geography, regional development and innovation studies. The value of the paper lies in presenting these diverse contributions in an integrated and comprehensive theoretical framework, which will provide a better understanding of the interconnections and interrelations between the various elements constituting the increasing importance of cities and city regions. This will represent an improved platform for policy makers for formulating and implementing more adequate strategies for promoting economic and social development by exploiting the potentials of cities in the globalising knowledge economy.

Keywords - cities, creative class, innovation, knowledge bases, regional innovation systems

Paper type - Academic Research Paper

1 Introduction: the urban turnaround

In the first decade of the 2000s strong evidence has been presented substantiating an argument for an urban turnaround taking place. While the discourse on industrial districts, clusters and new economic spaces dominated in the 1980s and 1990s (Piore and Sabel, 1984; Porter, 1990; Storper, 1997), in the 2000s focus has been directed towards cities as the node of new economic activities, new forms of collaboration and organisation as well as the preferred location of the creative class (Florida, 2002; Storper and Venables, 2004; Asheim, Coenen, and Vang, 2007).

The academic discussions during the first decade of the 2000s have been characterised by a growing number of researchers arguing that the future competitiveness of advanced, developed nations will be built on diversity and variety and not on specialisation. This
runs against a traditional cluster policy, which is based on the exploitation of specialised localisation economies. Krugman (2010) concluded that his New Economic Geography approach was not any more relevant for analysing developed economies as they had moved towards diversity as their primary competitive strength. (However, it was still useful in the rapidly growing, emerging economies of especially China.) Boschma and his colleagues (Boschma and Frenken, 2010) have demonstrated that firms and regions basing their activities on related variety, are the most innovative and competitive. Lundvall and colleagues (Lorenz and Lundvall, 2006) have maintained that firms combining the STI and DUI modes of innovations perform best, and, Laursen and Salter (2006) have shown that firms sourcing broadly from both R&D and experience based knowledge are the most innovative. Lastly, Florida (2002), building on Jacobs’ work (1969), argues that large city-regions demonstrating strong urbanisation economies are the most innovative and competitive locations due to their openness, diversity and tolerance, which attract the highly educated ‘Creative Class’ favoured by high-tech and creative industries. Glaeser adds to this that ‘cities make people smart’ (Glaeser, 2010). These new observed tendencies covers developments of business climate (what is good for business) as well as people climate (what is good for people) (Florida, 2002).

2 Cities and the creative class

Traditionally, the focus of urban as well as regional development has been on business climate, launching policy measures intending to attract new business to cities as well as to support the growth of existing industry. The attractiveness of cities based on an above average level of human capital, the best research universities of a country, and their positions as infrastructural hubs (e.g. the main airport with the best international flight connections) has resulted in an industrial structure dominated by highly value added and/or research based industrial and service activities (e.g. KIBS - knowledge intensive business services).

Richard Florida’s works, first presented in ‘The Rise of the Creative Class’ (2002) expands the perspectives of the attractiveness of cities by arguing that people climate (factors that positively effect the location of people) is becoming increasingly important as a complement to the business climate (factors that positively effect the location of businesses) in fostering regional economic growth, and in some sectors of the knowledge economy, a people climate even constitutes the most important factors. What follows from this argument is that people, particularly those who work in the growing high-technology and creative industries, do not follow jobs; rather, jobs in these industries follow people. This point runs contrary to what has been common wisdom for years—that firms that create jobs have to be attracted through fiscal or structural (cluster and innovation) policies in order to promote regional growth and development (Asheim & Coenen, 2005; Asheim, Cooke, and Martin, 2006). In contrast, Florida argued that in the knowledge economy, it is crucial to improve the people climate by creating and catering to diversity, openness, and tolerance in addition to more conventional factors of urban attractiveness, such as a rich cultural scene, interesting architecture, and well-developed recreational facilities.

1 The following two sections is based on published work carried out together with Högni Kalsö Hansen (Asheim and Hansen, 2009).
Florida’s points of view have gained broad interest around the world, including Europe, where his ideas and policy recommendations have become widespread (Florida and Tinagli, 2004). In the Nordic countries, the recognition that countries with a small population cannot produce enough talent and thus need to attract and retain talent from abroad made Florida’s thesis of interest to policymakers on the national and regional levels. The widespread acceptance of Florida’s conclusions raises the issue of whether his thesis is valid when it is implemented in different economic, social, political, and cultural contexts from those in the United States (Asheim 2006, 2009). Florida’s thesis was developed in a North American context, which represents a different variety of capitalism from that of Europe (a liberal versus a coordinated market economy) (Hall and Soskice 2001; Asheim 2009). Thus, Florida’s tendency to make big claims and generalizations and to draw far-reaching conclusions, mainly on the basis of U.S. statistical data on a high aggregate level, combined with narratives, needs to be theoretically and empirically qualified.

The basic reasoning of the creative class approach is that technology, talent, and tolerance are three crucial cornerstones that facilitate regional growth in the knowledge economy. The 3T’s are regarded as interconnected parameters that individually have a positive but limited influence on growth but that together have a significant synergetic effect. As Florida (2002, 249) put it, “Each is a necessary but by itself insufficient condition: To attract creative people, generate innovation and stimulate economic growth, a place must have all three.”

Florida acknowledged the numerous different explanations of regional growth that can be found within the fields of regional economics and economic geography. Glaeser (1998) is especially credited for his human capital perspective, which argues that a high concentration of educated people propels regional growth. In contrast, the creative class thesis argues that not only educated people are necessary to promote regional growth; other parameters—a talented workforce and a base of economic activities—are equally important for regional growth in combination with a tolerant, open-minded, and diverse people climate. The addition of tolerance to well-known parameters of economic growth is perhaps the most innovative part of the creative class thesis in that a focus is placed on aspects that have to do with the inclusion and well-being of people. In sum, the creative class approach focuses on three related elements: a good people climate attracts and retains creative and talented people, who, in turn, fertilize the ground for a competitive business climate, and, finally, a good and competitive business climate brings about economic growth. Figure 1 presents a schematic form of the argument.

![Figure 1. Schematic line of argument of the creative class approach](image)

The presence of a tolerant environment offers diversity and quasi-anonymity, which are treasured by the creative class and provide space for people who do not fit into the
common norms. This again increases the opportunities for innovative thinking and for the further development of new competitive knowledge.

The tolerance parameter covers a broad range of elements that influence the milieu and atmosphere of a city. Most important, tolerance has to do with low entry barriers, such as openness toward newcomers and open-mindedness toward different cultures and different norms that may help regions compete for talent, with an assumption that open-mindedness makes it easier for newcomers and that people who deviate from the norms can be creative and innovative. Knowledge-intensive businesses move to regions with a high concentration of talents and creative workers.

Finally, one of Florida’s achievements is to imprint the concept of a creative class on the minds of politicians and urban planners. Florida linked business policies with educational and cultural policies—thereby building a powerful coalition among three major areas in local, regional, and national politics. A people climate can be seen as a set of ingredients in a business climate, in that the presence of human capital and talent is essential for attracting and developing new high-technology industries, exploiting Jacobian urbanization economies (Jacobs 1969), and consequently fostering the economic growth of cities.

3 The differentiated knowledge-base approach

The creative class, as defined by Florida, in most developed OECD countries contains 30 percent to 40 percent of the employment and, in some regions, more than 45 percent, covering a variety of occupations. I argue that the assumption that such a large creative class should have the same locational preferences for where they want to work and live is naive. Thus, I maintain that the specific knowledge bases of the industries in which members of the creative class work and which are reflected in their education and work experience will result in different trade-offs among jobs, occupations, lifestyles, and places of living and, consequently, between the relative importance of a people versus a business climate when making locational decisions, which, consequently, will make some groups of the creative class more attracted to large city regions than other groups.

The innovation process of firms differs substantially among various industries and sectors whose innovation activities require specific “knowledge bases”, which depend on different types of talent in different modes and phases of the innovation processes (Asheim and Gertler, 2005; Asheim, Coenen, and Vang, 2007). We use three knowledge bases—analytical, synthetic, and symbolic (Asheim, 2007; Asheim, Coenen, Moodysson, and Vang, 2007)—because this typology encompasses and acknowledges the diversity of professional and occupational groups and competencies that are involved in the creation of various types of knowledge. These knowledge bases contain different mixes of tacit and codified knowledge, codification possibilities and limits, qualifications and skills required by organizations and institutions, and specific innovation challenges and pressures. Table 1 presents a summary of the characteristics of the three knowledge bases.

An analytical knowledge base refers to economic activities for which scientific knowledge that is based on formal models and codification is highly important, such as biotechnology and nanotechnology. University-industry links and respective networks are important and more frequently observed, and knowledge inputs and outputs are more often codified than in the other types. This does not imply that tacit knowledge is irrelevant, since both kinds of knowledge are always involved and needed in the process of knowledge creation and innovation (Nonaka, Toyama, and Konno, 2000; Johnson,
Lorenz, and Lundvall, 2002). Knowledge creation in the form of scientific discoveries and (generic) technological inventions is more important for this category of knowledge. Knowledge application takes the form of new products or processes, such as new firms and spin-off companies formed on the basis of radically new inventions or products.

Table 1. Differentiated knowledge bases. A typology.

<table>
<thead>
<tr>
<th>Analytical (science based)</th>
<th>Synthetic (engineering based)</th>
<th>Symbolic (art based)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing new knowledge about natural systems by applying scientific laws; <em>know why</em></td>
<td>Applying or combining existing knowledge in new ways; <em>know how</em></td>
<td>Creating meaning, desire, aesthetic qualities, affect, intangibles, symbols, images; <em>know who</em></td>
</tr>
<tr>
<td>Scientific knowledge, models, deductive</td>
<td>Problem-solving, inductive, custom production</td>
<td>Creative process</td>
</tr>
<tr>
<td>Collaboration within and between research units</td>
<td>Interactive learning with customers and suppliers</td>
<td>Experimentation in studios, project teams</td>
</tr>
<tr>
<td>Strong codified knowledge content, highly abstract, universal</td>
<td>Partially codified knowledge, strong tacit component, more context-specific</td>
<td>Importance of interpretation, creativity, cultural knowledge, sign values, implies strong context specificity</td>
</tr>
<tr>
<td>Meaning relatively constant between places</td>
<td>Meaning varies substantially between places</td>
<td>Meaning highly variable between place, class and gender</td>
</tr>
<tr>
<td>Drug development</td>
<td>Mechanical engineering</td>
<td>Cultural production, design, brands</td>
</tr>
</tbody>
</table>

(Source: Asheim and Gertler, 2005; Asheim, Coenen, Vang, 2007; Gertler, 2008)

A synthetic knowledge base refers to economic activities in which innovation takes place mainly through the application or novel combinations of existing knowledge, frequently observed today in plant engineering, specialized advanced industrial machinery, and building of advanced equipment for extractive industries. Synthetic knowledge is often formed in response to the need to solve specific problems through interactions between customers and suppliers, which implies that synthetic knowledge is more sensitive to distance than is analytical knowledge (Moodys, Coenen, and Asheim, 2008). Research and development (R&D) is, in general, less important than in the analytical knowledge base. University-industry links are, however, relevant, but they are clearly more in the field of applied R&D than in basic research. Tacit knowledge is more important than for analytical knowledge, particularly because knowledge often results from learning by doing, using, and interacting (Lorenz and Lundvall, 2006). Compared to analytical knowledge, more concrete know-how, craft, and practical skills are required in the creation and diffusion of knowledge. These skills are often acquired in professional and polytechnic schools or in on-the-job training. Overall, this type of knowledge leads to incremental innovation, dominated by the modification of existing products and processes.

Symbolic knowledge is applied in the creation of meaning and desire, as well as in the aesthetic attributes of products, producing designs, images, and symbols, and in the economic use of such forms of cultural artifacts. The increasing significance of symbolic
knowledge is evidenced by the dynamic development of cultural production, such as media (filmmaking, publishing, and music), advertising, design, brands, and fashion (Scott, 1997, 2007). A crucial share of work is dedicated to the “creation” of new ideas and images. As a well-known Italian designer noted, the market for design is about people’s dreams, and increasingly people are buying objects with intellectual and spiritual nourishment in mind (Brussels Airlines, 2009). Competition thus increasingly shifts from the “use-value” of (tangible) products to the “sign-value” of (intangible) brands (Lash and Urry, 1994, 122). In cultural production, the input is aesthetic, rather than cognitive, in quality, and as a result, the knowledge required is often narrowly tied to a deep understanding of the habits and norms and “everyday culture” of specific social groups. Because of the cultural embeddedness of interpretations, symbolic knowledge is characterized by a distinctive tacit component and is usually highly context specific. The process of socialization (rather than of formal education) is important not only for gaining “know-how,” but also for acquiring “know-who,” that is, knowledge of potential collaborators with complementary specialization through informal, interpersonal (face-to-face) interaction in the professional community (Asheim, Coenen, and Vang, 2007; Christopherson, 2002).

The three knowledge bases are intended as ideal types, with most activities in practice comprised of more than one knowledge base. The degree to which certain knowledge bases dominate, however, varies and is contingent on the characteristics of the firms and industries as well as different types of activities (e.g., research and production).

When Florida discussed economic activity attracting and/or being attractive to the creative class, he was referring to new and emerging high-technology and creative industries drawing on analytical and symbolic knowledge bases respectively. However, more traditional industries that are engineering based and draw on a synthetic knowledge base also employ talent from the creative class. Thus, the strong preferences for a people climate that Florida linked to talent employed in the new and emerging industries do not necessarily apply to people who work in more traditional industries. We argue that an engineer who works in an industry that makes packaging machines or automotives based on a synthetic knowledge base will not necessarily share identical preferences for living in a large city-region with an artist, a film director, or a creative designer in an advertising agency (based on a symbolic knowledge base) or a researcher in a biotechnology firm (based on an analytical knowledge base).

Past economic structures have different influences on the three types of knowledge bases. Synthetic knowledge is closely linked to institutions and organizations that constitute the regions’ economic structure and, thus, regions that are more dependent on synthetic knowledge will displace a more path-dependent regional development. Florida’s reference to Pittsburgh illustrates this point. Analytical and symbolic knowledge bases are, in contrast, less sensitive to established economic structures and more attracted to diversity. Consequently, they stand out as being less dependent on the historical trajectories of a certain place and more responsive to new development.

Innovations in industries that are based on symbolic knowledge are about “artistry” (Storper, 2009) and will often result from “selective forms of cross-fertilization among cognate domains of activity, as among fashion, design, the arts and media” (Storper and Scott, 2009, 17). Fast fashion or high fashion “learns from an alternative circuit of cities, 1 Ideal types are a mode of conceptual abstraction in which the empirical input constituting the ideal types exists in reality, while the ideal types as such do not.
the arts, and the ‘street’” (Storper, 2009, 14), which emphasizes that symbolic knowledge is highly context specific. To exploit such information and turn it into useful knowledge for innovation, one has to “be there,” enjoy being there, and participate in the relevant activities, which is necessary for understanding the cultural specific, the “unique” images, symbols, sign values, and multicultural milieu constituting the basis for the competitiveness of cultural products in a globalizing economy. In the case of cultural industries, diverse and urban “sites and spaces are particularly important, since they are the arenas in which taste is negotiated and constructed. For highly aestheticized, subjective, symbolic, and experiential products, the negotiation of taste is central to the creation and adherence of value” (Power, 2009, 101–02). New York and Toronto are excellent examples of such diverse and highly urbanized environments. Preferences for urban living among people who perform activities with a symbolic knowledge base that are found in the media, advertising, and design have been well documented by, for example, Gertler and Vinodrai (2004) and Grabher (2001). Generally, the postulated presence of a new subjectivism in postcapitalist societies, which is expressed by a stronger need and opportunities for self-realization in work life and leisure time (Thrift, 2005), represents arguments for the attractiveness of the people climate of large city-regions to certain parts of the creative class working in industries that are based on the symbolic and (at least to some extent) analytical knowledge bases.

Members of the creative class working in analytical based occupations, such as world-renowned scientists, often require a well-equipped laboratory and highly qualified colleagues at leading universities, public research institutes and/or corporate R&D units. Such organizations are usually located in large city-regions. Moreover, scientists may prefer larger city-regions, since they can more easily function as nodes in global research communities. Evidence already exists on how the development of (temporary) network organizations between an industry and a university as the new career track for scientists makes large city-regions more attractive because they offer a larger potential labor market for scientists (Lam, 2007). This means that the business climate is the most important; however, all things being equal, the people climate may well be the final decisive factor. It would be reasonable to think, for example, that Copenhagen would have problems attracting and retaining foreign talents, while Stockholm would not. The obvious explanation in such a case would be the more tolerant, open, and multicultural environment in Stockholm, since Sweden still has the most liberal immigration laws in Europe, which makes adaptation and immigration faster and easier, while Denmark has introduced the most restrictive laws in Europe in the past 10 years.

4 Regional innovation systems

Innovation systems are both selection environments and sources of new variety creation. The innovation systems approach, developed in the late 1980s, place innovation at the centre of economic growth. It advocates continuous upgrading of productive capabilities and an active role of government (Lundvall, 2008) in shaping selection processes and stimulating creativity. It represents a shift from a linear view on innovation, mainly understood as conventional science and technology policies, to a policy approach that views innovation is an interactive process in which many different social actors take part (Lundvall, 2008). Therefore it is also the first policy approach emphasizing that a systematic long term relationship between key stakeholders
(university, industry and government/public sector) can play a strategic role in the promotion of innovation and competitiveness.

The innovation system approach was developed in the beginning of the 1980s in the context of an OECD project on ‘Science, Technology and Competitiveness’. The ambition was to develop a more dynamic perspective on innovation and learning in the promotion of economic growth with an active role of government (Lundvall, 2008). This view represented a non-price competitiveness national policy or a high road strategy of innovation based competition, which later also was proposed by Porter (Porter, 1990).

Regional Innovation Systems (RIS) constitutes a strategic instrument in the implementation of urban and regional innovation policies (Asheim et al., 2006; Asheim, Boschma, Cooke, forthcoming). RIS is most commonly defined as consisting of two subsystems and their reciprocal interaction as well as relations to non-regional agency and organizations. These two subsystems are the knowledge exploration and diffusing subsystem consisting of universities, public and private research institutes, corporate R&D division, technology transfer organizations etc., and the knowledge exploitation subsystem constituted by regional clusters of industries interacting with the knowledge exploration subsystem.

However, in addition to this narrow definition of a RIS, it can be defined in a broad way. A RIS broadly defined includes the wider setting of organisations and institutions affecting and supporting learning and innovation in a region, where all types of Higher Educational Institutions (and not only universities) are included. This type of system is less systemic than the narrowly defined types of innovation systems. Firms mainly base their innovation activity on interactive, localised learning processes stimulated by geographical, social and cultural/institutional proximity, without much direct contact with knowledge exploring organisations but mostly benefiting from them through their training of skill people (Asheim and Gertler, 2005).

From a policy perspective an important difference exists between a narrow approach to innovation system analysis, focusing only on organisations and institutions created for the explicit purpose of promoting innovations (i.e. traditional science and technology policy), and a broad approach that maintains that also other public policies affecting firms’ and nations’ innovative performances and competitiveness need to be taken into account. This includes for instance education and labor market policies as well as institutional, cultural and social factors (Edquist, 2005; Lundvall, 2008).

RIS narrowly defined is a R&D based system which seeks to exploit outcome of research from universities and public and private research institutes. This mode of innovation can be characterised as the S(cience)T(technology)I(nnovation) mode of innovation based on the use of codified scientific knowledge, which is a science push/supply driven high-tech strategy able to produce radical innovations (Berg Jensen et al., 2007). According to Lundvall (2008) the ‘Science, Technology and Innovation’ (STI) mode of innovation could broadly be associated with the analytical knowledge base.

However, I would maintain that the STI mode is not only limited to an analytical knowledge base, but must also include synthetic and symbolic knowledge bases. In the case of synthetic knowledge and STI this can be illustrated by reference to applied research undertaken at (technical) universities, which clearly must be part of the STI mode, but mainly operates on the basis of synthetic (engineering) knowledge (drawing on basic research at science departments of universities creating new analytical knowledge). An important distinction in this case is made between application development and technology development. Application development means solving concrete problems in
connection with building the specific equipment for customers. This is carried out drawing on internal engineering competence as well as in interaction with suppliers and customers, and is, thus, an example of the D(oiring), U(sing) and I(nteracting) mode of innovation. Technology development means development of more general platform technologies, which represents the technological basic competence for carrying out application development. While the application development is only made in-house or in user-producer relationships, technological development takes place in cooperation with (technical) universities as applied research projects, and represents, thus, the STI mode of innovation.

The DUI mode of innovation is a user (market or demand) driven model based more on competence building and organisational innovations and producing mostly incremental innovations. The DUI mode of innovation is characterised by its focus on harnessing experience-based knowledge and continuously as well as pragmatically recombining knowledge from various internal and external sources. Thus, the DUI mode would mostly resemble the synthetic (and symbolic) knowledge bases. Consequently, it involves numerous actor groups in flexible forms of organisations and networks, and generates knowledge which may be highly tacit and specialized to its context of development and application and, thus, path dependent. Other HEIs than universities (i.e. the applied universities) are important suppliers of skills and competences for carrying out innovation within this mode of innovation.

However, the DUI mode is on the other hand not limited to industries based on synthetic or symbolic knowledge as also dominantly analytical based industries (e.g. pharmaceutical and biotech industries) make use of synthetic knowledge in specific phases of their innovation processes (Laursen and Salter, 2004; Moodysson, Coenen and Asheim, 2008).

Concerning the case of the symbolic knowledge base an increased importance of a STI mode of innovation can partly be substantiated by the new tendency of changing design education from being artisan based to be placed at universities and other HEIs with (to a certain degree) research based teaching, and partly by the steadily increasing research in game software and new media at HEIs (universities and polytechnics). In some countries, e.g. in Denmark, this research is located at new, specialised universities (e.g. the IT university in Copenhagen). The case of DUI in co-existence with analytic knowledge based industries is indicated by the importance ascribed to non-science system information sources (i.e. synthetic knowledge) by research-intensive companies operating in industries dominated by analytic knowledge bases (Laursen and Salter 2004). This broadening of what constitute the STI mode of innovation shows that also activities based on synthetic and symbolic knowledge bases needs to undertake new knowledge creation and innovation in accordance with a STI mode, and, thus, needs systemic relations with universities or other types of R&D institutes (e.g. in a regional innovation system context).

The degree to which certain knowledge bases dominates, however, varies and is contingent on the characteristics of firms and industries as well as between different type of activities (e.g. research and manufacturing). According to Laestadius (2007) this approach avoids classifying some types of knowledge as more advanced, complex, and sophisticated than other knowledge, or considering science based (analytical) knowledge, characterising the STI mode of innovation, as more important for innovation and competitiveness of firms, industries and regions than engineering based (synthetic) knowledge or artistic based (symbolic) knowledge, which is the dominating knowledge
input in the DUI mode of innovation. This also emphasises the importance of the complementary role different HEIs in a region can play in the provision of this complex mix of skills and competences. While universities are the prime producer of analytical knowledge, other HEIs such as polytechnics are important suppliers of synthetic and symbolic knowledge. The two modes of innovation will be differently manifested with regard to RIS and clusters. The narrowly defined RIS corresponds to the STI mode of innovation, while the more broadly defined RIS more easily would accommodate the DUI mode (Lundvall, 2008).

Even in large cities (e.g. in Berlin) the majority of the SMEs can clearly be categorised as belonging to traditional industries. This relates to the two modes of innovation as the knowledge based industries (SMEs and large) innovate based on the STI mode of innovation, and have well developed contacts with the universities and research institutes. The traditional industries (SMEs and large) on the other hand, which innovate following a DUI mode of innovation, to a certain degree lacks similar good contacts with R&D milieus at the applied universities (Asheim et al., 2003), due to the professors’ lack of time to devote themselves to research (basic and applied), and also generally have little support to develop the DUI mode of innovation as such.

However, the universities of applied sciences tend to be more open and better equipped to get involved with regional partners from industry, the health sector or welfare services. The main reason for this is that their fields of study and research (engineering based on synthetic knowledge as well as social work, business administration, and health services) are dominantly application oriented and is closer, and, thus, more immediate relevant and adaptable to the need of industry and public institutions than what is found at the universities and basic research institutes. However, universities of applied science have, as already mentioned, much less resources available for research due to the high amount of teaching.

The training of highly skilled workers and the provision of necessary intermediate technical skills and competence within these more applied areas of education and research are of significant importance for the future employees of these sectors when engaging in user-producer interactive learning and promoting incremental innovations in their work situation. These kinds of skills and competencies are of key importance for improving the performance of the DUI mode of innovation to obtain a better platform for the integration with the STI mode of innovation where universities play the leading role in the knowledge exploration subsystem as described above.

This distinction between the two modes of innovation is helpful in order to avoid a too one-sided focus on promoting science-based innovation of high-tech firms at the expense of the role of learning and experience-based, user-driven innovation. However, it also indicates limits of such innovation strategies in a longer term perspective and, thus, emphasizes the need for firms in traditional manufacturing sectors and services more generally to link up with sources of codified knowledge in distributed knowledge networks (Berg Jensen et al., 2007).

5 Combining the DUI and STI modes of innovation

Innovations occur through new combinations of existing knowledge, skills and resources. As evolutionary theory suggests (Metcalfe, 1998), the broader and more diverse the knowledge bases, the larger the scope for innovation (Asheim and Gertler, 2005). New research confirms that combining the two modes of innovation seems to be
most efficient with regard to improving economic performance and competitiveness, i.e. firms that have used the STI-mode intensively may benefit from paying more attention to the DUI-mode and vice versa (Berg Jensen et al., 2007). The ability of firms to search and combine knowledge from different sources seems to be stronger associated with innovativeness than either interfacing predominantly with customers or suppliers applying a DUI mode of innovation, or with research system actors in STI oriented processes. (Laursen and Salter, 2006). SMEs, for example, changing technological trajectory by supplementing their informal knowledge, characterised by a high tacit component (i.e. the DUI mode of innovation), with competence arising from more systematic research and development (i.e. the STI mode of innovation) can avoid being locked-in a price squeezing, low road competition from low cost countries. In order to do this they will need to raise their absorptive capacity through hiring skilled people graduating from HEIs (often supported by mobility schemes). In the long run, it will be problematic for most firms to rely exclusively on informal localised learning, and must, thus, also gain access to wider pools of both scientific and engineering knowledge on a regional, national and global scale (Asheim et al., 2003). However, still the DUI-based type of innovations will remain the key to the competitive advantage of most traditional SMEs, as strong tacit, context specific knowledge components, which is found in e.g. engineering knowledge dominating the DUI mode, is difficult to copy by other firms in different contexts (i.e. they will not become ubiquitous). This will be the basis for sustaining these firms’ and regions’ competitive advantage also in the long run (Porter, 1998).

In combining these two modes, the issues of cognitive distance, organisational forms and absorptive capacity becomes crucial (Nooteboom, 2000; Cohen and Leventhal, 1990). The process of absorbing ideas and knowledge has been conceptualized as involving several stages of interfacing and social processing, which are tightly interwoven with organisational forms. If the cognitive distances and the differences in processes of knowledge acquisition, assimilation and transformation between the two modes of innovation are perceived by key actors to be too wide, it will not be possible to combine them and to view them as complementary instead of incompatible alternatives. There will be a lack of absorptive capacity within firms and regional clusters to acknowledge and appreciate the potential gains of the other mode of innovation as well as to access and acquire the necessary competence to combining the two modes of innovation. This broad based innovation policy needs both narrow and broad defined innovation systems to be implemented in order to promote innovation and competitiveness.

In all except possible a few very large economies the most important source of variety in the knowledge bases will be found abroad. The ability of entrepreneurs and firms of a country to tap into global networks of knowledge and use it productively (open innovation) will in many cases be more important than the creation of new knowledge at home. Thus, the international dimension of globally distributed knowledge networks (open innovation) has increased dramatically in importance over the last decade. This means that it is more than ever vital for policy relevant research to understand how the international context interacts with nation- and sector-specific conditions in affecting competitiveness and economic growth. Arguably, an efficient knowledge economy is based on innovation systems with a high degree of openness and diversity, not only concerning knowledge strictly defined, but also with respect to tolerance towards the cultural, religious and ethnic characteristics of the carriers (e.g. entrepreneurs and researchers) of that knowledge (Fagerberg and Srholec, 2008, 2009; Florida 2002).
Connectivity in regional innovation systems

As touched upon above large city or metropolitan regions usually have the best and largest universities in a country, which play an important strategic role as the key node in the knowledge exploration subsystem of regional innovation systems (RIS). However, still the general impression is the characteristics of a fragmented, metropolitan RIS (Tödtling and Trippl, 2005). The structural characteristics of fragmented metropolitan regions could be summarized as follows:

(i) Metropolitan regions are normally regarded as centres of innovation with the presence of R&D organisations and universities, business services, as well as headquarters of international firms. As a consequence, R&D activities are usually above average. However, some metropolitan regions are lacking dynamic clusters of innovative firms due to the problem of fragmentation, i.e. the lack of innovative networks and interaction between universities-firms as well as among local companies. Such regions display an industrial structure characterised by so called ‘unrelated variety’, i.e. by having a diversity of sectors which do not complement each other, and, thus, do not produce knowledge spillovers. This may represent an important innovation barrier in such regions resulting in the development of new technologies and the formation of new firms often being below expectations.

(ii) Normally metropolitan regions have an above educational level, especially with respect to higher education, they have the largest national universities, and a well-developed network of other HEIs. In addition, they also house R&D institutes and departments of the large national and international companies. Thus, the challenge of the HEIs in a fragmented metropolitan region is more about increasing the impact of the presence of education and research than to increase the number of students and amount of research, i.e. the main problem is the weak connectivity in the RIS.

One reason for this is partly that universities in metropolitan regions traditionally have focused on their national and in some cases also international roles, and ignored the role they can play in promoting regional development. Due to the increased focus on the third task this has slowly been changed, and more and more we see that these universities no longer see any conflict between taking on their regional responsibility in addition to keeping their national and international ambitions. This change in attitude is of strategic importance for achieving a well-functioning RIS in these regions. Another problem has been a lack of trust and social capital among the main actors of the RIS. Universities not interested in their regional task combined with either national multinational companies or foreign multinationals and a rather low regional commitment have not produced enough social capital and trust which is of paramount importance to achieve a high degree of connectivity in RIS. Thus, the spatial proximity found between actors in the RIS in metropolitan regions has not been matched with a similar social and institutional proximity, which is characteristic of smaller regions such as the industrial districts of the Third Italy (Asheim, 2000; Boschma, 2005). The changes in attitude described above together with increased globalisation pressures have increased the awareness of the benefits of exploiting the local knowledge infrastructures more intensively, and not only rely on corporate as well as national and international R&D resources. The industrial structure in these regions is generally more R&D intensive than in other types of regions, thus, the benefits of exploiting the knowledge exploration subsystem of the RIS can really pay off in increased competitiveness and innovativeness. Finally, these regions with a rich endowment of knowledge, research, competence and skills should exploit the possibilities
of building on the ideas of related variety and diversify into new but related industries. Also with regard to skills provision and attraction new research has shown that the hiring of workers with related skills and competencies has a stronger impact on firms’ performance than the recruiting of workers with unrelated skills (Boschma and Frenken, 2010). These insights should also be reflected in the educational programs of the HEIs in the region. In fragmented metropolitan regions the impact of universities taking on a more developmental role, and contributing pro-actively to building and strengthening the RIS, could be considerable, and would play a major role in improving innovativeness and competitiveness in these regions. However, in taking up this challenge universities have to be supported by public government and industry in a well-functioning private-public initiated triple-helix collaboration.

The increased interest for and importance of the third task of universities could be described as a change from mainly taking on ‘generative’ to more and more engaging in ‘developmental’ roles Gunesekara (2006). Generative roles refer primarily to the provision of limited, discrete knowledge outputs such as scientific and technological information, equipment and instrumentation, skills or human capital, networks of scientific and technological capabilities and prototypes for new products and processes) in response to business or public sector demands (Benneworth et al., 2009).

In taking on developmental roles universities in contrast constructively interact with broader regional governance structures shaping “the development of regional institutional and social capacities” (Gunasekara, 2006, p. 730) and, thus, more directly promote regional economic development. Universities typically become involved in strengthening as well as creating new systemic connections within RISs, hopefully resulting in positive, long-lasting impacts on regional economic growth (Benneworth et al., 2009).

7 Conclusion: Collaboration and social capital

The tendency of large cities having a fragmented regional innovation systems points to the need of improved collaboration and cooperation both at a system and actor levels. In a globalising knowledge economy, understanding innovation as interactive learning implies that co-operation is necessary to make firms and regions competitive. Building social capital is a key strategy in promoting such cooperation – within firms, within networks of firms and within regions among relevant stakeholders. Social capital can arise both from civicness and from organisational and institutional innovation. But, while the latter can be built, the former can only be built on.

This raises the general question of the role of social capital in economic development. Florida argues that social capital is not conducive to promoting an innovative economy and that it has a strangling effect on creativity and innovation. Instead of seeking places that offer social control, people of the creative class are attracted by places (often large cities) that offer cultural diversity and quasi-anonymity—that leave space for individuality. Florida argues that social capital, as defined by Putnam (1993), is exclusive in the sense that social interaction is based on communities of likeness. The problem with Putnam’s social capital, according to Florida, is that its exclusive nature eliminates diversity and hence limits space for innovative thought. Simultaneously, the exclusive nature of strong ties makes it difficult for outsiders, for example, migrants, to enter social circles, and thus lowers the degree of mobility.

This view goes against earlier insights that linked innovative performance to social capital. Putnam’s (1993) work is cited in many of these studies to argue that social
capital, understood as networks and connections, trust, common norms and rules, and so forth, is crucial for creating learning environments and transforming knowledge into product or process innovations (e.g., Asheim 2000; Maskell and Malmberg 1999). According to this string of literature, innovation, understood as interactive learning, will have better odds when a high level of social capital is present. Evidence from the Nordic countries, for example, shows that social capital can be a powerful driver of innovation and economic growth.

Florida’s reference to Putnam’s work suggests an understanding of social capital as bonding, that is, rooted in civicness. However, social capital can also be considered as “bridging,” as a result of organisational and institutional innovation at the societal level (e.g., labor market regulation and legislation in the Nordic countries).

The presence of social capital in the form of a strong tradition of cooperation adds to the high level of human capital in the work force in the Nordic countries in a synergistic way, and represents an international competitive advantage. This organised way of bringing society inside the firm by internalising labour market institutions of cooperation and regulation in intra-firm learning organisations, based on broad participation, is an alternative way of achieving an integration (or ‘fusion’) of economy and society (Piore and Sabel, 1984) compared to the industrial district model, in which the firm is embedded in the spatial structures of social relations of the externally surrounding community. These contrasting models of integration and contextualisation of the firm also reflect the alternative interpretations of social capital mentioned above, i.e. as rooted in the “civicness” of communities as found in e.g. industrial districts (where social capital represents ‘bonding’) or through formal organisations at the system level of societies as is the case in the Nordic countries (where social capital implies ‘bridging’). The latter represents not only cooperation but also planned collective action among groups of actors (e.g. firms, trade unions, authorities) (Sabel, 1992).

References


Future centre in Taiwan: incubation process

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Structured Abstract

Purpose – To envision future industries through prototyping a future center, “Vision 2025” is a collaborative one-year project (August 2009 – July 2010) exploiting the synergy of Industrial Technology Research Institute of Taiwan (ITRI), Institute for Information Industry (III), and National Chengchi University (NCCU). This paper describes the incubation process of a well-managed yet innovative project.

Approach – Based on the four-stage incubation development covering training and environmental scanning, immersion and brainstorming, encountering and engaging, and sharing and diffusing, this project has proposed ten future industries for the society in Taiwan to contemplate on.

Originality/Value – Different from past government-appointed few experts’ viewpoints in projecting the future industries from supply side perspective, this project recruited a mass amount of fresh graduates to envision the world they would like to be in 2025 from the demand side perspective.

Practical implications – The following ten future industries are proposed: green industry, disaster prevention industry, love industry, silver industry, popular music industry, senses industry, happy life industry, branding industry, tourism industry, and health care management industry. Although the applicability and feasibility of these ten industries needs further testing, this paper delineates a successful model that capitalizes the resources of a large scale innovative young researchers, experienced experts, and university professors.

Keywords – innovation, incubation, future centre, synergy

Paper type – Practical Paper

1 Introduction

National Chengchi University was commissioned by Taiwan Ministry of Economic Affairs for prototyping a future center in probing “Vision 2025”. This “Vision 2025” one-year project (August 2009 – July 2010) is an integrated endeavor jointly implemented by
Industrial Technology Research Institute of Taiwan (ITRI), Institute for Information Industry (III), and National Chengchi University (NCCU) as a collaborative effort. Based on literature review, field studies, and intensive cooperation with industries, the main objective of this project is to generate novel yet practical imagination of future Taiwan and provide a blueprint for developing several creative industries with futuristic visions.

This Vision 2025 Laboratory is located inside NCCU campus with 80 mainly fresh graduates from all over Taiwan in 10 teams. ITRI, III and NCCU have assigned more than 30 experts, senior industrial analysts and a dozen professors to lead, guide and supervise the development of this future center for the purpose of capitalizing the synergy of innovative younger generation and experienced experts in the hope that the proposed future industries have both futuristic vision as well as feasibility. During the process, a total 158 daily progress reports, 93 activities, 18 film clips, weekly team meeting minutes, monthly grand meeting minutes and four grand improvement workshops minutes have been recorded. The weekly individual team meeting allows the supervising professor and the team members to review the past week progress and preview the next week task. At the later stage of the project, four improvement workshops were conducted with 5-7 external experts’ inputs including government officers, industrial experts, business men and professors to examine the innovativeness and feasibility of the proposed ideas. In summary, the development process of this project is well designed and recorded.

Different from past government-appointed few experts’ viewpoints in projecting the future industries from supply side perspective, this project recruited a mass amount of fresh graduates to envision the world they would like to be in 2025 from the demand side perspective. Sharing its incubation process is valuable as the second author is the director of this project, who follows up its weekly progress and comments its monthly report. In other words, we provide the insiders’ information to show a future center prototype for the interested parties to contemplate.

2 Incubation process

To present the incubation process in a systematic manner, the four-stage development covering training and environmental scanning, immersion and brainstorming, encountering and engaging, and sharing and diffusing will be introduced in sequence.

2.1 1st stage – training and environmental scanning

The first three months is basically exploration and environmental scanning stage with the following main events.
1. In July 2009, recruitment of 80 innovative researchers covering the disciplines of humanity, sociology, business, and communication from more than 500 applicants. Every applicant has gone through a laborious innovation interview from 9:00 a.m. to 6:00 p.m. Those selected has a strong sense of honor as they are the selected few. The slogan of our advertisement is “You are not just hunting for a job. You are hunting for Dreams.”
2. The Opening Ceremony of Vision 2025 Laboratory was held on August 3, 2009 with a press conference.
3. Various training were conducted in the first three months, including team building, creativity training, “World Café” to collect creative ideas, basic media training for digital images recording, story telling skills and graph presentation.
4. Vision 2025 website was set up early October 2009.
5. During the first three months, intensive guest lectures were arranged that oriented the researchers about government expectations, emerging industries, and the goals of this future center.

6. Various types of regular meetings are set up, including team members meeting, professor-members meeting, weekly progress meeting, monthly report meeting. From these meetings, the governance structure and monitoring routine have been formulated.

7. Commentators (both internal and external experts) are invited to provide suggestions in the monthly report meeting to infuse and accelerate the domain knowledge and experience those young researchers are lacking of.

2.2 2nd stage – immersion and brainstorming

Following the first three months’ intense background knowledge acquisition and team building, in the second stage the whole group has gone through various kinds of training and trips to be immersed in the fields, particularly focusing on experiencing three main themes – locality, lifestyle and business. For example on March 5 & 6, the whole research group visited three Bed & Breakfast hotels (B&B) in I-Lan city that has developed many tourist attractions in terms of architecture, B&B, featured meals and DIY activities.

Many B&B owners built their hotel structures with their dreams woven inside and created very appealing stories. For instance, a nature friendly Water-Grass House was built with eco-roof adopting local architecture design using local building materials. The owner has undergone several years of technology aided research and development to experiment many kinds of water-grass products including for food, for medicine, for house plants and for craftworks. A trip to his house is full of wonders, containing water-grass meal with relevant nutrition information, an eco-environment tour of the water-grass plantation, an eco-museum, DIY activity, and an exhibition of water-grass innovative artworks.

I-Lan with about an hour drive from the metropolitan Taipei is an unpolluted countryside city. Its beautiful nature has provided a wonderful relaxing place for a “slow-life style”, envied by the busy Taiwan workers. Over the past few decades, the urbanization has almost emptied this city; now the citizens have transformed their farmlands with innovation that attracts thousands of weekend visitors. The transformation has added great values to their increasingly abandoned farms and revived the whole city.

The two other B&B owned by the same architect are named “Floating Island” and “Independent Forest”. In addition to his home-welcoming hotel style inviting visitors to dream and to detach from the busy city, this owner also sets up a new business model by
inviting the rich to invest in his hotel construction and then contracted back to the architect for running the business. Furthermore, the investor can have annual free coupons for spending vacations in the B&B. By signing in such an agreement, the owner not only realizes his dream under the financial constraints but also creates a new win-win business model.

The purpose of this two-day trip is for the Vision 2025 researchers to be immersed in this innovative I-Lan city, to interview the successful entrepreneurs, to learn from interacting with peers within the innovative atmosphere, and to reflect what elements they may take away to create their own future vision. It is a combined adventure of nature, beauty, technology, art, culture and humanity.

2.3 3rd stage – encountering and engaging

Half way through the project, the envisioned future industries are gradually surfaced. Following the local innovation immersion, learning from foreign experiences is also essential. With thorough literature review, three trips to the international benchmarks were made, including trips to Japan and Korea, China, and Europe.

From April 17 to 22, a group of selected members visited Japan and Korea. The benchmarking innovation in Korea includes “Cross Ocean Bridge” (de-frozen technology), Songdao New City – the largest scale futuristic town in Northeast Asia, Seoul Animation Center, and Ubiquitous Dream Hall. In Japan, the delegates visited several urban renewal projects, such as Robongi Hill, Robongi Midtown, Arkihabara Electronic Retail Town, and Aging Research Institute. To see is to believe, experiencing those futuristic sites and institutions enables the researchers to have more senses about the projects they are undertaking.

From May 13 to 22, the second delegation visited the Netherlands, Germany, Sweden, and Denmark. The main task is to see the benchmarks of eco-city, future city, sustainable city, global climate change prevention, innovative architecture as well as their infrastructure.

From May 22 to 27, the third delegation visited Shanghai, Hung Chou, Kuang Chou, Shenzhen, and Hong Kong. Through personal experience of the recent development of these major cities, this group has witnessed how fast a city can grow and prosper in a desirable and sustainable way.

2.4 4th stage – sharing and diffusing

After international encountering and engaging, the final stage is for sharing and future diffusing. Over months of study, it becomes clear that for the industries to have deep roots, three dimensions and four values need to be considered – everyday life, locality, and business with the flavor of high value-adding activities, high innovation work opportunities, high quality living environment, and high caring social system. Two public exhibitions were planned for the sharing. On the annual Home Coming Day of NCCU alumni in May, a pre-exhibition was held to collect the initial public response of the Vision 2025 Taiwan Future Industries. On June 13, the formal exhibition of the proposed ten future industries and job opportunities were displayed in Taipei Huashan Creative Park. A popular vote reveals that green planner, love analyst, and silver fun city designer are the three most promising jobs, reflecting a high interest of environmental protection and aging people heath care issues.
For the formal exhibition, each team was required to produce 15 minutes film introducing the proposed industry in addition to the posters and brochures. The appendix provides the required contents of the film. May 12 was set for the film shooting plan meeting and May 31 was the “show and tell” of the film clip. In what follows, the proposed ten industries were briefly introduced.

Results sharing
1. Green industry –
   The environmental issue has become every day concern. Therefore, green related business should become a promising future industry. Green certification for industries and individuals, such as expert certificate and general certificate should be conferred by the government or relevant associations. Green planner must have a valid expert certificate to help industry and individual set green goals for future accreditation. For instance, green planner needs to help every firm and every building calculate energy consumption for possible energy saving. According to this research team, green industry in Taiwan should be able to generate 18 billions US dollars revenue by 2020.

2. Disaster prevention industry –
   Since Taiwan has frequent natural disasters including flood, land slide, typhoon, and earthquake, this team proposes an industry that train people to cope with such disasters. The business model includes the development of relevant facilities and construction, such as quake safe building and various kinds of equipment for self-protection. In addition, this industry can provide survival skill training with different levels of certificate. The certificate may link to the discount of insurance fee.

3. Love industry –
   This team explores three stages of love development, including marriage, bringing up children, and separation. By building love stories databank, the love analyst can provide suggestions for clients under different stage of love development; for instance, communication skills, facial expression, body language, and psychological response of people at a certain occasion. Hopefully, everybody can find his/her ideal partner.

4. Silver industry –
   The aging people are rapidly increasing in Taiwan. Taking care of their needs has become a pressing issue. To encourage the mobility and to enrich the life of the aging people, the concept of exchange home is proposed. That is, a matching system can be set to enable the old travelers exchanging their homes for a fixed period of time to experience different life style and to travel in other cities or other countries in an economic way. In addition, old people can lease their apartment with discounted price to nurses, pharmacists, therapists, or taxi drivers in exchange for their professional service.

5. Popular music industry –
   Digital music, mobile music market and live music may be the three popular music forms in the future. Specifically, life style house stationed at universities is proposed to capitalize the innovation of college students through various kinds of music competitions. The prediction is that there will be 110 life style houses in Taipei generating revenue of approximately 4000 millions US dollars by 2025. This team envisions that music industry may transform from selling music to selling life style and music stars with the value attached to a particular star. Future musician can live in and drive a mini van for composing and for countryside performance. Equipped with adequate facilities, the mini van can be a “ready-to-go” music café that carry music to every part of Taiwan.

6. Senses industry –
Based on the five senses of eyes, ears, mouth, nose, and body, this team probes the future industries from the perspectives of technology and service. Utilizing cloud technology, multiple senses movie, virtual experiential tour, and sleeping quality planning to shot off some senses for complete refreshment are some of the examples. Others include internet purchase accompanying with real senses such as smell; special therapy hats that send signal to the damaged brain area to activate certain motions; electronic lollipop that helps the blind to see the image surrounding them and eventually to be connected to the internet in the future. The technology and the developed industry aim to assist the handicapped to have a better life and the same technology can be used for entertainment as well.

7. Happy life industry –

Focusing on the revival of population decreasing cities, this team proposes to attract the younger generation to return to their rural hometown through developing unique town features to regain the traditional happy, trustful, cohesive, and mutually support community life.

8. Branding industry –

The commercialization of innovation is becoming more and more important. Oftentimes, the innovation or original ideas are buried without proper marketing and branding. Therefore, branding planner can help commercialize the original innovative ideas for production, marketing and sales both locally and internationally.

9. Tourism industry –

Through on-site interviewing international tourists, focus group discussion and consumer survey, this research team concluded that tourism in Taiwan needs to provide experiential tour with local features. The mid-term goal is to increase international activity exchange, to strengthen the peripheral facilities of the hot tourist spots, and to design packaged tour discount. The long-term goal is to develop thematic parks with rich traditional art and culture. Activities may include national holiday festivals, competition, and monthly exhibition such as candy experience in January (Chinese New Year), traditional Chinese arts in February, bicycle competition in April (Taiwan bicycle manufacturing is world known) and Taiwan beer festival in July. This team also introduces their high-tech invention of “walking camel” that reduces the traveler’s burden of carrying luggage thus enjoys trouble-free shopping during the trip. In addition, “moving puzzle” is an internet mechanism that help individual traveler to jointly purchase group discounted tickets without paying the service fee to the travel agent.

10. Health care management industry –

Targeting for the busy and high-stress managers, this research team emphasizes human touch with the assistance of technology to create healthy cities. In the healthy city, citizens should be able to develop good routines, advancing from healthy diet, routine exercises to good quality of sleep and hearty smiles. The goal is stress-free and lasting-health, taking care of managers’ spiritual needs at the same time. A new promising job may be healthy space planner who helps explore each individual family member’s needs in terms of preferred color, furniture, light and space for a comfortable interactions and healthy living.

Future diffusion

The research results and proposed future industries are well received by the government officers and external reviewers. Although the applicability and feasibility of the ten proposed industries needs further field testing, this is the first future oriented project that invites such a large scale of young people to participate. The energy of
potential innovation and the formation of future power are evident. As a result, establishing a Future Center or Future Power Research Center is suggested in order to follow up this project and to facilitate a close linkage with industries for enhancing Taiwan future competitiveness.

A follow-up thematic development study is strongly encouraged by the government reviewers. For instance, the proposed health care industry can be experimented with the collaboration of one or two hospitals; the silver industry concept can be pilot tested together with current silver village for future realization. In addition, presentation to industries, universities and media to gain feedback for the potential diffusion is proposed by the participating experts.

3 Conclusion

Taiwan is a small island with abundant qualified human resources, yet the frequent visits of natural disaster such as earthquake, typhoon, and flood that often wiped out lifetime efforts have prompted Taiwanese people to develop a habit of striving for survival no matter what happens. Since failure is the mother of invention, we have observed that innovation in various levels has become a way of life in Taiwan. Being a democratic society for several decades, we have also noticed the recent unleash of innovation in our younger generation in music industry, recreation industry, art design, and in engineering innovation as well.

This project is a well-managed future center incubation process in four stages, namely training and environmental scanning stage, immersion and brainstorming stage, encountering and engaging stage and sharing and diffusing stage. The one-year nurturing process starts with intensive team building, knowledge acquirement, research methodology and media report training. For each proposed industry, a well-grounded strategy, policies and predicted revenues are supported by literature review, research, trend analysis and feasibility analysis. The ensuing immersion and brainstorming stage put those young researchers in the fields with the iterations of field experience and brainstorming then field visit again for several rounds to practice thinking out of the box. To deepen the immersion, at the encountering and engaging stage, researchers had the personal contact with the benchmarking sites to sense the innovation and to be activated for deeper and wider futuristic imagination. The purpose of the last stage sharing and diffusing is to push the researchers to convincing themselves by selling their year-long innovation - proposed future industries to strangers. If they can convince the audience when sharing their ideas, they are more likely to have lasting commitment in making their dreams come true for future successful diffusion.

As people said “the sustainable resource in Taiwan is brain power and innovation”, this project has planted the innovation seeds in those participating young researchers. They are encouraged to let their imagination run wild without restriction, to have bold dreams, and to sell their dreams with compelling stories. They know that innovation comes from daily life, yet free from the traditional boundary. In their diary, they said “we have learned the skills of environmental scanning, industrial analysis, logic thinking, mind mapping, brainstorming, data collection, interpersonal skill, team work, time management, image recording, story telling, and presentation skill.” What they have learned is new perspective and new thinking model.

This group of young researchers has adjourned at the end of July 2010. Although it is still too early to evaluate the outcomes of this one-year project, we are confident that the
seeds of innovation have been planted; the evoked and demonstrated passion will definitely shape the future of this group of people and the future of Taiwan. The remaining task of this future center is moving to the “Center for Creativity and Innovation Studies (CCIS)” at NCCU.

Innovation is the future power. Taiwan Ministry of Economic Affairs is looking for the new definition of industry through the eyes of these young researchers. This paper shares the whole process of how Taiwan incubates a future center with the joint efforts of a national research center, industries, and a university. Research results are recorded in written description, in digital images and film clips for policy makers’ references. A lot of interactions were observed among the members of different levels, specifically, they have a lot of fun during the process. We are optimistic that this “Vision 2025” project will spawn some creative industries in the near future in Taiwan.

Appendix

The 15 minutes film contains the following narration:

Introduction: 10 seconds
Field investigation: 50 seconds
Main story and key person interview: 1 minute 30 seconds
Background information of the story: 3 minutes 30 seconds
Industry analysis: 6 minutes (industrial map, suggested investment approach, field investigation results, and future impact)
Conclusion: 3 minutes
Team Work  Team Presentation

Media Training  Monthly Report Meeting

The “Independent Forest”  Group picture in front of “Floating Island”
Brochures of the exhibition

Exhibition of the future industries
Knowledge-based development metrics: current issues and trends

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Structured Abstract

Purpose – The purpose of the paper is to provide an overview of current research and trends in KBD metrics.

Design/methodology/approach – We carry out a descriptive review of approaches and methods identifiable in the public domain, particularly those in use within the KBD community of researchers and practitioners, followed by a discussion of emerging topics and research agendas.

Originality/value – This study lists some of the emerging issues and looks at the most prominent research agendas dealing with KBD metrics.

Practical implications – The outcomes provide a basis for designing a KBD metrics capitalizing on the state-of-the-art review and subsequent analysis and conclusions.

Keywords – knowledge based development, intellectual capital, metrics, indicators, knowledge economy.

1 This study is part of the research program on KBD Metrics sponsored by the World Capital Institute within the Knowledge Management Research Chair, Tecnológico de Monterrey, México. Javier Carrillo participated in his capacity as program and research chair leader. Alex Marín and Ricardo Flores worked on earlier English and Spanish reports on the Model Sheets, respectively. Alex and Ricardo are students at EGADE’s Doctoral Program in Administration, associated to the KM Research Chair.
1 Introduction

We are presently living in an era of transformation, with a shift from the tangible to the intangible and from economies of material goods to knowledge based ones. Government policy – particularly for developed countries – is tending towards knowledge based economies with investments in technological research and development, improvement of quality of education, health, and the development of national systems of innovation as core drivers for the nations’ further development. However, there remain problems and debates on the exact process of measurement for knowledge based economies.

The field of knowledge management is a relatively young one in the scope of economics and management science. In this field, to develop metrics for the quantification or classification of knowledge has been an ever-present challenge. It is this paper’s goal to thus present an overview of current practices, and to thus provide a more consolidated vaulting block for future research and attempts at defining measurements for knowledge based economies.

Investigating the history of models for knowledge based development quantification, we have identified four major types of knowledge-based metrics: Global, National, Regional, and Organizational. Within each type of metric, theorists and agencies have proposed various models. In this report, we are excluding organization-level models. We have found twenty-two separate models for the evaluation of intellectual capital or cross national comparison, and have organized them along two axes, first by breadth (i.e. from global to regional) and then by degree of reductionism (see Table I).

Following, we present the results of our initial review. In the first part of the study, the models corresponding to the global, national and regional level are illustrated with a number of examples. Comparative sheets for each model are included at the end of the study, after the references. Each model sheet includes ID elements such as name, authors and/or organization, year and cases of application; followed by descriptive elements such as structure, numerical algorithm for data processing, Scope and constraints, a visualization example and model references.

2 Global metrics

The most common metrics we tracked down were those focused on global comparison. Within this category, we found ten different methods for quantification or comparison of development. Looking at them in their assessment of intellectual capital, we found that none of the global comparison metrics had a purely reductionist approach, with most including some element of knowledge based development in their metrics.

The European Innovation Scoreboard (EIS), developed by PRO INNO Europe, focuses on innovation initiatives, indicators, and tendencies of all members of the European Union. Being focused on innovation as a complement to the economy, the EIS downplays intellectual capital, and thus is more reductionist than not (Pro Inno Europe, 2009). Quantifying innovation input and outputs across 26 indicators, the PRO INNO metric provides a method for comparison of nations in the European Union. Expanding on this same metric, PRO INNO subsequently launched a global study, named the Global Innovation Scoreboard (Pro Inno Europe, 2009). Bringing the number of indicators down to 9, but broadening the scope to innovation input and output and technological capacity,
the metric exists as a complement to the European variant, one less in depth, but more apt for global comparison.

**Table 1. Breadth vs. degree of reductionism in a series of KBD metric models**

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The World Bank’s *Knowledge Assessment Methodology* (KAM) seeks to evaluate a nation’s strengths and weaknesses in knowledge based economy (World Bank, 2008). Adding more indexes related to intellectual and human capital, while still focusing on economic performance, the KAM metric falls closer to the middle in regards to reductionist vs. non-reductionist approach to intellectual capital. Looking at economic programs and infrastructure tied to intellectual capital, as well as metrics based on the human side of nations, it is a middle ground and subsequently a widely used metric for comparison.

Even more focused on intellectual capital, Sussex University’s *INEXSK Method* rates nations based on their infrastructure, experience, skills, and knowledge (Mansell and Wehn, 1998). Though the knowledge element of this metric is relatively theoretical, as it aims to quantify social vision and social appropriation of information and communication technologies (ICTs).

The remaining six metrics are more heavily skewed towards intellectual capital, and as such have been divided into the systemic, being those focused more purely on intellectual capital, and the non-systemic, namely those seeking to integrate all elements of value to human contact and seek to quantify a higher value, such as happiness.

The first of the non-systemic methodologies is that proposed by the *Organization for Economic Cooperation and Development* (OECD), which seeks to quantify the output of knowledge-based economies (OECD, 1996). Focusing on knowledge, i.e. the generation of knowledge, number of personnel in investigation, intellectual property generation, and international transfer of knowledge, the OECD’s metric provides the means for global comparison in terms of intellectual capital.

A similar method is proposed by the Australian Bureau of Statistics in the form of the *ABS knowledge-based economy model* (ABS 2004). Using data from the Asian-Pacific Economic Co-operation (APEC) and the OECD, they rate nations intellectual capital output on five scales, namely: Innovation and entrepreneurial spirit, human capital, ICTs, social impact, and economy. However, the focus is heavily on intellectual capital, and is
criticized as much for its usage of second hand data as it is for ignoring the aspect of societies while including a notion of social impact.

The last of the non-systemic methods is that brought forward by International Data Consulting and World Times, the Information Society Index (ISI). This metric’s focus is on information societies, and as such evaluates nations on four sub-indexes: the degree of access to ICTs, degree of absorption of ICTs, degree of utilization of ICTs, and the degree of insertion of ICTs into information societies (IDC, 2000).

Three methods seek a more integrated methodology, one heavy on knowledge capital, but also encompassing the human condition. The first of these systemic methods, the United Nations’ Human Development Report (HDR) focuses on the condition of a nation’s people. Creating a metric based on nations’ poverty index, human development, and gender development, the HDR aims to position the population at the center of the development quantification (UNDP, 204).

Similarly, the New Economic Foundation Happy Planet Index (HPI) looks not only at wealth and development, but at culture, gastronomy, life expectancy, and the ecological footprint of nations. Built on three barometers, the HPI looks primarily at life expectancy, vital satisfaction expressed by each nation’s citizens, and the ecological footprint each nation leaves in the pursuit of the required standard of living for the nation to feel content (New Economic Foundation, 2009).

Lastly, Bhutan’s Gross Domestic Happiness study, stems from the argument that a nation’s development is truly seen not in industry or economy, but in the happiness of its people, the government of Bhutan sought to codify happiness on four main elements: focus on sustainable and egalitarian socioeconomic development, preservation and promotion of cultural values, preservation of the environment, and good governing practices (Kinga, et al., 1999).

3 National metrics

Seven metrics were identified for the analysis of a nation. Designed to provide a nation with insight as to its internal operations or standings in regards to intellectual capital, these methods all have use for the analysis of single nations. Much like the previous group of methods, these will be presented in order from those most reductionist to those least so.

The first metric, designed by Aregional, is the Index of Systematic Competitiveness of Mexican Cities (ICSMC). Looking to quantify the ability for each of the major cities within the nation to compete internationally, the ICSMC gathers data from the Mexican federal government, the Bank of Mexico, and state and municipal governments to quantify global business competitiveness. This metric, though insightful in terms of looking at the state of the nation, yields little to no information on intellectual capital (ARegional, 2009).

Similar to the ICSMC, the Mexican Institute for Competitiveness and ITESM’s graduate school of public administration generated a State Competitiveness Index (IMCO and EGAP, 2006). This index factors ten elements with which to analyze and rank each of the 32 states of the nation. These indicators look at all facets of government and policy of the states, from the legal system to the efficiency of the markets, with an end result yielding strengths and weaknesses of each state in regards to operations and economy. Much like ICSMC, intellectual capital is mostly ignored.
The Center for Strategic Studies’ *Knowledge Based Economy - The Condition of the Mexican States* report looks at the level of development of each of the Mexican states, but rather than look solely at the political and economic factors, this study looks to see what factors are needed for a knowledge based economy to emerge and evaluates each state based on how far they are in attaining it (Molina et al, 2005). The end result, as such, gives strengths, weaknesses, and opportunities of each state, but the recommendations lie more in the generation of intellectual capital.

The *Knowledge Based Economy Index* (KBEI) put forward by the ‘Este País’ Foundation takes a very similar approach to the Center for Strategic Studies (Naumann F. Stiftung et al, 2001). The KBEI also seeks to quantify the potential of each of the Mexican states in regards to knowledge based economies. Generating their index on five major components, this metric focuses on the economic output and infrastructure, but also quantifies and compares exterior orientation, innovation systems, and education levels and qualified human resources per region.

Further towards the non-reductionist end of the spectrum, the *State New Economy Index* (SNEI) put forward by the Progressive Policy Institute seeks to gauge how much each of the states of the USA has adapted and managed the New Economy (Atkinson and Scott, 2008). Using twenty-nine indicators, the SNEI divides them into five major categories being: generation of jobs related to knowledge, globalization, economic dynamism, penetration of digital economy in economic activity, and the capacity to innovate. This index then allows each state to have an idea of its standing within the nation, and where areas of opportunity lie while providing the nation a better view on general trends for future policy making.

The last two metrics found are far more non-reductionist, and can both be classified as systemic in their approach. The *Cities Ranked and Rated* metric (Sperling and Sander, 2004) looks to compare the major cities in the USA amongst each other as well as 27 major Canadian ones on the grounds of image, character, and quality of life. The key categories for the generation of this metric are: economy and job market, cost of living, weather, education, health, crime, transport, art and culture, quality of life, and leisure and free time. This study is conducted at a national level, and provides the populace with a concept of where the “best place to live” in their nation might be.

The final national metric identified is Mercer’s Human Resource Consulting *Global Quality of Living* city ranking (Mercer, 2009). The purpose of this study is not to identify the best place to live, but to help companies determine optimal compensation packages for expatriates taking into account discrepancies in living standards between the city of origin and the destination. This metric is built on thirty-nine factors across ten categories, which include sociopolitical climate, socio-cultural factors, schools and education, infrastructure, leisure, economic climate, and the environment.

### 4 Regional metrics

The regional metrics identified were fewer, with more closer to the reductionist side of the scale than not. Of the most reductionist, we identified America Economia Intelligence’s *Urban Competitiveness Index* as one of the least intellectual capital-intensive metrics (America Economia, 2009). Seeking to identify the best region for a company to do business in. Taking data from the World Bank, this metric factors over 50 different variables across two major dimensions: context and differential variables.
Chile’s Ministry of Urban Planning generated a slightly different metric for evaluating regional competitiveness, the results of which are presented in their *Index of Regional Competitiveness*. This metric looks specifically towards factors for competitiveness in each region, primarily economic yield, population, number of companies, innovation, science and technology, infrastructure, government, and natural resources. Taking in 73 separate indicators, data is collected from various heads of businesses operating, and the data is then quantified and normalized to thus glean the regional strengths and areas of opportunity (Ministerio de Planificación de Chile, 2009).

Peru’s National Competitiveness Council’s *Regional Competitiveness Index* is another regional metric that looks at regional comparison in a very similar fashion to Chile’s metric (Cnsejo Nacional de Competitividad de Perú, 2008). However, they add an element of intellectual capital, looking at the factors of Chile’s metric, and adding in education and health to gauge competitiveness in economy and resources as well as human and intellectual capital.

More inclusive of knowledge based development, the *World Knowledge Competitiveness Index*, developed by Robert Huggins Associates, seeks to measure not only knowledge generation, but rather the degree to which knowledge is converted into economic value and how much of that wealth is transferred to citizens of a particular region (Huggins, Izushi and Devies 2005). Looking at the degree of competitiveness of knowledge based economies of each region and factoring in the expenditure in research and development and education, as well as unemployment rates and ICT infrastructure, productivity levels, and citizens’ access to private capital and knowledge based employment, this metric gauges the efficiency of regional knowledge based economies and identifies the returns of those economies to the region’s citizens.

Finally, on the least reductionist and most systemic edge, the *Capital System Framework* deliberately has sought to develop a model to determine a community’s relative position in regards to advancement towards knowledge based development (World Capital Institute, 2001). Designed around eight capital categories aiming at constituting a complete a consistent set of capitals, it includes Identity and Intelligence Capitals, Relational and Financial Capitals, Human Individual and Human collective Capitals, and Instrumental Tangible as well as Instrumental Tangible Capitals.

At the end of the paper, a number of model sheets with constant record fields allow for an account and comparison of most of the methods included in this study.

### 5 The KEI project

Anyone interested in KBD indicators is bound to come across sooner or later with the Knowledge Economy Indicators (KEI) Project, a landmark in the field of Knowledge Economy metrics. Surprisingly, this project is less well known within the KBD community than say, the World Bank’s KAM or the OECD Method. However, KEI is arguably the most substantial effort aimed at understanding and leveraging the potential use of knowledge social indicators for purposes of policy design and assessment. The project is generously documented at the Universität Trier webpage: [http://www.uni-trier.de/index.php?id=26661](http://www.uni-trier.de/index.php?id=26661). This section is based on a CD tutorial produced in Spanish as an introduction to the project (López et al, 2010).

Started in September 2004, the KEI project (“Knowledge Economy Indicators: Development of Innovative and Reliable Indicator Systems”) objective, was “to develop and improve indicators for the knowledge economy, including the analysis of aggregation
issues and the use of composite indicators”. The project covered indicators from 25 EC and 5 other European countries plus 6 non-European countries (United States, Japan, India, China, Australia and Canada).

The KEI project reviewed current concepts and definitions on the Knowledge Based Economy (KBE) and used such themes to classify existing indicators and explore them in depth. Literature reviews allowed the identification of some unexplored topics, which in turn permitted identifying the way in which these could be tackled through innovative approaches better suited for KBE understanding and assessment. Composite indicators were carefully analyzed through a number of both statistic and participatory approaches.

These included the use of multi-criteria techniques, aggregation and weighting techniques and decomposition methods. An evaluation of analytical and presentational techniques was also included. Simulation methods were also used to investigate indicator robustness, as well as their resulting conclusions. The study assessed the quality and accuracy of indicators and associated data.

The KEI project included seven workpackages plus a final report. The seven packages were divided into two main groups. Group one included workpackages 1, 2 and 4. These focused on KBE theory, KBE policies and required indicators, respectively. Based on the prior results, group two included packages 3, 5, 6 and 7. Workpackages in this second group focused on statistical analysis of indicators in order to identify robust composite indicators.

The workpackages are as follows,
1. Defining KBE
2. KBE indicators
3. Statistical analysis of KBE indicators
4. Innovative use of KBE indicators
5. Composite indicators for the KBE
6. Role of multinationals as source R&D information
7. Simulation study
8. Final Report

Hence, the KEI project aimed at developing new indicators and improve existing ones, with the goal of providing tools for monitoring KBE progress. The project classified existing indicators prior to checking in detail the nature of data and other information quality issues. Composite indicators were developed subsequently and subject to statistical and participatory tests. Finally, the robustness of composite indicators, as well as the conclusions reached by these, were validated through simulations.

Within the workpackages, deliverable 8.2 is a synthesis of KEI achievements. According to this source, such outcomes include:

- A formal definition of KBE
- A detailed listing of existing KBE indicators
- Information on missing KBE indicators and possible solutions to generate them
- A discussion on the policy context and the needs of indicators users from the perspective of globalized R&D activities, besides some methodological options
- A review of the statistical analysis carried out on selected KBE indicators, as well as a proposal for handling missing data
- A brief overview of the “benefit of doubt” approach, consisting on the selection of endogenous weightings for the aggregation of those indicators forming a composite indicator
- General information on the composite indicator proposed for a KBE.
In all, the KEI project is a formidable effort aimed at better understanding and managing R&D activities from a European perspective. However, its inclusive approach, globalized perspective and innovative approach make it a major reference for all future work in KBD metrics. The KEI project has set the ground for future R&D work on KBD metrics, particularly that aimed at international policy making.

6 Emerging issues

The KEI project emerged in response to policy formulation and assessment in the EC. Also, it focused on a specific view of the KBE namely an instrumental multi-factor perspective of knowledge as a leverage to economic growth. This view of the Knowledge Society and the Knowledge Economy has been typified as transitional insofar increase in monetary mass remains as ultimate social goal, a dualistic approach prevails between “tangible capital” (traditional physical and financial) and “intangible” (intellectual or knowledge-based capital) (Carrillo, 2006). As a consequence of this approach value dimensions become heterogeneous, making it difficult to build a complete and consistent set value dimensions or capital system (see Carrillo 1998, 2002, 2004, 2006, 2010 for a discussion of these constraints on the space of possibilities for the concept of Knowledge Society).

Such transitional perspective permeates the KEI project and consequently European ideas and policies (and to be fair, received views worldwide) on the Knowledge Society and the Knowledge Economy. The instrumental character or resource-view of knowledge is explicit in statements such as:

This is the view expressed in the third European Report on Science & Technology indicators (EC, 2003b). Knowledge is viewed as the key resource for competition in a globalizing world, with knowledge creation and diffusion both deemed key factors in the ability of Europe to face increasing competition from low-wage countries. This means that the knowledge economy is considered also a goal for public policy and something to be encouraged by public policy. (KEI-WP1-D1.1 p.4, bolds and italics original).

The epistemological assumptions underlying this view are critical for they conceptually determine how knowledge and its role in development is understood, operationalized, measured and above all, incorporated into public policy design, management and evaluation. A system of indicators ultimately expresses the limits, elements and rules in a formal system, determining the space of possibilities. An instrumental or transitional view of the knowledge economy substantially reduces the vision of knowledge societies to a quantitative catalyst of economic growth instead of the qualitative evolutionary paradigm of social design it might be. Instead of challenging the current rules of the economic game, the social innovation consists in adding some external elements as facilitators of current production factors. Alternative transitional views differ only in the amount of production sectors involved in the accounts:

“The only notable difference between the ‘knowledge economy’ and the ‘knowledge-based economy’ is that the former focuses on knowledge-intensive sectors, while the latter extends the concepts to all sectors of economic activity. We view the knowledge economy as much broader than a focus on knowledge-intensive sectors and so we use the definition of the knowledge-based economy that considers changes taking place across all sectors” (KEI-WP1-D1.1 p.2).
As an alternative interpretation of Knowledge Based Value Systems (be it Societies, Cities, Economies, etc.) a radical KBD perspective has been advanced by some Intellectual Capital and Knowledge Based Development authors (cfr. Carrillo, 1998, 2006; Von Mutius, 2005, Allee, 2009). Allee has stressed the existence of a common underlying nature of all capital forms. This is empirically shown in capital convertibility along value network transactions:

“Participants in a value network, either individually or collectively, utilize their tangible and intangible asset base by assuming or creating roles that convert those assets into more negotiable forms of value that can be delivered to other roles through the execution of a transaction. In turn, the true value of deliverables received is realized by participants when they convert them into gains or improvements in tangible or intangible assets” (Allee, 2009, p. 430).

Von Mutius, in turn has looked at the deeper implications of integrated capital systems. By reflecting on the received dichotomy between traditional capital and intellectual capital, he advances the following position:

“The proposal … is to place the idea of IC in a broader context. Not to dilute it, but enhance its impact. This context is broadened in three respects. First, it appears to be of vital importance not to discuss the theme of IC in isolation from social capital, but to make but to make the inseparable interconnection of these two forms of capital a focus of exploration from the start. Both intellectual and social capital are intangibles, human and immaterial values. And, in practice, they can be generated and increased only in rather similar ways: by sharing knowledge in cross-border relationships.

Secondly, I would like to recommend that we consciously establish a conceptual relationship between the apparent soft topic of intangible assets or values and the hard strategic topic of tangible assets or material (physical and financial) value. This argument proposes that immaterial and material assets should be regarded in the future as being of equal weight and needing to be balanced in new ways on all areas of leadership and management activity.

Finally, this requires addressing the theme on a different level. It is to be viewed, not as a subordinate or partial function of management or administration, but as a comprehensive and interdisciplinary leadership task” (Von Mutius, 2005, pp. 152-153).

Informally, Von Mutius was setting the requirements for a formal capital system (a complete, consistent and homogeneous system of value categories). From this perspective, this is highly convergent with Carrillo’s Capital System approach, a comprehensive taxonomy of value categories where all capital forms are valuable by themselves, not as subsidiaries to financial capital, and all constitute together a cohesive system (e.g., Carrillo, 2002). This system has evolved in a flexible system of accounts, applicable as an endogenous capital strategy (e.g., Carrillo 2005). The Capital System accounts are the base to the annual MAKCi (Most Admired Knowledge City) Awards.

As a conceptual paradigm, the Capital System approach challenges many of the received practices on KBD operationalization and measurement. In particular, it redefines the core issue of aggregation and composite indicators at an entirely new level. More widely, it overcomes epistemological assumptions that pervaded the received view on IC and KBE such as inductivism, intrinsic dualism and reductionism. These implications are beginning to be examined (Carrillo, 2010b).
Research agendas

The field of KBD metrics is far from static. Actually, if judged by increasing attention in specialized fora such as dedicated publications and conferences, the topic seems to be on the rise. This is understandable due to low degree of technical development relative to conceptual and methodological developments in the IC and KBD arenas. In this final section, some of the most visible agendas in KBD metrics are described.

As mentioned in the acknowledgements note, this work is part of the Research Program on KBD Metrics sponsored by the World Capital Institute within the Knowledge Management Research Chair, Tecnológico de Monterrey, México. It started in 2009 aimed at developing a MAKCi Index as an alternative to the current Delphi-based annual consultation determining award winners. It has generated a number of tracks including,

Track 1. State-of-the-art. Setting the ground for other tracks, this one aim at capitalizing on existing knowledge and disseminating it within the KBD community. This track has generated a number of monographs, as well as the Introduction to KEI project CD in Spanish. This very work is an outcome of that track.

Track 2. Statistical analysis of MAKCi data. This track aims at making the most of track records on the four annual MAKCi consultation studies from 2007 through the present. The working paper Making MAKCi: Identifying key elements in Knowledge-Cities Benchmarking by Alicia Leal and Blanca García is presented somewhere else in this conference.

Track 3. Methodological trad-offs. In practice, decision-makers, evaluators and practitioners are concerned with having the most informative system of indicators at the most reasonable cost. This track aims at developing a series of tools for helping practitioners make the best cost/benefit decisions in implementing KBD indicator systems. Benefit here refers to the attributes of outcome data from a metrics canon perspective. Cost refers to implementation requirements in the real world of aggregation and composite secondary sources. A first paper, examining fundamental epistemological assumptions in KBD conceptualization and metrics by Carlos Garcia and Javier Carrillo is now being submitted for publication.

Track 4. Alternatives to GDP. Building on all previous tracks, this one aims a documenting, analysing and eventually developing alternative urban, regional, national and supranational development indices with reference to Capital Systems. This is convergent with the World Capital Institute long-term goal of assessing global assets and liabilities from a KBD perspective. This is mostly work-in-progress and is currently broadening its international collaboration base.

Although the core team of this research program is based at Tecnológico de Monterrey, insofar a World Capital Institute initiative it is open to researchers from around the world. At the moment, colleagues from Colombia, United States, India, Iran and Canada are participating in some of the ongoing work. Those interested in joining may contact the authors of this paper.

Another example of current KBD metrics research initiative is the AICTE Project on Developing a Framework for Flexible Knowledge Management Indices based at the Institute of Management Technology in Ghaziabad, India. Under the leadership of Professor Surinder Batra, this project started in 2009. The scope of this project is both at a firm and societal level, i.e., at the KM and KBD levels. Project details can be found at the webpage http://www.imt.edu/AICTEResearchProject/index.asp
According to this source, the project goal is
“Establishing, testing and validating a framework for developing Regional Knowledge Management Indices, which would be used for evaluating the extent and effectiveness of the processes for creation and utilization of Knowledge in different regions. The purpose of such indices would be to evaluate how different regions compare on various parameters of knowledge creation as well as distribution and use of knowledge within and across regions for economic growth and for larger good of the society.”

As a sample of the project activities and its research agenda, a consultation workshop was conducted on April 30, 2010 at IMT Ghaziabad. Participants engaged in four alternative groups:
- Group A: Aspects of Knowledge Measurement at Village Level
- Group B: Adapting KAM to City & Village Level Knowledge Measurement
- Group C: Learning from Enterprise Level Knowledge Measurement for Adaption at the Country/ City/ Village Level
- Group D: Robust approaches for Knowledge Measurement at Enterprise Level.

A close collaboration is already ongoing between Monterrey’s Research Program on KBD Metrics and Ghaziabad’s AICTE Project on Developing a Framework for Flexible Knowledge Management Indices. Links with other related initiatives as well as individual researchers and practitioners on KBD metrics are continually being explored.

References


"Network Applications to Education in Brazil:Helping to Integrate Segments of the Population into the Information Society" in Mitter, S. (ed.) The Cyber-Economy and the


Bryant, K. 1999, Progress in S&T Indicators: from R&D to the Knowledge-based Economy, prepared for the China-Australia Workshop on S&T Indicators, Department of Industry, Science and Resources, Canberra, Australia.


Edvinsson, L. y Malone, M.S. (1998), “*El Capital Intelectual, Cómo identificar y calcular el valor inexplotado de los recursos intangibles de su empresa*”, Grupo Editorial Norma


Kinga, Sonam et al. (eds) (1999), *Gross National Happiness*, Thimphu: The Center for Bhutan Studies


Organization for Economic Cooperation and Development (1996d), Transitions to Learning Economies and Societies, Paris


Model Sheets

European Innovation Scoreboard

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Pro Inno Europe</th>
<th>Year Implemented</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Structure:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This method presents an evaluation and comparative analysis of the main innovation initiatives in European countries, including indicators and all member states of the European Union (EU). Innovation is a non-linear process, this model is composed of 26 indicators, divided along two innovation dimensions: Innovation input and output.</td>
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<td></td>
<td></td>
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<tr>
<td>- Innovation input: innovation drivers, knowledge creation, corporate innovation and spirit.</td>
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<tr>
<td>- Innovation output: Applications and intellectual property.</td>
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</tr>
<tr>
<td>- Numerical algorithm for data processing:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pondering of all indicators must be equal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Scaling method:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Lowest national value = 0, highest national value = 1 within EU-25</td>
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</tr>
<tr>
<td>b. SII is calculated from the mean value of all rescaled values</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Each indicator ( X_{it} ) for given country ( c ) and time ( t ) is transformed into ( 1 \times \frac{X_{it} - \min_{c}(X_{it})}{\max_{c}(X_{it}) - \min_{c}(X_{it})} ), where ( \min_{c}(X_{it}) ) and ( \max_{c}(X_{it}) ) are the minimum and maximum value of ( X_{it} ) among all countries ( c ) and time ( t ). The normalization of indicators ( I_{it} ) has values between 0 (straggler, ( X_{it} = \min_{c}(X_{it}) )) and 1 (leader, ( X_{it} = \max_{c}(X_{it}) )). The rescaled normalization of the indicators has identical ranges, in this case (-0.5, 0.5). This range must be selected to maintain symmetry around 0 among the ( z ) values of the method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Normalization must be based in relation to the EU-25</td>
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<tr>
<td>5. Relative to the EU-25 data is calculated as the relation between the most recent values of a nation and the EU-25 values of that same year</td>
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<td></td>
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<tr>
<td>6. Missing data is not adjusted</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. Calculation of Tendencies</td>
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<td></td>
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</tr>
<tr>
<td>8. Tendencies are calculated as the percentual annual variation between the previous recorded year and the previous three years, after a one year offset</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9. The 3 year mean is used to recenter interannual variability, the one year offset is used to increase the difference between the three year mean and previous year’s data and to minimize statistical error and sample variance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. T. T.1 and T.2 a condensed innovation index is calculated using the MinMax strategy, based on the minimum and maximum values of a 3 year period (information recompiled Dr. Slavo Radosavic’s presentation, UCL).</td>
<td></td>
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</tbody>
</table>

Scope and constraints

EIS is published annually to evaluate and quantify the innovation-related progress of the EU. This methodology is currently revised, depending on necessities. This study has great applicability as it is designed on a continental level, and also includes and compares other non-European countries.

Model visualization example

References and sources

The Global Innovation Scoreboard

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Pro Inno Europe</th>
<th>Year Implemented</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
<td></td>
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</tbody>
</table>

- **Structure:**
The Global Innovation Scoreboard 2008 (GIS 2008) has as its objective to provide a general vision of the main tendencies, results, and determining factors of innovation of nations around the world.

- **Numerical Algorithm for data processing:**
GIS 2008’s methodology takes into account 9 indicators to measure innovation and technological capacity. They are grouped along 3 main pillars: Group companies and products, human resources and infrastructure, and absorption capacity.

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Indicator</th>
<th>GIS value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group companies and products (40%)</td>
<td>Patents per population (3 year average)</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Businesses’ R&amp;D – BERD (% PIB)</td>
<td>20%</td>
</tr>
<tr>
<td>Human Resources (30%)</td>
<td>S &amp; T tertiary scholarization rate</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td>Work force with tertiary education (% of total workforce)</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td>Scientific Articles per population</td>
<td>7.5%</td>
</tr>
<tr>
<td></td>
<td>I + D per population</td>
<td>7.5%</td>
</tr>
<tr>
<td>Infrastructure and absorption</td>
<td>ICT expenditure per population</td>
<td>10%</td>
</tr>
<tr>
<td>capacity (30%)</td>
<td>Broadband penetration per population</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Public I + D - (HERD + GOVERD) - (%GDP)</td>
<td>10%</td>
</tr>
</tbody>
</table>

For each pillar an index is calculated composed of an average of the indicators. All values are pondered in relation to the size of the nation, thus providing the GIS relative to each nation.

<table>
<thead>
<tr>
<th>Scope and constraints</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>This methodology represents a complement to the EIS. It is used to make global measurements and uses indicators previously demonstrated to realize their study.</td>
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</tbody>
</table>

| Example for visualization of the method | N/A |  |

<table>
<thead>
<tr>
<th>References and sources</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
Knowledge Assessment Methodology (KAM)

Authors / Organization: World Bank
Year Implemented: 2008

Description:

- Structure:
  This method finds its roots in the Knowledge Assessment Methodology (KAM), whose objective is to compare the world’s nations amongst themselves in search of a leader in knowledge based economy. KAM proposes four pillars upon which the economy of knowledge lies: 1) An economic and institutional regiment which provides incentives for efficient use of knowledge, 2) an educated population trained to create, share, and implement knowledge in an effective way, 3) a dynamic information infrastructure to facilitate communication, diffusion, and procession of information, 4) An efficient system for innovation which includes research centers, universities, consulting firms, and other organizations capable of utilizing global knowledge, assimilating it, and adapting it to its local needs, all while generating new technology.

- Numerical Algorithm for data processing:
  The KAM indexes are generated via the following method:
  a. Information on the BD variable is taken from the World Bank (Var.i)
  b. Information is sorted from highest to lowest, creating a range (range i), showing the demonstrating the ranking of each instance against the total number of instances per variable.
  c. The total number of economies with a lower yield to that analyzed is calculated for each variable (Np).
  i. Data is normalized as follows: Normalized Var = 10 * (Np/Nt), thus aiding in obtaining the normalized value for each variable per economy according to its yield relative to the total number of cases with available information included in the comparison (Nt).
  ii. The normalized variable has a range of 0 to 10, with 10 being the best. The quantity of worst economies should equal the total number (Np=Nt) thus yielding a normalized variable of 10. Economies with the worst yield will have Np=0, and in thus result in a normalized variable of 0.
  iii. Once normalized, the variables are to be graphically represented

Scope and constraints

Because of its transparency and ease of use, KAM has been widely used by government functionaries, politicians, researchers, as well as representatives of the public and private sectors. It provides valuable precedents for dialogue on Economies of Knowledge between the World Bank and nation’s leaders. It is easily obtained as it is published annually online and on cd-rom. Data is updated as it is obtained and published online.

Example for visualization of the method

Mexico

- Adult Literacy Rate of age 15 and above
- 15-year-olds' science literacy (PIRLS)
- 15-year-olds' math literacy (PIRLS)
- Quality of Management Schools
- Quality of Science and Math Education
- 4th Grade Achievement in Science (TIMSS)
- 4th Grade Achievement in Math (TIVSS)
- 8th Grade Achievement in Science (TIMSS)
- 8th Grade Achievement in Math (TIVSS)
- Internet Access in Schools
- Gross Secondary Enrollment rate
- Gross Tertiary Enrollment rate
- Life Expectancy at Birth

Comparison Group: Latin America Year: most recent (KAM 2008)

References and sources

### INEXSK Methodology

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Sussex</td>
<td></td>
</tr>
<tr>
<td>SPRU - Mansell and Wehn</td>
<td></td>
</tr>
</tbody>
</table>

### Implementations and Analyses


### Description

- **Structure:**
  This study is capable of establishing criteria for international comparison. It analyzes four aspects considered important for a country to be in a position to be able to fully take advantage of CITs. These aspects are Infrastructure, Experience, Skills, and Knowledge. The particularities of this last indicator are that though its importance and place in the model have been ascertained, it is not yet clear how to measure it; it should reflect the development of knowledge and the application of this for socioeconomic development. The information they aim to obtain through this metric is comparable to that of “social vision” through the notion of CIT usage with social purpose and appropriation.

### Scope and constraints

This study has an international reach as it is designed with international comparison in mind. Sources used are second hand, given that most of the data comes from institutional studies such as those provided by the International Telecommunication Union and UNESCO among others.

### Example for visualization of the method

N/A

### References and sources

OECD: The Knowledge Based Economy

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>OECD</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD (1996c), <em>Transitions to Learning Economies and Societies</em>, Paris</td>
<td></td>
<td></td>
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</tbody>
</table>

**Description**

In this study, conducted by the OECD, a series of indicators are proposed with the purpose of measuring performance of knowledge based economies, but warns that knowledge is not a traditional economic input as it differs in its production functions. Knowledge inputs are measured, namely the production of knowledge, investigation personnel, patents, innovation, and transferece of knowledge to other countries. Its flow and storage: diffusion of information technologies, separate knowledge flows, development of patents or registered university projects. Outputs, networks and knowledge, learning.

The indicators proposed by the OECD are essentially qualitative, useful, and relatively easy to collect as data.

**Scope and constraints**

Study performed mostly on countries belonging to the OECD. Large part of its data is first hand.

**Example for visualization of the method**

N / A

**References and sources**

ABS Knowledge-based Economy Model

**Authors / Organization** The Australian Bureau of Statistics  
**Year Started** 2003

### Implementations and Analyses
- Bryant, K. 1999, *Progress in S&T Indicators: from R&D to the Knowledge-based Economy*, prepared for the China-Australia Workshop on S&T Indicators, Department of Industry, Science and Resources, Canberra, Australia  
- Department of Trade and Industry (UK) 2001, *UK Competitiveness Indicators: Second Edition*, Department of Trade and Industry, United Kingdom  

### Description

**Structure:**
The ABS model is based on work performed by the Asia-Pacific Economic Cooperation (APEC), the Economic Committee, and the Organization for Economic Co-operation and Development (OECD). It is composed of five dimensions: Innovation and business spirit, Human Capital, ICTs, Social Impact, and Economy.

![ABS Knowledge-based Economy Model](Image)

### Scope and Constraints
- Uses second hand sources from OECD  
- Does not provide a complete description of each dimension  
- Applied at a global level  
- In particular, the method does not offer a systemic treatment of a knowledge based society, despite the fact that it includes factors in social elements that could affect economic changes or are affected therein

### References and Sources
Information Society Index (ISI)

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>International Data Consulting / World Times</th>
<th>Year Started</th>
<th>1998</th>
</tr>
</thead>
</table>

**Description**

- **Structure:**

  This method measures the level of insertion of nations in the Information society and is composed of 15 variables grouped into 4 sub-structures used to calculate the range of each nation and thus generating one general index and 4 sub-indexes. Countries are categorized by their level of access, absorption, optimal usage of CITs, and insertion into the Information Society. The ranges/levels set forth are the following (in decreasing order): Skaters, Striders, Sprinters, and Strollers.

**Scope and constraints**

Aids government planners in the measurement and progress of their nations in relation to others and offers financial investors and IT providers with a toolset for evaluating opportunity, facilitators, and barriers.

**Example for visualization of the method**

N / A

**References and sources**

**Gross Domestic Happiness (GDH)**

**Authors / Organization**
Bhutan Center of Studies

**Year Started**
2008

### Examples


### Description

- **Structure:**
  GDH stems from the premise that true development of human society is found in the complementarity and mutual reinforcement of material and spiritual development. The four pillars of GDH are the promotion of sustainable and egalitarian socioeconomic development, the preservation and promotion of cultural values, the preservation of the environment, and the establishing of good governance. GDH is a qualitative condition compared to the Genuine Progress Indicator, which grades happiness and wellbeing. Both measures concur in that subjective values like wellbeing are more relevant that objective values like consumption.

- **Numerical Algorithm for data processing:**
  It is defined as a series of indicators to measure the index of Gross Domestic Happiness, and these include nine basic dimensions: psychological wellbeing, use of time, community vitality, culture, health, education, environmental diversity, standard of living, and government.

  GDH is built in two steps, the first referring to indentification and the other to aggregation. Besides decribing the mechanism to develop the national index, it also highlights dimensions for each district or group.

  1. Identification of each indicator’s threshold.
  2. Categorization of people in private and non-private.
  3. Identification of thresholds by domain.
     a. GDH threshold by domain = 1 domain, if the person is private in a certain domain, they are identified as being not happy.
     b. A person considered happy is not private in the domains.
  4. Number of workers = (# unhappy people)/ (# people polled)
  5. Calculation of threshold distance for each indicator = (threshold – effective input) / (threshold)
  6. Calculation of indicator severity = (threshold – effective input) / threshold
  7. Average severity = total severity / number of severity
  8. Index = Average severity * Number of workers

  **GDH index = 1 – index**

### Scope and constraints

The concept of GDH faced international scepticism in its early formulations. However, systematic improvements have now attracted increasing attention to this alternative approach.

### Example for visualization of the method

![Mean hours of activities](attachment:image)

### References and sources

- Kinga, Sonam et al. (eds) (1999), *Gross National Happiness*, Thimphu: The Center for Bhutan Studies
## Happy Planet Index

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>New Economic Foundation</th>
<th>Year Started</th>
<th>2006</th>
</tr>
</thead>
</table>

### References

### Description

- **Structure:**
  This report offers a classification of countries across the world according to an index developed by these same nations to measure the happiness of their inhabitants, depending not only on their level of development or wealth, but also evaluating their culture, gastronomy, life expectancy, and above all the ecological footprint of each nation. This index is based on data from 143 countries representing 99% of the global population. It uses three barometers to develop its classification: life expectancy, vital satisfaction expressed by each nation’s citizens, and the carbon footprint they leave to attain the standard of living they deem necessary to be happy.

- **Numerical Algorithm for data processing:**
  \[
  HPI = \text{Satisfaction} \times \text{Life expectancy} / \text{Carbon Footprint}
  \]

### Scope and constraints
- This index is considered by the UN to be very useful and significant in the measurement of a country’s development. It is important to highlight that there are limitations to the data, it is necessary to gather more and better data, since many of the cases have been estimated.

### References and sources
Human Development Report 2004 – United Nation Development Program

Authors / Organization | UNDP | Year conceived | 2004

Implementations and Analyses

Description
- Structure:
The purpose of this report is to bring people back to the center of development, in terms of discussion on economics, politics, and aid. It focuses on topics of debate on actual development of nations, and oversees analysis of behaviour and recommendations. The report is composed of five parts: Human Development Indexes (HDI), Human Poverty Index for developing countries (HPI-1), Human Poverty Index for Select Countries (HPI-2), Gender related Development Index (GDI), and Gender Empowerment Measure (GEM)
- Numerical Algorithm for data processing:
  - **Human development index (HDI):** component index = real value − minimum value
    Maximum value − minimum value
    \[ \text{HDI-1} = \{ \frac{1}{3}(P_1 + P_2 + P_3) \}^{1/\alpha} \]
    \( P_1 = \text{Probability of not living past 40 years of age (multiplied by 100)} \)
    \( P_2 = \text{Adult illiteracy rate} \)
    \( P_3 = \text{Proportion of population without access to sustainable sources of clean water and of children with insufficient weight for their age.} \)
    \( \alpha = 3 \)
  - **Human Poverty Index for Select Countries (HPI-2):**
    \[ \text{HPI-2} = \{ \frac{1}{4}(P_1 + P_2 + P_3 + P_4) \}^{1/\alpha} \]
    \( P_1 = \text{Probability of not living past 60 years of age (multiplied by 100)} \)
    \( P_2 = \text{Adults lacking functional literacy} \)
    \( P_3 = \text{Population under the poverty line (50% of adjusted mean income)} \)
    \( P_4 = \text{Long term unemployment rate (12 months or more)} \)
    \( \alpha = 3 \)
  - **Gender related Development Index (GDI):**
    \[ \text{GDI} = \{ \frac{\text{proportion of female population (female index1)−0} + \text{proportion of male population (male index1)−0}}{1−\varepsilon} \}^{1/\varepsilon} \]
  - **Gender Empowerment Measure (GEM):**
    \[ \text{EDEP} = \{ \frac{\text{proportion of female population (female index1)−0} + \text{proportion of male population (male index1)−0}}{1−\varepsilon} \}^{1/\varepsilon} \]

Scope and constraints
The purpose of this metric is to recover people and knowledge centrally in discerning economic development. It can be obtained online and used openly. Most of the data was second hand as it is developed from census data reported by the countries themselves, data that is constantly renewed.

References and sources
State competitiveness index, EMC and EGAP

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>EMC and EGAP</th>
<th>Year conceived</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This study qualifies global and partial competitiveness of the 32 Mexican states. Ten factors are considered: Reliable and objective system of law, Sustainable management of the environment, Inclusive, prepared, and healthy society, Dynamic economy with stable indicators, Stable and functional political system. Efficient production factors based market (capital, labour, energy, wages), World class transport and logistics sectors (infrastructure, transport, and financial sectors). Efficient and effective government, Usage of international relations. Economic sectors with growth potential. The final result sums to define areas of opportunity and best practice in the country for each factor.</td>
<td></td>
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</tr>
<tr>
<td><strong>Numerical algorithm for data processing:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A set of variables for each factor must be defined, and to each set a dummy variable is assigned. On top of these indexes, another metric is added the Brute formation of fixed capital (FBFC). Added to these indexes, a dependent variable is added: the Brute formation of fixed capital (FBFC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Methods to determine the dependent variable</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(t) = (A_{t}) total yearly salary cost (i-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(t)AFN = (A_{t}) net fixed asset from yearly census (i-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(t)I = (A_{t}) yearly tax on assets (i-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Brute formation of fixed capital from index salary and job creation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(i),(j) (index) = (\Delta) Wages,(i)-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages (A_{t}) (= PEAA_{t}) (Wage,)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>where state (= AB,\ldots) and year (i = 1,2,\ldots)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Brute formation of fixed capital per state:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(i) = [ FBFC(i),(j) ((E_{t}) AFN(_t)) ] (\frac{1}{\text{Population}})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{Population})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\sum_{t=1}^{t} E_{t} AFN_{t})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(i)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Brute formation of fixed capital from assets reported by each state:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Relationship between states can be calculated as follows, with (L_{t}) being taxes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(i),(j) - (\Delta) IAA(i),(j)-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC(i),(j) - (\Delta) IAB(i),(j)-1</td>
<td></td>
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</tr>
<tr>
<td><em>Detritus of each of the results from the methodologies</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FBFC = 0.39 I_\text{act} + 0.42 I_\text{AFN} + 0.47 I_\text{imp}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where I_\text{act} = FBFC, I_\text{AFN} = FBFC and I_\text{imp} = FBFC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>To determine the FBFC from the index:</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The index retained the relations of FBFC between states. As such, to convert the estimated FBFC, one must multiply the results of each state by the same calculated number, such as the mean of the national FBFC and the sum of the estimated FBFC for each of the 32 states in the same year (EGAP, IMCO 2006).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion of strengths and weaknesses**

The application of this method is very revealing as it can help prepare states for global competitiveness via the detection of areas of opportunity. The method has some weaknesses, since it is difficult to probe some of the information needed from each entity one wishes to study.

**Example for Visualization of the method**

In this graph, the position of the 45 nations in the Prepared, Healthy, and Inclusive Society subindex are presented for the 2006 index of international competitiveness of the IMCO.

**References and sources**

Knowledge Based Economy, conditions of the Mexican States

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Center for Strategic Studies (CEE)</th>
<th>Year conceived</th>
<th>August 2005</th>
</tr>
</thead>
</table>

Implementations and Analyses


Description

- Structure:
  This model evaluates the potential of federal entities to detonate and consolidate a development process centered around the intensive usage of knowledge in productive activities. The authors determined the degrees of development of the federal entities of each of the components of a knowledge based economy. Twenty-one variables were considered. Following this evaluation, a synthesis of the data gathered from each state was used to generate the state index of knowledge based economy.

- Numerical Algorithm for data processing:
  Each state was given a number from 1-32, with 1 being the most developed and 32 the least.
  \[ K = (32 - R) \times \frac{10}{K} \]
  where \( K \) is the subindex. Values closest to 10 are the best.
  - State Index of knowledge based economy \[ \frac{K_1 + K_2 + K_3 + \ldots + K_n}{n} \]

Scope and constraints

Thanks to this index, one can determine which states have adequate conditions in which to generate a knowledge based economy, and which are lacking. It is neither exhaustive nor infallible in its methodology, given the fact that information is limited and not always pertinent, leaving room for the index to be enriched and fortified (Robles, Molina et Fuentes, 2005). Data for this metric is second and third hand, as it relies on other metrics such as KAM and OECD

Example for visualization of the method

N / A

References and sources

State New Economy Index

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Year conceived</th>
<th>First published 1999, updated in 2002.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressive Policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute (PPI), Robert D. Atkinson &amp; Scott Andes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Implementations and Analyses


Description

-Structure
Developed to measure how and to what capacity each of USA’s states adapt to and manage the New Economy via twenty-nine indicators subdivided into 5 categories which are: 1) job creation in knowledge, 2) globalization, 3) economic dynamism, 4) penetration of digital economy in economic activity and exchange, 5) capacity to innovate. Various statistical techniques are used, with an end result being a ranking of the states according to their internal consolidation of the New Economy.

With these indicators as a frame of reference, each state is able to gain a clearer view of its present situation, as well as areas for opportunity and possible concern in a near future.

- Numerical Algorithm for data processing:
  1) Categorization:
     a. Rank the values according to their standard deviation in order to measure the magnitude of difference.
     b. Based on the average of the majority of indicators, approximately half the states will be assigned positive or negative values.
     c. Adjust the values adding 10 to each category, guaranteeing as such that all values be positive.
  2) Evaluation:
     a. Each indicator is measured according to its importance in order to remove possible conflicts of correlation in the results.
     b. The final score will be evaluated via the sum of the adjusted values in each category.
     c. Total score = Sum of accumulated values / highest value

Thus, each final score per state is represented as a percentage of the value of the first place state in each category.

Scope and constraints
The application of this metric offers great value to nations seeking to gain insight as to state of their efforts in implementation and consolidation of New Economy initiatives per state or region. As mentioned prior, this method also provides areas of opportunity, strengths, and weakness, which could aid nations in becoming more competitive by better focusing their economic and technological efforts.

Example for visualization of the method

N / A

References and sources
<table>
<thead>
<tr>
<th>Cities ranked &amp; rated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authors / Organization</td>
</tr>
<tr>
<td>Year Started</td>
</tr>
</tbody>
</table>

### Implementations and Analyses
- The National Climatic Data Center (NCDC)
- The National Oceanic and Atmospheric Administration
- The US Department of Commerce
- U.S. Census Bureau for population and demographics, commute statistics, and commercial activity
- Bureau of Labor Statistics for economy, employment, and cost of living
- Department of Education, National Center for Education Statistics for education
- Centers for Disease Control and Prevention for health
- Claritas, Inc.

### Description
- **Structure:** Study realized to compare different cities in the United States as well as 27 Canadian cities evaluating the image, character, and standards of living of each city to determine a ranking of each one relative to the others. The indicators group themselves across 10 categories: economy and work, living expenses, weather, education, health, crime rate, transport, art and culture, quality of life, leisure, and free time. The rating is based on nine series of statistical attributes and one subjective appreciation, with adjustments. All categories are pondered according to the needs and interests of the individual citizen and of the family. The model produces a score and rank for each of the nine categories, a composite score, and a ranking per metropolitan area.

  - **Numerical Algorithm for data processing:** Points are assigned to specific attributes within the nine categories. Once the value of a point its results are classified according to its importance and accumulated within the corresponding category. The tenth category, quality of life, is subjective and considered as a general aspect of patrimony and habitability. Once the data is filled in each category, a series of 10 ratings are given to each metropolitan area. Each point is converted via a percentile scale to make comparison easier, after which the categories are accumulated.

### Scope and constraints
This study aims to find the best place to live. Study is conducted at a national level, using second hand sources (census data, etc).

### Example for visualization of the method

N / A

### References and sources
## Global Quality of Living City ranking

<table>
<thead>
<tr>
<th>Authors / Organization</th>
<th>Mercer Human Resource Consulting SA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Started</td>
<td>1996</td>
</tr>
</tbody>
</table>

### Description

- **Structure:**
The main objective of this index is to “aid companies with global or regional presence in defining its compensation packages for expats, considering the living conditions of the destination.” It is utilized by companies to compare the city of origin with the destination and to define, if due, an adequate compensation for the loss in standard of living, typically called hardship allowance.

It relies on 39 factors to determine standard of living, grouped in 10 categories: sociopolitical environment, economic environment, socio-cultural environment, health, schools and education, public services, transport, recreation, consumables, housing, environment

### Scope and constraints

### Example for visualization of the method

N / A

### References and sources

# Urban Competitiveness Index

<table>
<thead>
<tr>
<th>Authors/Organization</th>
<th>América Economía</th>
<th>Year Started</th>
<th>2009</th>
</tr>
</thead>
</table>

**Examples**

- ACI Aero
- Cisco
- CB Richard Ellis
- The Heritage Foundation
- Cybermetrics Lab
- Economatica
- Mercer
- América Economía Intelligence
- World bank
- ISI Web of Knowledge
- PNUD

**Description**

- **Structure:**
  Seeks to synthesize the variables that companies and executives observe when first installing themselves in a city. This indicator is the result of a methodology designed especially to create a ranking of the best cities to do business in. It constitutes a model of over 50 variables divided into two main dimensions: context and differentials.

- **Numerical Algorithm for data processing:**
  Given that variables are in different units, these are standardized in base 100, in such a way that grants the highest value to that most practical, according to the nature of the variable. Some variables were synthesized into subindexes, via averaging of standardized variables. Finally, each indicator was assigned a ponderator proposed by the panel of experts and the two dimensions of the model, leading to the UCI.

**Scope and constraints**

The UCI is a model of great value, and covers a great part of its indicators during the study. Most of the sources are second hand and obtained from organisms such as the World Bank. It also has first hand data from América Economía Intelligence at its disposal.

**Example for visualization of the method**

N / A

**References and sources**

# Index of Regional Competitiveness - Chile

<table>
<thead>
<tr>
<th>Authors/ Organization</th>
<th>Ministry de Planning- Government of Chile</th>
<th>Year Started</th>
<th>1997</th>
</tr>
</thead>
</table>

**Implementations and Analyses**

- University of Chile
- Department of Economic Studies INE
- Department of analysis and public policy of the ministry of planning
- Superintendence of Banks and Financial Entities
- National Institute of Statistics UDAPE

**Description**

- **Structure:**
  This global indicator tries to show the capacity and potential of a regional economic system to generate and maintain sustainable growth in its income per capita of its inhabitants. Seven factors are taken into consideration to generate this index: economic results, companies, people, innovation, science and technology, infrastructure, government, natural resources. It is divided into 26 spheres and 73 indicators.

- **Numerical Algorithm for data processing:**
  Given that there are many scales and construction methods, they must all be scaled from 0 to 1. The following variable standardization model is used:
  
  \[
  Z_i = \frac{X_i - \min(X_i, j = 1, ..., 13)}{\max(X_i, j = 1, ..., 13) - \min(X_i, j = 1, ..., 13)}
  \]
  
  Afterwards, the following formula is used to calculate the index value for each factor:
  
  \[
  I_F = \sum_{i=1}^{n} a_i Z_i, \text{ } I_G = \sum_{i=1}^{n} a_i Z_i
  \]
  
  In making the sum of the weighted values of each factor equal 100, you simultaneously are able to use them to generate the global index. In this version, the simple sum of the factors divided by 100 yields the global index:
  
  \[
  \text{ICR} = \sum_{i=1}^{7} I_i = I_{AG} + I_{P} + I_{EVT} + I_{E} + I_{I} + I_{AB}
  \]

**Scope and constraints**

For the elaboration of this indicator, a series of surveys are applied to different heads of business in the country. It is of great help in identifying strengths and weakness in each region in order to reinforce initiatives to maintain competitiveness in each region. The data is first hand as it comes from their own surveys, but is backed up by second hand sources from government data.

**References and sources**

Regional Competitiveness Index – Peru

<table>
<thead>
<tr>
<th>Authors/ Organization</th>
<th>National Council on Competitiveness - Peru</th>
<th>Year Started</th>
<th>2008</th>
</tr>
</thead>
</table>

**Examples**

**Description**

- **Structure:**
The Regional Competitiveness Index of Peru represents in one number various dimensions of competitiveness of each region, using a very simple method of calculation. It is composed of eight factors: Institutionalism, infrastructure, economic performance, health, education, business climate, science technology and innovation, and natural resource.

- **Numerical Algorithm for data processing:**
  It is calculated via percentile method. For each region, the subindex values were calculated, applying percentile rankings to the values of the corresponding variable. The percentile ranking for variable k for region i is calculated as follows:

\[
\text{Percentile rank } k,i = \frac{\text{Number of variables smaller than variable } k,i}{\text{Number of regions} - 1}
\]

- If variable \( k,i \) is the largest of all variables \( k \), then the percentile ranking is equal to 1. If variable \( k,i \) is smallest of all variables \( k \), its percentile rank equals 0. As a consequence, the value of the subindexes fluctuates between 0 y 1.
- In order to associate the highest value with the best result in the index, the value of “1” was assigned to the best performing variable in each index.
- For example, the GDP per capita subindex maximum value is 36662.20 and the minimum is 2898.98 corresponding to Moquegua y Apurímac respectively.
- The percentile rank of Moquegua is calculated as follows:

\[
\text{Percentile rank } k,i = \frac{\text{Number of regions with values smaller than 36662.20}}{24 - 1} = 1.0000
\]
- Similarly, percentile rank of Apurímac is calculated as follows:

\[
\text{Percentile rank } k,i = \frac{\text{Number of regions with values smaller than 2898.98}}{24 - 1} = 0.0000
\]
- As an example, the rank of Piura (GPS per capita of 7921.33) is calculated like this:

\[
\text{Percentile rank } k,i = \frac{\text{Number of regions with values smaller than 7921.33}}{24 - 1} = 0.6086
\]
- For each region, each of the 8 factors is calculated as a simple average of the subindexes constituting said factor.
- For each region, the Regional Competitiveness Index is obtained as a simple average of the eight factors obtained in the previous step.
- All values of the index are ranked to obtain the ranking of each region.

**Scope and constraints**

It is a useful tool for regions to self-monitor and benchmark against each other. It also helps understand the dimensions of competitiveness, and helps in demonstrating that promoting competitiveness is intimately linked to reducing poverty and increasing the standard of living for a populace. Its sources are all third-hand as they are obtained from the World Bank.

**Example for visualization of the method**

N/A

**References and sources**

### Capital Systems Framework / MAKCi Awards

<table>
<thead>
<tr>
<th>Authors/Organization</th>
<th>Year Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Capital Institute</td>
<td>2008</td>
</tr>
</tbody>
</table>

#### Examples

#### Description

- **Structure:**
  The Capital Systems / MAKCi Framework is based on an assessment of a city’s Urban Capital Systems. The city’s capital base (both tangible and intangible) and its capacity recombine it in innovative ways. The major capital categories are:
  1. Identity capital
  2. Intelligence capital
  3. Financial capital
  4. Relational capital
  5. Human Individual capital
  6. Human Collective capital
  7. Instrumental-material capital
  8. Instrumental-knowledge capital

- **Numerical Algorithm for data processing:**
  As the Framework stresses the taxonomy and systems base, these can be computed through alternative means according to the need at hand. The MAKCi Awards, for example, are based on an annual Delphi study. The Diagnose of Monterrey as Knowledge City, on the other hand, was based on a systematic aggregation of composite indicators.

#### Scope and constraints

This method is based on the “Systems of Capital” paradigm as a method for the visualization and development of knowledge based systems and helps determining the potential of knowledge based development of a city looking at assets and liabilities. It may be applied to several levels (organizational, regional, national, global).

#### Example for visualization of the method

![Diagram](image-url)

#### References

**World Knowledge Competitiveness Index**

<table>
<thead>
<tr>
<th>Authors/Organization</th>
<th>Robert Huggins Assoc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year started</td>
<td>2002</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td></td>
</tr>
<tr>
<td>- Structure:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This index aims to reflect the degree to which knowledge is converted to economic value and transferred to the wealth of citizens of a particular region. The calculation of the World Knowledge Competitivity Index consists of measuring the components of a knowledge based economy of different regions or cities of the world using certain variables and indicators which are later aggregated using factor analysis and data envelopment analysis.</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>- Numerical Algorithm for data processing:</td>
<td></td>
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<tr>
<td></td>
<td>All data are first converted so that the mean and variance of each variable is set at zero and one respectively. After standardisation, factor analysis is applied to simplify complex and diverse relationships that exist among a set of observed variables by uncovering common dimensions or factors that link together the seemingly unrelated variables, and consequently provide insights into the underlying structure of the data. In general, these dimensions are uncorrelated with another. To extract the common part of variations among the original variables (i.e. commonalities), an extraction method called image factoring is employed. The dimensions obtained are then rotated. A rotation varimax method is used with Kaiser normalisation. While identifying common dimensions of the underlying structure, factor analysis also shows the location of each case within the underlying structure, by providing the case’s scores for the dimensions identified. These scores are used for the dimensions as sub-composite indices. Subsequently, these sub-composite indices are aggregated with a view to obtaining a single composite. A quantitative analytical technique called Data Envelopment Analysis (DEA) is used to obtain a single composite index from the above sub-composite indices. DEA is a linear programming technique originally developed for the estimation of the relative efficiency of a set of units (decision making units, DMUs) producing a set of outputs from common inputs. It neither assigns weights to variables with any dependent variable chosen a priori, nor assigns weights set a priori. Instead, it seeks a set of weights for each unit that maximises a weighted sum of variables, with the constraint that no units have a weighted sum larger than one. As a result, each unit receives a score between 0 and 1. This process is repeated for all units in the data set, giving each unit a score unique to each iteration. Finally a geometric mean of all the scores is taken for each unit, providing a DEA score. The DEA model can be stated as follows. Let $x_{ij}$ ($i = 1, ..., m$) be the scores of m sub-composite indices for region $j$ ($j = 1, ..., n$). A composite score of region $j$, denoted here as $C$, is then maximised as: $\max C_j = (V_1 x_{1j} + ... + V_m x_{mj})$</td>
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<td><strong>Scope and constraints</strong></td>
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<td>This method offers the identification of strengths and weaknesses of regional economies in terms of their knowledge capacity and utilization. It offers ample coverage. Data sources are second and third hand, relying on UNESCO, OECD, and others.</td>
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<td><strong>Example for visualization of the method</strong></td>
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<td><img src="image" alt="Graph" /></td>
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<tr>
<td>1. Economic Activity Rate</td>
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<td>2. Number of Managers</td>
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<td>3. Employment in IT and Computer Manufacturing</td>
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<td>4. Employment in Biotech &amp; Chemicals</td>
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<td>5. Employment in Automotive and Mechanical Engineering</td>
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<td>6. Employment in instrumentation and Electrical Machinery</td>
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<td>7. Employment in High-Tech Services</td>
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<td>8. Per Capita Expenditure on R&amp;D by Government</td>
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<td>9. Per Capita Expenditure on R&amp;D by Business</td>
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<td>10. Number of Patents Registered</td>
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<td>11. Private Equity $ Per Capita</td>
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<td>12. Labour Productivity</td>
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<td>13. Mean Gross Monthly Earnings</td>
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<td>14. Unemployment rate</td>
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<td>15. Public Expenditures on Primary and Secondary Education</td>
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<td>16. Public Expenditures on Higher Education</td>
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<td><strong>References</strong></td>
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<td>Robert Huggins Associates (2008), Competitiveness Reports, WKCI 2008, retrieved 25 September 2009,</td>
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Knowledge city models: lessons from a study of the Danish creative class

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Structures abstract

Purpose: The paper analyzes the nature and geography of the Danish creative class, in order to test the relevance of Richard Florida’s propositions in the context of a small, open, welfare economy.

Approach: Relative to incumbent (North American) research on the creative class, the paper has a novel empirical context and approach, combining detailed Danish register labor market data with qualitative interviews.

Originality: The paper’s approach allows it to complement incumbent research, by casting light upon differences between segments of the creative class, and between different city models for attracting the creative class.

Practical implications: The paper offers practitioners an insight into four different knowledge city models that have been successful in Denmark, as well as discussions of policies and pitfalls for cities that wish to attract the creative class.

Keywords: creative class, knowledge city, Denmark.

Paper type: Academic research paper.

1 Introduction

A central component of any policy aimed at improving a city’s knowledge infrastructure is building its attractiveness to human capital — in particular, highly educated labor, or labor central to innovation processes. Much incumbent research has focused on urban amenities as central for the attractiveness of a city to human capital (Roback, 1982; Glaeser et al., 2001; Lloyd and Clark, 2001; Shapiro, 2006). However, the work by Richard Florida and associates (Florida, 2002a; 2002b; 2002c; 2005a; 2005b; 2008) constitutes a different perspective, and has made a notable impact in both the policy and scholarly worlds (e.g. Gertler et al., 2002; Montgomery, 2005; Boyle, 2006; Raush and Negry, 2006; Weick and Martin, 2006). Simplified, Florida argues that in a globalized economy where knowledge constitutes competitive advantage, it is possible to analytically identify a component of the labor force that is particularly important, because it is technically, socially, and/or artistically creative on the job. This creative class within the labor force has particular preferences for amenities such as high-quality housing, work empowerment, and specialized consumption. While the creative class shares these preferences with highly educated labor, Florida is able to demonstrate empirically that the
US creative class has a more unique trait: it prefers to locate in cities with particular high levels of cultural services, ethnic diversity, and tolerance towards non-mainstream lifestyles. Florida further claims that as a result of this preference-driven pattern of location of the creative class, diverse and ethnically and culturally rich cities prosper economically, as innovation-intensive films pursue the creative labor into these cities.¹

Most incumbent research on the creative class is based on North American data. The policy lessons hitherto drawn from this research has, understandably, on the one hand, ignored the potential huge problems in transferring city policies to countries of other sizes and institutions, and, on the other hand, glossed over differences between different city types in each country. This paper seeks to help to remedy these shortcomings, by developing policy lessons from a study of the creative class in a small European welfare economy: Denmark. With a population of only 5.5 million, short distances, a well-developed infrastructure, and with a universal welfare state, Denmark offers an empirical setting that may complement the North American research. The paper hence explicitly seeks to draw policy lessons for cities in small, open welfare economies, and it points towards different city strategies for attracting human capital. The data presented the paper is generated by the European research project “Technology, Talent and Tolerance in European Cities: A Comparative Analysis” (see Andersen and Lorenzen, 2005; 2009; Lorenzen and Andersen, 2009).

The remainder of the paper falls into three parts. Section 2 briefly describes the size and socio-economic characteristics of the Danish creative class, and section 3 tests the applicability to Denmark of Richard Florida’s two central propositions: the “Technology thesis” (the creative class takes a central in regional economic development) and the “Tolerance thesis” (quality of place is a central driver of the location of the creative class). The fourth and final section develops policy insights by pointing to four different Danish city models for attracting the creative class.

2 The Danish Creative Class

2.1 Data sources

Florida (2002b; 2002c) describes the creative class as consisting of bohemians (e.g. artists, designers, and writers), engaged in applying artistic forms of creativity; a creative core (e.g. researchers, engineers, and doctors), applying mostly technical creativity; and creative professionals (e.g. managers, finance people, and lawyers), mainly applying creativity in a generic and managerial sense (for more detailed definitions, see appendix 1). Whereas the creative professionals is the largest subgroup, the creative core has the highest skill levels and accounts for most of the innovation created by the creative class. However, even if the bohemians are relatively few and account for only a modest part of the creative class’ contribution to economic growth, according to Florida, this has the most specialized preferences and is pioneering the preferences of the creative class in general. Aspects of the preferences of the bohemians disperse to the rest of the creative class, creating its “bourgeoisie-bohemian” — or, affectionately, “bobo” (Brooks, 2001) — ethos. All the types of creative labor is approximated by statistics on job

¹ Malanga (2004), Glaeser (2005), Peck (2005), and Scott (2006) are examples of criticisms of Florida’s argument and empirical designs.
functions, and we extracted data from Statistics Denmark’s labor market data base (see Appendix 1).

The statistical unit used to analyze the geographical distribution of the creative class in Denmark is called ‘city regions’ — these are not administrative units, but units based on the population’s residency and commuting patterns. In city regions more than 50% of daily commuting takes place inside the region. In 2004 there were 34 city regions in Denmark. In addition to city regions, municipalities are used as the unit of analysis. See Appendix 1 for more detail.

As supplement to register data, qualitative interviews were also carried out in eight of the 34 Danish city regions. These cities are not a representative sample. Rather, they cover a multitude of different types of cities and were sampled on the basis of a geohistoric analysis, as “critical cases”, examining the role and effect of the creative class in different contexts. These cities fall into three different categories:

- National and regional centers (Copenhagen, Århus, Odense and Ålborg)
- City regions with a large share of the creative class compared to the size of the overall population (Svendborg, Sonderborg and Ærø)
- City regions with a small share of the creative class compared to the size of the population (Esbjerg)

Three different groups of individuals were interviewed. The economic as well as political impact of the creative class was examined through interviews with politicians/public servants, as well as interviews with local business managers of innovation-intensive companies and companies facing or having just completed relocation. Finally, members of the creative class participated in group interviews about their location preferences and lifestyle choices. Each group was constructed to ensure maximum variation on parameters such as age, gender, family, and membership in the different subcategories of the creative class.

2.2 Description of the Danish creative class

The creative class constituted 25% of the Danish labor force in 2004. This figure does not include people who freelance or are self-employed, thus the real figure is estimated as closer to a third of the Danish work force. The creative professionals is the largest subset within the creative class, constituting approximately 2/3, the creative core make up the other 1/3, while bohemians are a very small subgroup of a few percent.

While 22% of the Danish population as a whole has finished higher education, the average educational level for members of the creative class is considerably higher. 44% of the creative class has finished higher education, and thus the creative class is twice as likely as the population at large to have finished higher education. Even if the creative

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2 A revision occurred in 2007, reducing the number of regions to 27, however, the data was collected prior to these changes thus 34 regions are used for the statistical analysis.

3 In 2005 the municipal structure in Denmark was changed and the number of municipalities reduced to 98. While the new structure is relevant for policy-making, the data used in the study is from the period 1995-2004 and thus collected on the basis of the old municipal system. 271 units also create a better basis for regression analysis, for this reason the old municipal system is used if not otherwise mentioned.

4 Higher education is defined as mid-length degrees, i.e. three years, as well as long degrees, five years and more.
class is better educated than the general population, it is noteworthy that more than half does not have a degree. In other words, even if higher education (academic degrees) in some cases is the entrance ticket to a creative job function in industry, a large part of such jobs is not possessed by high education levels. 17% of the Danish creative class is not educated beyond the ten years of compulsive education.

Statistically, the correlation between the presence of the creative class and higher income levels on the regional and city levels is significant. Thus municipalities with a high proportion of the creative class have a more solid tax base. Further analysis of the data shows that the correlation between the location of the creative class and individuals with high income levels is not linear correlation, but exponential. Hence, when a city’s concentration of the creative class surpasses the national average, the process may become self-reinforcing, attracting even more creative people to the city.

It is also worth noting the cultural consumption patterns of the Danish creative class. While Richard Florida suggested that the creative class in North America is attracted to cities with generally high cultural opportunities, his work did not engage in much detail. These questions have been considered in the Danish context and the findings show that not only does the creative class prefer to live in places with many cultural activities; they also consume culture differently than other groups. Even when accounting for the socio-economic differences between the different groupings in the study there are still visible differences between the creative class and the service class when it comes to cultural consumption patterns. Overall, the creative class is more culturally active, creatives attend pop and rock concerts, and visit art exhibitions and art museums, city landscapes and cultural sites more often than the rest of the labor force. In short, the creative class is a major consumer of cultural activities, activities that tends to be urban, individual and flexible.

2.3 The Geography of the Danish Creative Class

The modest size of Denmark influences its geography: There is only one city with a population of more than a million, Copenhagen, and Arhus, the second largest city, has a population of a mere 300,000. This shapes the Danish regional labor market: Academics (in particular, academic couples) find it hard to find specialized career jobs outside of the few larger Danish cities. While Copenhagen offers more career opportunities, these opportunities come with a different set of expectations in terms of life/work balance since most of the major international companies are located in Copenhagen. Large, international companies create the foundation for specialization and highly professionalized environments but they also create high-paced work environments. There is a general tendency for clients, customers, and companies to grow smaller further away from Copenhagen.

The general Danish geography can be traced in the distribution of the Danish creative class: Generally, it agglomerates in the two major cities, measured both by absolute figures and share of the labor market. This aligns with Richard Florida’s North American findings: The abundance of recreational and cultural opportunities in cities are the major

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5 The study of the creative class’ cultural consumption patterns in Denmark differs slightly methodologically from the other parts of the chapter as the bohemians are considered part of the creative core in this study. However, the group is numerically very small and the results are not skewed by the inclusion of this group.
pull factors for the creative class, and the larger the city, the more diverse and specialized opportunities become here. In terms of the population, Copenhagen and to a lesser extent Århus, are the only places in Denmark that are sizable enough to offer the amenities of a metropolis. While Århus can offer business amenities (knowledge institutions, a highly skilled workforce, and a range of hi-tech clusters), but cannot match Copenhagen in terms of finance, administration, and international relations, corporations, and “pipelines”. It is very noteworthy that the third largest Danish city, Odense, does not attract the third largest share of the creative class. In fact, after Århus, the “size” effect seems to taper off, and relatively smaller cities such as Svendborg and Sønderborg account for larger shares of the creative class than Odense.

The data from Denmark also shows that the majority of the creative class elects to live in smaller cities surrounding Copenhagen proper. These cities retain other quality of life such as green spaces, forests and the seaside, but still have easy access to Copenhagen city centre. The creative core, having higher average wages, tends to cluster in the more exclusive northern suburbs of Copenhagen, whereas the creative professionals are more likely to live in the less exclusive and less expensive suburbs south of Copenhagen.

Only the bohemians exhibit a slightly different geography. On the one hand, most of the bohemians, i.e. those embedded in the urban labor market and art scene, agglomerate in inner city areas, such as Copenhagen, Frederiksberg, and Århus municipalities. On the other hand, a distinct component, typically of free-lancing bohemians, is found in very small cities, for example, where there are artist colonies and/or particular scenery.

To conclude, the creative class’ choice of location is dependent on three main factors: employment opportunities, particular city qualities — and purchase power, accounts for much of the differences in location pattern between the creative core, the professionals, and the bohemians.

3 Do Florida’s propositions hold in Denmark?

3.1 Test of the technology thesis

A central component of Richard Florida’s theory is the economic effects of the creative class on economic development. Economic development is a many-facetted notion, and in addition to living standard, should also capture whether a city is at the forefront of the development towards a knowledge economy. In order to measure the economic impact of the creative class on Danish cities, we use three different indicators:

1) A city’s share of high-tech industry; 2) The share of a city’s inhabitants with high incomes; 3) Employment rate. In addition, we analyzed rates of start-up in a city’s industry.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of high-tech industry</td>
<td>0.315***</td>
</tr>
<tr>
<td>Share of people with high personal income</td>
<td>0.537***</td>
</tr>
<tr>
<td>Number of employers per 1000 inhabitants</td>
<td>0.043***</td>
</tr>
</tbody>
</table>

*** Significant level: 0.01

All these indicators have a positive correlation with a high presence of the creative class. However, the strength of the relationships varies. The correlation between the location of the creative class and the location of high-tech industry is moderately strong,
thus it is possible to show statistically that cities with a high concentration of the creative class also experience a strong presence of high-tech industry. The correlation between the location of the creative class and people with high personal income is also moderately strong. Cities with the highest concentration of the creative class are likely to coincide with cities with higher income levels. The location of the creative class is thus connected with wealth and a strong tax base.

While there is a positive correlation between employment rates and the location of the creative class, the correlation is not significant. This is interesting, since employment rates can be considered an indicator of both regional economic development as well as quality of place, since few people would like to live in cities with high levels of unemployment. The poor correlation in 2004 could be explained by Denmark’s very low overall unemployment in 2004.

The relationship between the location of the creative class and these indicators change very little when they are analyzed over time. However, a time series analysis does bring out an interesting observation about a fourth indicator which has not shown impressive correlation in 2004: The rate of company start-ups. In the period 1996 – 2004 there is a clear correlation between the location of the creative class and the growth in the number of companies in an area. This suggests that the creative class either creates or attracts businesses to an area.

Correlation between the location of the creative class and indicators of regional development 1996-2004

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of high-tech industry</td>
<td>0.293***</td>
</tr>
<tr>
<td>Share of people with high personal income</td>
<td>0.624***</td>
</tr>
<tr>
<td>Number of employers per 1000 inhabitants</td>
<td>0.243***</td>
</tr>
</tbody>
</table>

*** Significant level 0.01

Richard Florida’s proposition that the creative class propels economic growth has been heavily criticized, because he could not statistically demonstrate that the presence of the creative class creates city growth, rather than simply being attracted to cities with strong economies. However, our time series analysis indicates strongly that there is a causal relationship between the creative class’ choice of location and an city’s subsequent economic development. Thus, we have been able to test and support one of Richard Florida’s central theses.

Our qualitative interviews lend further insights. More and more Danish companies are outsourcing a part of their production and are only keeping the most demanding and innovative processes in Denmark. As a result the creatives become a fundamental condition for a company’s competitiveness and one of the major challenges is to attract new knowledge in the form of new employees. Companies are dependent on people with the ability to think differently and creatively and this is the case in most industries not merely the creative ones. During the economic boom in the 2000s, when this research was carried out, many Danish companies had to decline orders and projects because they were unable to hire the necessary labor force. Recruiting the creative class can be difficult, particularly, for companies that are not located in major cities. The most talented of the creatives, particularly in technical job functions, have a lot of job offers and are less willing to relocate for work, thus some companies have chosen to relocate the most creative, specialized and knowledge intensive processes to cities where the creative class
lives and wishes to work because the companies are fundamentally dependent on a highly skilled and specialized workforce. These companies have to choose between relocating certain departments and losing their most valuable creative employees. Even in cities with educational institutions companies can find it hard to recruit experienced employees and it might be necessary for them to relocate research and development to another location. In several interviewed companies, creative labor is considered so essential that the companies were willing to relocate departments in order to recruit creatives.

There are major differences in the shortages experienced between the three different subgroups within the creative class. In general companies have less trouble recruiting in the cities, and this is the case for all three subgroups of the creative class. Companies who rely on bohemians have an easier time recruiting than those companies in need of technical creatives. The creative professionals are generally not in short supply but companies located in provincial cities find it harder to attract this group. Overall, most companies have problems recruiting people with a cross-disciplinary skill set, such as engineers with project management experience, artistic creatives with a financial expertise, or creative professionals with specialized technical skills.

In sum, the Danish study shows that there is a correlation between where the creative class lives and city growth. The analysis indicates that the creative class influences a city’s ability to attract individuals with high income levels, the growth in the number of companies and the growth in high tech industries, thus the presence of the creative class affects the tax base, the number of jobs and a city’s ability to develop knowledge intensive industries. These findings are all in line with Richard Florida’s hypotheses.

3.2 Test of the tolerance thesis

Richard Florida’s second central proposition is that it is not merely employment opportunities that attract the creative class to a city, it is also its ‘quality of place’. In order to investigate this proposition, this section presents both a quantitative analysis of the correlation between indicators of different city qualities and the geographical distribution of the creative class, as well as a qualitative, interview-based analysis of the location preferences of members of the creative class.

Richard Florida suggests that tolerance is a core city quality, because it allows for diverse living and work functions, and aligns well with both the creative class’ work and life style preferences. In this work, three indicators of tolerance are used, including a city’s share of homosexuals, its share of cultural workers and artists, and its share and mix of people with different ethnic backgrounds. Slightly different indicators have been used for the Danish empirical analysis. Since homosexuality is considered less of a taboo in Denmark than in the United States, and because no public data about the population’s sexual preferences exists, cities’ share of homosexuals has been replaced with a measure of labor market integration of non-western immigrants as an indicator of tolerance to diversity. In addition, diversity is measured through a combination of labor market and nationality-based indicators such as an area’s share of foreign nationals, the share of non-western nationals who are active in the labor market, and an area’s share of artists and cultural workers. In addition to these indicators, Richard Florida also mentions the importance of recreational activities to attract the creative class, thus an indicator for this has been included, measuring the level of cultural activities compared to the size of the population in a city. Lastly, it is hypothesized that the public services/amenities available
in a city affects its attractiveness, thus a measure of staffing levels in the public sector is used to investigate the relationship between public services and quality of place.

The correlation between quality of place and the size of the creative class 2004

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation Coefficient</th>
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<tbody>
<tr>
<td>Bohemians</td>
<td>0.341***</td>
</tr>
<tr>
<td>Share of foreign nationals</td>
<td>0.129***</td>
</tr>
<tr>
<td>Share of non-western nationals in the labor market</td>
<td>0.160***</td>
</tr>
<tr>
<td>Level of cultural opportunities</td>
<td>0.003***</td>
</tr>
<tr>
<td>Staffing levels in the public sector</td>
<td>0.094***</td>
</tr>
</tbody>
</table>

*** Significant at the 0.01 level

As the table above shows all five variables have a significant positive correlation with the location of the creative class, i.e. cities with a high number of bohemians, many foreign nationals, many non-western nationals in the labor force, numerous cultural opportunities, and high staffing levels in the public sector are likely to have a statistically larger creative class than places that lack these features. However, taken separately each of the variables is only weakly correlated with the location of the creative class; it is the combination of these factors that attracts the creative class.

Examining each of the variables in more detail, the correlation between a high concentration of bohemians and a high concentration of the creative class is the strongest; however, it is still only moderately strong. There are weak correlations between the share of foreign nationals and the location of the creative class, as well as amongst the share of non-western nationals in the labor force and the location of the creative class. Although the correlations are weak, these relationships seem to indicate that the creative class is attracted to city diversity and inclusion and openness to outsiders.

The correlation between the availability of cultural amenities and the location of the creative class is very weak, almost bordering on non-existing. As a strong message to policy makers keen on large-scale cultural ventures such as concert halls, museums, these seem to play no role when it comes to quality of place that may attract the creative class to a city. Likewise, the correlation between the level of public service provisions and the location of the creative class is also very weak, which indicates that while the level matters, it is not a primary concern for the creative class. In the Danish context this may also be a result of the tradition for compensation arrangements between municipalities, traditionally ensuring similar public service provisions across cities. It seems likely that the creative class would desert a city if the level of public service dropped below a certain overall standard.

The strength and significance of the relationships between these indicators of quality of place and the location of the creative class are shown to be consistent over time. The table below shows the correlation coefficient and the significance of the relationship between the five indicators of quality of place in 1996 and the developments in the size of the creative class between 1996 and 2004:

---

6 Even if these features seem to attract the Danish creative class, it should be noted that the Danish creative class is itself overwhelmingly Caucasian.
Analysis of the relationship between quality of place and the creative class over time can indicate the direction of the causal relationship, i.e. whether it is the quality of place that attracts the creative class or whether the creative class impacts the quality of place. The above table shows that there are certain aspects of the quality of place that attract the creative class. However, the analysis does not show a straightforward relationship and most likely synergy exists between cities with a certain quality of place and the creative class. Cities with a high concentration of the creative class focus more politically on the quality of place, thus setting in motion a self-reinforcing effect.

The second part of this study is based on a series of interviews, predominately with members of the creative class about their location preferences. Generally, the creative class put emphasis on access and availability of cultural opportunities. These include major events such as concerts and plays, but also more everyday opportunities such as cafes, community activities and shopping. Whereas Copenhagen and Århus have all these in abundance, for a smaller, provincial city, whether the city has chosen to provide these opportunities can make a very notable difference in the attractiveness to the creative class.

Many of the interviewees emphasized the importance of city spaces; beautiful architecture, cozy squares, green spaces and proximity to water were all highlighted as important factors. Furthermore, specialized shops and lifestyle opportunities are considered essential, housing prices are also increasingly a factor, since particularly young members of the creative class cannot afford the more expensive and desirable locations, and they are increasingly being pushed further outside the major cities since they are not willing to compromise on the quality of housing.

The atmosphere of a city is also highlighted as vital: A number of the interviewees mention a desire to live abroad, but many of them also mention cities they would not want to live in because they are too hardcore – for example Singapore. Instead they prefer places with a relaxed atmosphere, where tolerance is combined with civic participation and inclusion, and a sense of community. Authenticity is also important to the creative class; diversity inspires both their life and work and career opportunities are also a major factor in the creative class’ choice of location. Lastly, there are also practical considerations, the creative class generally does not like commuting, and thus prefer living close to those amenities that provides them with life quality. For many easy access to knowledge institutions, as well as good educational facilities for their children are important factors too. The quality of public services, such as child care, also plays a role, as well as public infrastructure, distances are rarely measured in kilometers but most often in time, thus access to good public transport and roads which shorten travel times is vital. Finally, proximity to family is important too; especially when the creative class has children the grandparents often become a central element in the busy life of the creatives.
4 Danish Knowledge City Models: The Big, the Proximate, the Specialized and the Quaint

Because the Danish case is small in quantitative terms, our analysis of the Danish creative class has allowed us to cast more light upon differences than was possible for Richard Florida’s North American research: We have demonstrated differences between segments of the creative class, differences in priorities and preferences, and differences in the ways different Danish cities attract the creative class. While the Danish creative class is attracted to major cities, these are not the only places where the Danish creative class wants to live. On the one hand, the same trends as identified by Richard Florida in the United States are visible in Denmark; the creative class in Denmark is attracted to diverse cities and the opportunities they offer, which is shown clearly by the skewed geographical distribution of the creative class towards Copenhagen and Århus. On the other hand, because of the small overall size of Denmark, and the presence of a single metropolis, the creative class also value other aspects of cities than purely size. Thus other and smaller cities are also able to attract the creative class.

In this section, we shall seek to synthesize these insights into differences, and sketch out stylized models of cities that are able to attract the creative class.

The Danish findings do concur with Richard Florida’s overall hypothesis, however, the study presents a more complex picture of the choices the creative class makes, since it includes smaller as well as different types of locations than the ones included in the North American research. The creative class in Denmark seeks to balance career opportunities, family life, and recreational activities when choosing where to live. While large cities generally appeal to the creative class; the pulse, pace and diversity of city life draws the creative class, not all of them want to live right at the center of the action. Instead they choose to live in the suburbs or surrounding cities, where they can find peace and quiet and be closer to recreation, while still retaining easy access to the opportunities of a major city. The Danish creative class is also attracted to specific provincial cities often because they have highly specialized industrial clusters, or because of peculiar qualities of place, particularly, character and charm. Consequently, in the Danish context, Århus and Copenhagen, while remaining firmly in place as the first and second most popular cities for the creative class, do not have a monopoly on attracting the creative class.

Generally, in Denmark there are four city models which are particularly attractive to the creative class:

1. Big cities like Copenhagen and Århus
2. Cities that are proximate to major cities such as Solrød, Fanø, and Gentofte
3. Highly specialized cities like Sønderborg
4. Cities with a peculiar quaint quality of place like Svendborg, and Christiansø.

Below, we will discuss these four different types of cities and some related policy implications.

4.1 The Big City Model

Major cities like Copenhagen and Århus do have advantages when it comes to attracting the creative class, in particular, diversity. The major cities offer both diversity as well as specialization, they have numerous industrial clusters, they are the site of several higher education institutions, and they function as knowledge centers. These two

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7 Richard Florida included only cities with a population over 100000 in the original research.
major cities are also better connected to the global infrastructure and transportation. For example, Copenhagen airport is the largest airport in Scandinavia, serving almost 20 million passengers annually. In these cities the number of jobs and services does not merely grow proportionally with population numbers, they grow exponentially, since private companies and service providers are able to find a market for highly specialized goods and services. Thus major cities have disproportional numbers and types of jobs and services, art, diversity and culture all tend to be overrepresented in the major cities. Because the major cities are more diverse and have more of the qualities of place that the creative class looks for, they also have a disproportionate share of the creative class.

The large cities are extremely attractive to the creative class; however, this attractiveness is constantly in danger of eroding through congestion. Large cities may struggle with issues of overpopulation, traffic congestion, pollution, and pressure on public services such as daycare, elder care and health care. Such disadvantages, or simply the risk of disadvantages, adversely affect the attractiveness of Copenhagen and Århus to parts of the Danish creative class. Our interviews reveal that recreational areas and well-functioning public services is very important to attract particular segments of the creative class.

Even the segments of the creative class that appreciate metropolises so much they are willing to disregard some of their disadvantages may be difficult to attract and retain for the big cities, because the global competition between similar metropolises is increasingly toughening. This is an issue for Copenhagen and Århus, the only Danish cities big enough to compete globally for the global creative class as well as international investments. This is the largest strategic challenge facing the large cities; to expand without becoming too congested. Large public investments in infrastructure and environmental improvements are part of the strategy to attract the global creative class as can be seen in North American cities as well as in London. Large cities have markets and customer bases large enough to offer a huge variety of highly specialized goods and services. However, when it comes to service provisions more generally; health care, childcare, elder care etc, the large cities are less competitive. Consequently, continued upgrading of these services (often public services) is an important element in the strategy to attract the creative class.

In the light of these considerations it is clear that Copenhagen asserts a particular pull on the Danish creative class, and that the Danish capital is the motor in the Danish economy which benefits the entire country. The majority of the Danish creative class lives and works in Copenhagen, and the city is also unique in its ability to attract creative foreigners. However, this is not an argument to stop investing in Copenhagen and such investments should not be limited to prestige projects. On the contrary, the city needs continuous investments to further enhance the existing positive dynamics otherwise increased congestion may erode the city’s attractiveness. When compared to its European neighbors such as London, Paris and Hamburg, Copenhagen is competitive, despite its modest size and low level of globalization, because of its quality of place: good infrastructure, beauty and tolerance. However, without continuous investments in these qualities of place; congestion, architectural uniformity, and excessive gentrification can erode Copenhagen’s competitive advantages.

4.2 The Proximate City Model

An other option in order to attract the creative class is quite straightforward; cities in close proximity to major cities tend to attract a disproportional share of the creative class.
The smaller diversity and less specialized services of a small city is not a problem when it functions in tandem with a nearby metropolis. If it is within easy commuting it may be an attractive “living machine” for the creative class. Such proximate cities range from pure commuting cities which must be very close to major cities and be well-integrated into the infrastructure and commuting patterns of the city (for example Værløse and Fanø in Denmark) to provincial cities which are only partly integrated into a major city nearby. The latter cities (such as Roskilde and Randers) combine a relatively short commute with well-developed but less specialized local services and amenities.

The proximate cities compete directly with the major cities for creative class residents. Commuter cities and provincial cities do have certain advantages compared to the major cities; these are lower house prices, better quality of place, as well as better public services, in particular schools and daycare institutions which the major cities may be too congested to offer.

4.3 The Quaint City Model

Within any notable size near proximity to big cities, a third type of Danish cities has managed to attract high shares of the creative class. These cities benefit from a unique quality of place; what we may call quaintness. They are members of an exclusive club of small Danish cities with a particular history still mirrored authentically in the urban landscape. These cities are characterized by particular quality of place, active local art and music scenes, and certain of the creative class value these qualities of place very highly and are willing to live with the often limited public services, limited local job opportunities and long commutes. It is particularly the part of the creative class with especially autonomous or flexible jobs who are able to live in these places. Christiansø is an example of a quaint city, it is very small, far from any major city and lacks industrial specialization, despite these disadvantages the place has a very high share of the creative class, specifically, the bohemians. The same could be said of Svendborg, which is another small quaint city with a lot of historical authenticity and a thriving local milieu which is attractive to the creative class. Unlike Christiansø, Svendborg also benefits from an element of proximity, as it would be feasible to commute to Odense from the city, in effect combining elements of the Proximate with the Quaint city model.

The policy implications of our findings about proximate and quaint towns are particularly relevant for small as well as midsized cities. Small cities generally have limited abilities to attract the creative class, if they are close enough to a major city they may be able to function as proximate cities, attracting a ‘sleeper’ group of creatives. A small share of these cities also has unique cultural, historical or natural qualities that enable them to attract exclusive colonies of the creative class through quaintness. However, for most small cities the best strategy to attract the creative class is through growth, and the focus should mainly be on attracting new habitants and companies in general with less focus on the particular profile of the new residents.

The midsized cities have more options. For them it is not so much about population growth in general, but the right kind of population growth. The choice is often between pursuing a strategy as a proximate or a quaint city, or in some rare cases, a combination of the two. Whichever one of these two types is pursued through for example upgrading housing and service provisions, it is important to preserve the city’s authenticity and local environment. The effects of prestige projects are often short-lived and in a worst case scenario it may sabotage the qualities that attract the creative class to a small or midsized
city; high quality housing and services and the availability of an interesting and engaging
daily life. Local bands, cafes, galleries and artists can be more important than mega-
concerts, annual festivals and large amusement parks. In order to attract the creative class
to small cities, small but frequent experiences that brighten the day have more potential.
Some smaller and midsized cities could make themselves more attractive to the creative
class through growth, if this equals improvements in housing, services and cultural
opportunities. However, their size imposes certain limitations and the type of growth
pursued should seek to maintain and develop those qualities of place that attract the
creative class. Growth that creates the necessary critical mass for specialized services and
cultural opportunities such as health food stores, sushi places and experimental theater
will attract the creative class.

4.4 The Specialized City Model

In the analysis of the Danish creative class it has been possible to analyze smaller
cities in much more detail. These analyses clear show a phenomenon that Richard Florida
did not have the option to dwell on in the American case: A number of relatively small
cities stand out from the general trend that cities become less attractive to the creative
class as they decrease in size. These small cities have a surprisingly high share of the
creative class and they are not proximate to any major city. An example of this kind of
city would be Sønderborg, characterized by an industrial cluster and a highly specialized
labor market for mechatronics. With such a high level of specialization of the labor
market and career opportunities within certain fields, specialized city can attract a small
but potentially vital part of the creative class — in the case of Søderborg, particular kinds
of engineers. Another Danish example would be Ålborg with strong telecommunications
and nanotechnology clusters which attract both engineers as well as scientists.

5 Conclusion

The four city models outlined above show that even if metropolises have certain
advantages, different other models of cities are able to compete for the creative class. It is
clear that the Danish creative class is attracted by many of the qualities of place identified
by Richard Florida, in combination with employment opportunities and good career
prospects. To attract the creative class demands a combination of regional qualities. The
size of the population and the business sector alone are not enough, neither are quality of
place and cultural opportunities. Many creatives have chosen quality of place above
access to career opportunities, however, a lack of opportunities for the creatives limit
certain regions’ ability to harvest the creative class’ potential for creating unique
economic outcomes.

Overall, the Danish creative class moves to cities characterized by greater tolerance
and diversity. Thus, Richard Florida’s two central propositions hold relevance in the
Danish case. Furthermore, the analysis indicates the direction of the causal relationship
i.e. the creative class is attracted by cities characterized by openness and diversity, also line
with Florida’s hypothesis.

From the perspective of the majority of the creative class the choice of location is
often between Copenhagen and Århus, While working hours are similar in the two cities,
commuting is often shorter in Århus, but there are fewer career opportunities there
because headquarters and international companies are most often located in Copenhagen.
Thus the creative class in simplistic terms describes a choice between:
• An exciting job, many career opportunities, but commuting problems and stress in Copenhagen;
• An exciting job, fewer career opportunities and fewer commuting problems, but still stress in Århus;
• Limited job opportunities but a better work/life balance in a provincial city.\(^8\)

Throughout the last decade, the research on the creative class has led to an flood of public policies: Across the world, cities compete to attract the creative class. However, policies have often been one-dimensional, and has relied almost exclusively on readings of research on the North American creative class. Failing to take differences between cities, and between national contexts, into account, many policymakers have aimed at developing similar policies, regardless of the size and endowment of their urban constituency. In effect, these policies have pitted provincial towns against major cities, and seem to suggest that they should compete on the same qualities of place. The study of the Danish creative class, presented in this paper, suggests that different strategies should be developed for different cities. In Denmark alone, we have demonstrated four, quite different, but all successful, models of attracting the creative class. In other national contexts, there may be more, and policymakers should investigate before applying policies. One size does not fit all.

Furthermore, it is important to recognize that it is combinations of city qualities that work together to attract the creative class. While some creatives choose their location based on rational considerations about career opportunities, financial considerations etc, others do choose to follow their heart. Those cities that appeal to both hearts and minds have the best chance of attracting the creative class. The cities which possess only one of these two dimensions, whether it is size, diversity or industrial clusters, the missing dimension will limit their growth and success. Those city regions with the largest creative class have managed to combine a thriving business sector with a high quality of place.

Finally, our analysis shows that factors such as the level of public services provision and cultural institutions may sometimes matter surprisingly little in the location choices of the creative class. The main reason for this in Denmark is the even distribution of services across the cities. While it seems likely that if a city dropped below a certain minimum standard it would drive away the creative class, the results also indicate that large-scale investments into cultural infrastructure do not automatically attract the creative class. The creative class is more likely attracted to small, local, vibrant creative environments. It is not the huge stadium concert that will attract the creative class, but the presence of bohemians who makes a city vibrant – the creative class prefers quality over quantity when it comes to cultural offerings.

References

\(^8\) Of course, certain parts of the creative class, for example doctors and teachers, can find good career opportunities across Denmark.


Appendix 1. On the data base and the definitions employed

The data used in this paper is the result of a common European project with participation from Denmark, Finland, Germany, the Netherlands, Norway, Sweden, Switzerland, and the UK. We chose countries with a high level of economic development for reasons pertaining to availability of data, in order to avoid very large effects of different political regulation regimes upon the distribution of the creative class, and in order to avoid problems with integrating data from economically less-developed countries with high urban primacy with countries with more perfect rank-size urban hierarchies (for problems of incorporating less developed countries into such data sets, see Soo, 2005).

Partners from all countries have participated to developing the variables in the dataset in order to ensure the best possible homogeneity between the European countries as well as possibilities for comparability between European and North American analyses of the creative class. The source of the data varies between the European countries. Data for the Nordic countries (Denmark, Finland, Norway and Sweden) is register data supplied by the national statistical bureaus, containing accurate information on the whole population. For the remaining countries, data is national census data supplied by the national statistical bureaus, containing information on a substantial and representative sample of the national populations.

To ensure comparability between the European countries, city regions are used as unit of analysis. The European countries use slightly different definitions of a city region, however they all correspond to Eurostat’s NUTS 4 regions. NUTS 4 (which after 2003 are called “Local Administrative Units, level 1”) are in fact not administrative, but functional regions which should capture metropolitan regions akin to those used by Florida used (of course, there are subtle differences between EU countries in how NUTS4/LAU1 are defined statistically). Hence, NUTS4 are an appropriate regional unit for minimizing cross-regional travel-to-work and other spillovers. The majority of people living in one NUTS4 region is likely to also work there, and use the services there.

The point of departure for each variable in the dataset is the indicators developed and presented by Florida (2002c) in his analyses of the creative class. This paper employs the following variables:

- **Population**: number of all inhabitants (residents).
- **The creative class**: the share of the employed residents occupied within creative professions defined as the ISCO codes 245 (Journalism, art, and writing), 3131 (Work with sound, light and pictures related to photography, film and theatre), 347 (Work within art, entertainment, and sports), 521 (Modeling), 211 (Work with in physics, chemistry, astronomy, meteorology, geology, and geophysics), 212 (Work with in mathematics and statistics), 213 (IT planning and development), 214 (Architecture and engineering), 221 (Work within biological natural science), 222 (Work within medicine, odontology, veterinary science and pharmaceutics), 231 (University and college teaching), 232 (High school teaching), 233 (Elementary school teaching), 234 (Specialty teaching), 235 (Other work related to education), 243 (Work related to information and distribution of culture), 244 (Work within social science, humanities and high level social work), 247 (Work related to administration of the law within the public sector), 1 (High level management), 223 (Midwives and high level nursing), 241 (Work related to the organization and economy of business), 242 (Work within law), 31 (Technical work in non-biological areas), 32 (Technical
work in biological areas), 341 (High level sale and marketing), 342 (Business services), 343 (Administrative work), 345 (Work related to police investigation), and 346 (Work related to social guidance and care).

- **Cultural opportunity index:** the number of employees in a city region working in industries with NACE 553 (Restaurants and related activities), NACE 554 (Bars, night clubs, cafés and related activities), NACE 921 (Film and video), NACE 922 (Television and radio), NACE 923 (other entertainment), NACE 925 (Libraries, archives, museums and other cultural activities), NACE 926 (Sports)

- **Hi-tech jobs:** the share of the employees in the city region, who work within hi-tech industries defined as the NACE codes 244 (Manufacture of pharmaceuticals, medicinal chemicals and botanical products), 300 (Manufacture of office machinery and computers), 321 (Manufacture of electronic valves and tubes and other electronic components), 322 (Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy), 323 (Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods), 331 (Manufacture of medical and surgical equipment and orthopedic appliances), 332 (Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment), 333 (Manufacture of industrial process control equipment), 334 (Manufacture of optical instruments and photographic equipment), 335 (Manufacture of watches and clocks), 341 (Manufacture of motor vehicles), 342 (Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers), 343 (Manufacture of parts and accessories for motor vehicles and their engines), 353 (Manufacture of aircraft and spacecraft), 642 (Telecommunications), 721 (Hardware consultancy), 722 (Software consultancy and supply), 723 (Data processing), 724 (Data base activities), 725 (Maintenance and repair of office, accounting and computing machinery), 726 (Other computer related activities), 731 (Research and experimental development on natural sciences and engineering), 732 (Research and experimental development on social sciences and humanities), 742 (Architectural and engineering activities and related technical consultancy), 743 (Technical testing and analysis), and 921 (Motion picture and video activities)

- **The creative class is further divided into three subgroups:**
  - **The creative core:** the share of the employed residents occupied within specific (technical or educational) creative professions defined as the ISCO codes 211, 212, 213, 214, 221, 222, 231, 232, 233, 234, 235, 243, 244, and 247.
  - **The creative professionals:** the share of the employed residents occupied within specific (generic or managerial) creative professions defined as the ISCO codes 1, 223, 241, 242, 31, 32, 341, 342, 343, 345, and 346.
  - **Bohemians:** the share of the employed residents occupied within specific (artistic) creative professions defined as the ISCO codes 245, 3131, 347, and 521.
Abstract

The Ruhr in Germany is a polycentric city region with a population of more than 5 million. Dominated by coal and steel production, the cities in this powerful industrial region had no university. Though the region had a very skilled industrial labour force, and an excellent vocational training tradition, higher qualified engineers and managers were educated at public universities outside the region (Aachen, Hannover, Braunschweig and elsewhere). A very successful political development initiative by the state of North Rhine-Westphalia in 1960 led in the decade to follow to the establishment of new public campus universities in Dortmund, Essen, Duisburg, and Bochum. All major universities in Germany are state universities). However it took more than forty years to turn the industrial cities into knowledge cities. Although coal mining and steel production has almost come to an end in the region, the cities do still not feel like being gown towns, like Heidelberg, Goettingen or München. In addition, in the absence of a powerful integrating regional authority city politics in the Ruhr are traditionally very much focused on local municipal territories. Regional cooperation is rather the exception than the rule.

In 2010, caused by increasing regional competition in Europe, and realizing that the spatial integration of the universities is unsatisfactory, the local governments, led by the urban development department of Essen, started an initiative to overcome municipal boundaries and turn the knowledge cities to an integrated knowledge region. The unique strategic bottom-up process of integration, involving all major stakeholders of the regional knowledge society (picked in person from universities, other institutes of higher education, local economic development and urban development departments, research institutes, research foundations etc.), will be presented in the paper. The expected
outcome of the CampusRuhr initiative is a spatially and mentally integrated network of modern knowledge institutions in the former industrial region.

Keywords – knowledge cities, knowledge regions, knowledge Ruhr

Paper type – Academic Research Paper

Knowledge society, knowledge cities, knowledge regions: much rhetoric, little action?

In the 21st century knowledge has become a precious local and regional resource for post-industrial territories, which have been severely affected by the economic and social implications of structural change. To compensate for the loss of industrial monopolistic power, and to remain competitive in a world economy, the new global division of labour forces cities and regions in Europe (and beyond), to develop knowledge as a local and regional resource. Consequently, preparing for the knowledge society has become the new political challenge. This requires action at all tiers of governance. In Europe, where higher education is still a domain of the public sector, it depends on policies and strategies at four or even five tiers of government, from the local and regional, to the national and European tier. As a rule, policies at higher levels of planning and decision-making target knowledge institutions and their respective environments, by promoting innovation and research. Thereby the spatial dimension of developing the knowledge environment is often neglected or remains weak. The European Union provides more funds for international research and means for innovative approaches to regional development, to remain competitive with North America and Asia. National governments, or state governments, as in the Federal Republic of Germany gradually increase budgets for education and research to contribute their share to European knowledge strategies and to maintain their influence. Where regions have a role in knowledge development, they promote regional innovation, formulate regional strategies and implement policies from higher tiers. Finally local governments shift their attention from industrial parks to knowledge environments. They aim to better respond to the spatial and social requirements of developing the knowledge environment.

Polycentric city regions, like the Ruhr in Germany, are facing particular problems, when pursuing knowledge strategies. As a rule they have to bring together self-confident local governments and to overcome traditional intra-regional jalousies. Thereby they have to rely to a large extent on external financial support from higher tiers of government. Worldwide there are very few examples where polycentric city regions were able to overcome the many impediments for joint knowledge strategies.

In this paper the enormous efforts of an old industrial region in Germany will be sketched, to turn into a knowledge region, changing from coal mining and steel production to knowledge development. Suffering from multiple legacies of a glorious industrial past, the Ruhr in Germany is in a comparably weak position to compete with other metropolitan city regions in the country, such as Munich, Stuttgart, or Berlin.

The approach of the CampusRuhr Initiative, presented thereafter, is a unique strategic bottom-up process of spatial policy integration, involving major stakeholders of the regional knowledge society (picked in person from universities, other institutes of higher education, local economic development and urban development departments, research institutes, research foundations etc. The expected outcome of the CampusRuhr Initiative
is a spatially and mentally integrated network of modern knowledge institutions in the former industrial region, condition the region to become an integrated knowledge environment. The efforts are still in the beginning, though it may be worthwhile to share the experience and encourage other city regions to undertake similar initiatives.

6 The Ruhr: from coal and steel to knowledge production

Until the early 1960s, the cities in this powerful industrial region had no university. Albeit the Ruhr, dominated by coal and steel production, had a very skilled industrial labour force, and an excellent vocational training tradition, higher qualified engineers and managers were educated at public universities outside the region (primarily in Aachen, Cologne, Münster, Hannover, Clausthal-Zellerfeld or Braunschweig). Academically qualified knowledge workers were not trained in the region. Consequently academic knowledge milieus, profiling the region, were absent. Knowledge development was in the hands of the large and powerful coal and steel corporations. Not surprisingly the local political elite evolved from working class milieus and trade unions. Hence a regional knowledge culture, beyond the regionally rooted iron and steel milieus could not evolve.

In 1960, things started to change. A far-sighted political initiative by the State of North Rhine-Westphalia launched a new vision for the region. During less than a decade the State Government (All major universities in Germany are state universities!) took action and established new public universities in Dortmund, Essen, Duisburg, and Bochum. However, it took more than forty years to root higher education in the traditional working class milieus and turn the industrial cities into emerging knowledge cities. Although coal mining and steel production has almost come to an end in the region, the cities do still not feel like being gown towns, such as Heidelberg, Goettingen, Marburg or Tübingen. Given the social fabric of the cities, dominated by blue colour industries focussing local development on the promotion of future oriented white knowledge industries, would not find political majority. To respond to the challenges of structural change (and globalisation), the cities in the region are rather competing than joining forces. Consequently, regional cooperation is rather the exception than the rule. And given the strong tradition of local self-government, the established regional authority is too weak to set-up a strong regional agenda for accelerated knowledge development. The State of North Rhine Westphalia, the strong political institution, which is quite independent from the Federal Government of Germany, cannot urge the region to review their local development priorities. The influence of the state is rather indirect by granting financial support for selected local projects. Given the explicit federalist structure of Germany, the national Government has only little power. Only via national industrial and labour policies it has a chance to influence and guide regional economic development policies.

The Ruhr in Germany is a polycentric city region with a population of more than 5 million and a few large cities, such as Essen, Dortmund, Duisburg, Bochum and Gelsenkirchen. The densely populated region is divided among three provincial authorities, which execute state policies and control local governments. Though the region has a unique institution, the Siedlungsverband Ruhrkohlenbezirk. Almost hundred years ago the region formed a regional authority to guide regional spatial planning and development. At that time this authority has been much admired abroad for its innovative regional agenda. This authority is still in place, though it has changed its name twice. Today it is governed by representatives of eleven municipal governments and four
counties, looking over another 42 local governments and by representatives of labour and corporate associations. Following the logics of representative democracy, regional knowledge institutions do not have a voice in the regional assembly. Without much political legitimacy, and manoeuvring between a strong state and powerful local governments, this institution is very weak. Without much political legitimacy, and manoeuvring between a strong state and powerful local governments, this institution is very weak. It has no power over local governments, and is not legitimized to act in key policy fields such as transport, energy, housing, economic development or even education and research. What remains are among others, regional marketing, waste management or forestry. Even regional intelligence is not a strong action area of the authority. Given this weak stance, aggravated by traditional intraregional jealousies the regional institution is not in a position, and is not requested or encouraged by the local governments to develop longer-term future oriented development strategies. Co-ordinating efforts of local governments and developing a regional knowledge profile, is not a prime concern of this established regional authority in the Ruhr.

7 The Ruhr 2010: An impressive knowledge landscape.....

Mapping the impressive success of half a century of efforts to restructure a powerful old industrial landscape into a modern knowledge environment reveals the magnitude of changes in the region. Up to 1960 coal mines and steelworks in the region dominated the regional economy and a huge labour market. Together with the related forward and backward linkages in logistics, chemicals and heavy machinery production, the majority of jobs were depending on the industry, which dominated the regional economy. Today, just four mines are still exploiting coal, and, according to political decisions made in the beginning of the new millennium, all coal mining will come to an end in the region, by 2018, mainly for environmental reasons. The Ruhrkohle AG, the powerful coal corporation, headquartered in Essen, has already changed its name into Evonik, a corporation involved in chemical and various non coal related production in the region and branches all around the world. Only one steel work in Duisburg is still producing raw steel in the Ruhr. Other steelworks have been demolished and replaced by shopping centres, as in Oberhausen or dismantled and transported to China, as the Westfalenhütte in Dortmund. Wherever, local initiatives new spatial pioneers succeeded to gain access to derelict pits and production sites, protected as industrial heritage, they turned it into locations for culture, and related cultural and creative industries. Knowledge industries, following the rationales of state ministries for education and research, economics and labour, as well as university boards, did never grasp the chance to turn industrial brownfields into knowledge establishments. A legacy of the industrial past, where educational priorities were set on the qualification of a skilled blue collar labour force, and the dual system of professional education in Germany, is the fact that only 8.6 percent of the labour force in the region had a university degree in 2005, and only 20 percent of high school graduates were eligible for studying at a university.

Nevertheless, comparing the state of knowledge industries in the Ruhr in 2010, the changes are impressive. In 2010, 15 institutes of higher education are located in the Ruhr. Six universities (the Technical University in Dortmund, the universities in Duisburg/Essen and Bochum, The University of the Arts Essen, the small private university in Witten-Herdecke and the Distance Learning University in Hagen) and 9 Colleges of Applied Arts and Sciences (Fachhochschulen) are located in the polycentric region. With the exception of Oberhausen, all cities in the Ruhr with a population of
more than 100,000 have their own local institute of higher education. They provide undergraduate and graduate education for around 165,000 students. 60 percent of these students origin from the region, only 13 percent are students from foreign countries, mainly from China, the countries of South East Europe and the Middle East. Every year 20,000 students enrol in one of the regional institutions of higher education. More than 10,000 teaching staff and researchers are working at these knowledge institutions and in a plethora of public and semi-public research institutes and science centres which have been established all over the region during four decades of strategic regional restructuring, among them four Fraunhofer-, four Leibnitz- and three Max Planck–Institutes. (Traditionally, a considerable share of basic and applied research activities are done outside institutes of higher education in Germany). Together they form impressive innovative knowledge cores in the former industrial region. In their neighbourhood more than 30 technology and science parks have been established. They have become the cradles of innovation and future oriented technologies and the home of many new firms and enterprises. They add new fields of knowledge and expertise in nano-, plasma and bio-technologies, in environmental and life sciences or in communication and information sciences, to traditional areas of competence such as logistics and energy production. Additionally, the particular challenges of structural change in a region dominated for a century by heavy industries, have nurtured the evolution of expertise in basic and applied regional science, which is increasingly sought after beyond the Ruhr. All this forms a dense network of innovative knowledge institutions, which employ a new generation of regionally educated and trained knowledge workers and attract international talents from beyond the region. This, in the beginning of the 21st century the Ruhr does easily benchmark with the density of knowledge industries in other metropolitan regions in Germany. The impressive transformation of the Ruhr from a traditional industrial knowledge region to a modern post-industrial knowledge region is still in progress. Given the gigantesque task, it will require a few more decades to bring this transformation to an end, respectively to a new cycle of innovation.

Figure 1. Institutes of Higher education in the Ruhr
Figure 2. Technology and Science Parks in the Ruhr

8 . . . . though, a knowledge region with a few shortcomings

When exploring the knowledge dimension of the transformation process in the region in the beginning of the new millennium, however, some shortcomings can not be overlooked:

- The international image of the region as an innovative science region is still weak. It reflects the low international profile of the young, though economically strong state of North Rhine-Westphalia. This makes the region comparably less attractive for international elite students and scholars in comparison to more appealing cities such as Munich and Berlin, or to internationally renowned universities, such as Heidelberg, Karlsruhe or Aachen. This does not reflect a lower scientific quality of the regional institutions of higher education. It is rather the consequence of a traditionally much introverted nature of the region, the absence of hospitality and the dearth of cosmopolitan and media covered lifestyle milieus. After having successfully graduated from universities in the Ruhr, many international students proceed for further qualifying doctoral and post-doc studies to the United States or other more Anglophobe countries, while only few students from abroad are successfully attracted encouraged to continue their research career in the region.

- When, the first new universities were established by the state government in the 1960s and related research establishments followed, they could not be located at the inner city sites of the traditional industries. Like out-of-town shopping malls they had to be built as campus universities on virgin land at the outer fringe of the cities and far from
built-up areas, though without the facilities of traditional campus universities as known from renowned the Anglo-American institutions. Following early criticism of the academic community in the region only the university of Essen was built on a former derelict site at the edgy of the city centre. The power of the established regional industries, owning most of the land in the region, did not allow more forward-looking locational decisions. This, obviously, slowed down the integration of the new knowledge institutions into the cities of Bochum, Duisburg and Dortmund, spatially, economically and socially. Today the cities are confronted with two urban development challenges. They have to find new uses for abundant industrial brownfields in the inner city. And they have to overcome the locational disadvantages of the pragmatic decisions made a few decades ago, when selecting appropriate sites for the new universities.

- The presence of the regional institutions of higher education in the cities is not visible. Mostly located at the outer fringe of the cities, the functional university buildings are not representative elements of the polycentric urban landscape, not palpable parts of every day city life. Student milieus did not generate alluring student entertainment quarters in the precincts of the universities, attractive alike to students, researchers, to citizens and tourists. Mainly for pragmatic and financial reasons derelict industrial buildings were not considered to be appropriate structures for modern knowledge institutions. Universities are not integrated into the urban landscape. They are seen rather as factories on knowledge islands producing degrees than as urban symbols of knowledge and civic pride. Housing policies in the region, traditionally targeting miners, steelworkers and related working class communities, did not accommodate the particular needs of housing for the new academic middle class. Consequently, no urban districts emerged satisfying the requirements of the new urbanites.

- Even after almost half a century universities and knowledge institutions are still not an integral part of the regional society. Although much acclaimed in local and regional marketing brochures, they are not an essential target of urban and regional policies, nor a fully acknowledged element of strategic local development. Local political circles are still over-dominated by representatives of the traditional industrial complex. The generational change from miners and steelworkers to IT managers or eco-science knowledge workers is progressing very slowly. It seems there are still many mental cultural and ideological barriers to be removed. Only few representatives of the new knowledge class are sitting in local councils. Hence the interests and requirements of the new scientific community are not well articulated in local planning and decisions-making processes. It reflects the facts that the managerial class of the regional industries and the academic class of the regional knowledge institutions are still two much separated communities, with only few communication bridges. On both sides, external linkages are usually favoured over local and regional ones.

- Not surprisingly, a significant deficit in the region is the absence of regional discourse milieus. In absence of intellectually profiled regional media, and the lack of a strong regional identity, regional discourse does hardly take place. Though again and again single efforts have been undertaken to promote a joint regional identity, local parochialism dominates. Regional solidarity is only expressed if the Ruhr is being criticised for its mentality to ask for public subsidies for promoting structural change and for cushioning the severe social implications of the long transformation process. A joint regional vision of necessary action for regional structural change does not exist. As soon as suggestions for the necessary functional division of labour in the region are being made, resistance is being expressed from local stakeholders, killing
any effort for concentrated action. In addition it is known, that the state government of North Rhine-Westphalia, being afraid of loosing regional balance, does not support a strong Ruhr, speaking with one voice and challenging the leadership of the state government.

In the past, no major effort was undertaken, either by the state government, or by the established regional authority to embark on a joint regional knowledge strategy. Only the three universities signed a contract to overcome their isolation and to cooperate in selected fields of concerted action. It seems, however, that the cooperation is rather symbolic than real. The fear of state government intervention and the worry to lose individual freedom prevented the institutions to agree on a better division of labour. Hence there is still much to do to profile the polycentric city region as a knowledge region, regionally, nationally and internationally.

9 Campus Ruhr: A municipal grassroots strategy

In 2010, caused by increasing competition in the country and in Europe, and realizing that the spatial integration of the universities is unsatisfactory, the local governments started an initiative to overcome municipal boundaries and turn the single knowledge cities to an integrated knowledge region. Inspired and led by the urban development department of Essen, a small group of persons committed to the region, not to single cities, and being aware of the need to support the knowledge transformation of the region, came together, to jointly explore ways and means for developing a regional knowledge strategy from below. From below means that the initiative, labelled CampusRuhr Initiative was not triggered off by the university rectors in the region and not set in place and financed by the state government. Supported politically by the major cities in the Ruhr, the heads of urban planning departments promoted the initiative and authorized the urban development departments of Essen and Bochum to take action. Persons, invited to join the ambitious group came from institutions, which were involved in knowledge development, held positions as stakeholders for furthering knowledge development in the region, or promoted regional development for innovation and knowledge advancement. The members of the kick-off group were invited as knowledgeable and influential individuals, committed to the field, deliberately not as representatives of knowledge regional institutions. This was done to avoid time-consuming representative action, which by regional experience rather slows down consensus finding processes or even grid-locks decisions to change the status quo in the region.

After agreeing on the need for such an initiative, in a first round, a regional conference was organized to attract a larger regional audience and seek consensus for further strategic action. Most cities and many stakeholders of regional knowledge institutions attended the event, articulated their expectations and contributed their knowledge to the initiative. They agreed that a regional strategy to profile the whole region, - not single cities-, as a knowledge region, has to be developed and implemented. The inviting initiators of the event and the participants were aware that a long way has to be gone, to orchestrate cities and to win unanimous support from all the knowledge institutions and related knowledge industries. Three concerns dominated the discussion. First, what are the explicit regional, and not local dimensions of such a strategy? Second,
how should a regional strategy, which bridges local governments with knowledge institutions, be elaborated and who should do it? Third, who would be willing to finance the development of such a strategy, given the stance that it should evolve from below and not as a strategy imposed from the state government, with all the implications for ideologically motivated political intervention. Given the innovative character of the strategy, it would be almost impossible to convince local governments in the region to share the costs. Their weak financial status in times of the financial crisis would not allow them to invest in activities, which are not mandatory for local governments. Too many voices would raise their discord. Obviously such concerns could not be pushed aside during this first event, though the participants were aware that adequate ways have to be explored to deal with such fear and the implications for individual cities and institutions. In turn it was much easier to consent on the nature of regional challenges and on necessary fields of action for a joint regional strategy. Major challenges to profile the Ruhr as an internationally competitive knowledge were seen to be factors like the ones mentioned above, though particularly

- The low international image of the region as a knowledge region for a number of reasons, though mainly due to the absence of internationally renowned prestige universities;
- The lack of a powerful regional authority, and the lack of visionary regionally legitimized leadership;
- The lack of explicit spatial policies to develop attractive knowledge quarters in the region.

Similarly, essential fields of a strategic agenda action, identified in this first round of communication, easily found consensus. They were:

- Enhancing the cosmopolitan profile of the region;
- Improving the regional accessibility of the knowledge locations;
- Paying more attention to the spatial dimension of knowledge development in the region;
- Raising visibility of the knowledge complex in the city;
- Attracting international conventions and congresses to the region;
- Improving conviviality and international hospitality for knowledge workers;
- Marketing the region as a place for advanced studies and post doc research in areas, where the regional knowledge complex has particular competence;
- Raising the interest of regional media in the knowledge dimension of regional development;
- Improving the communication among knowledge institutions in the region and between the knowledge complex and regional communities;
- Increasing the political representation of knowledge workers in local parliaments and in the regional assembly.

The initiative had a good start. It encouraged the small group of regional knowledge enthusiasts to further commit to and follow up the project, and to continue where windows of opportunities were open. They were aware that a municipal grassroots strategy in a polycentric city region, which is burdened with all the economic, social, environmental and political legacies of its industrial past, requires much communication, mutual understanding, tolerance and patience, and the willingness of the knowledge institutions to closer cooperate with their local institutions, while pursuing their academic goals and objectives.
A comparative knowledge-based urban development analysis: Vancouver, Melbourne and Manchester vs. Boston

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Structured Abstract

Purpose – The purpose of this paper is to introduce a knowledge-based urban development assessment framework, which has been constructed in order to evaluate and assist in the (re)formulation of local and regional policy frameworks and applications necessary in knowledge city transformations.

Design/methodology/approach – The research reported in this paper follows a methodological approach that includes a thorough review of the literature, development of an assessment framework in order to inform policy-making by accurately evaluating knowledge-based development levels of cities, and application of this framework in a comparative study – Boston, Vancouver, Melbourne and Manchester.

Originality/value – The paper, with its assessment framework, demonstrates an innovative way of examining the knowledge-based development capacity of cities by scrutinising their economic, socio-cultural, enviro-urban and institutional development mechanisms and capabilities.

Practical implications – The paper introduces a framework developed to assess the knowledge-based development levels of cities; presents some of the generic indicators used to evaluate knowledge-based development performance of cities; demonstrates how a city can benchmark its development level against that of other cities, and; provides insights for achieving a more sustainable and knowledge-based development.

Keywords – knowledge city, knowledge-based development, knowledge-based urban development, assessment framework

Paper type – Academic Research Paper

1 Introduction

In the 21st Century, the demand for knowledge capability diminishes the significance of material factors resulting in a new era dominated by knowledge. Particularly in this era of the knowledge economy, knowledge-related activities, including creativity as a tacit knowledge form, have become central to creating employment and wealth, sustaining economic growth, and place-making (Friedmann, 2010). In the global knowledge economy, knowledge-intensive industries and knowledge workers are extensively seen as the primary factors needed to improve the welfare and competitiveness of cities. To attract and retain such industries and workers, cities produce knowledge-based urban development (KBUD) strategies, and this strategising has become an important
development mechanism for cities and their economies. Beyond this, KBUD is also being seen as the development pathway of the emerging knowledge cities (Yigitcanlar et al., 2008b). The process of planning and implementing KBUD approaches is neither quick nor simple. This is already understood by the research community, which has begun to concentrate its efforts on developing appropriate frameworks, methodologies, tools, systems, and metrics in the last few years. Taking into account of these developments in the field, this paper discusses the critical connections between knowledge city foundations and integrated KBUD mechanisms.

In particular, the paper develops a conceptual understanding of KBUD that supports knowledge city formation and generation, as well as attraction and retention of investment and talent. Following this, the paper introduces a KBUD assessment framework developed to provide a clearer understanding of the local and regional policy frameworks, and relevant applications of KBUD for cities to become prosperous knowledge cities. The paper, and the KBUD assessment framework, demonstrates a method for measuring knowledge-based development capacity of cities by scrutinising their economic, socio-cultural, enviro-urban and institutional development mechanisms and capabilities. It also compares the KBUD characteristics of four knowledge cities: Boston, Vancouver, Melbourne, and Manchester.

The paper is prepared in six sections, and the remainder of the paper is structured as follows. Section 2 provides an overview and gives relevant background to the knowledge-based development of cities and their transformation into knowledge cities. Section 3 provides more detailed information on KBUD and its processes. Section 4 presents the KBUD assessment framework. Section 5 reveals the results and discusses the findings of the comparative study of Boston, Vancouver, Melbourne, and Manchester. Section 6 concludes with a discussion on the role of KBUD in knowledge city formation and the benefits of using the assessment framework to evaluate and assist in the (re)formulation of local and regional knowledge-based development strategies.

2 Background

Over the last several decades, we have witnessed major economical, technological, social and environmental changes that have significantly impacted the patterns of urbanisation, human activities and lifestyles. During the past few years, the challenges of globalisation, knowledge economy, climate change, network society, transportation technologies, information and communication technologies, global division of labour force, rapid urbanisation, and shrinkage of cities have become important topics of discussion (Yigitcanlar, 2010a). Particularly, the need for new spatial arrangements for cities to better cope with these challenges, and the necessity of adjusting city structures in order to become more compatible with the knowledge economy are among the most popular issues, and have heavily occupied the agendas of scholars, decision-makers and practitioners (MacKinnon et al., 2002). These issues surfaced the need for developing and adopting new urban planning, development and management mechanisms to foster the sustainability of cities and make them resilient to change (Yigitcanlar, 2010b).

In recent years, we have also witnessed the birth of new concepts and paradigms that started to effect urbanisation and ease the impacts of the abovementioned change and challenges. Carrillo (2004) categorised these new concepts and paradigms under four groups: dematerialisation (i.e. a lesser volume of material inputs and outputs); environmentalism (i.e. a greater concern with sustainability); experience upgrade (i.e. the
capacity to attain the same results without the conventional means of space and time), and; essentialism (i.e. the understanding and pursuit of ever more fundamental values).

Up until recently urbanisation has been viewed primarily from the perspective of urban planning with a focus on the physical form and built environment of cities (e.g. on land use zoning, building and infrastructure), and very little consideration has been given to the knowledge resources or the cultures that produce knowledge. Traditionally, the emphasis has been on attracting tangible forms of production (i.e. labour, land and capital), and knowledge as an intangible asset was often ignored (Knight, 2008). With the advent of these new challenges, concepts and paradigms, greater attention needs to be shown in the restructuring of cities, so that they are able to house more knowledge-based activities and knowledge becomes a major source for local development (Metaxiotis et al., 2010).

The types of environments which need to be developed for knowledge-based activities differ significantly from those developed by commodity-based activities, and thus call for different development strategies. The most immediate impact of the knowledge economy in relation to the urban environment is the reduction in displacements made possible by the telecommunication technologies (i.e. changing working, schooling and shopping patterns). According to Graham (2002), present configuration, organisation and lifestyles within urban centres are more the inheritance of tribal, hierarchical and material production patterns than they are good examples of urban design with a strong culture fit for knowledge societies.

One of the crucial tasks for cities in the era of knowledge economy, which is characterised by globalisation, is that cities need to create environments where knowledge resources are valued, conditions are conducive to their development, and knowledge resources are securely anchored (Yigitcanlar et al., 2008a). With this perspective, the key conditions that contribute to the development of knowledge cities are outlined by Knight (1995) as: the community is able to define, perceive and value knowledge as a form of wealth; the city acknowledges the importance and contribution of knowledge worker; the city is able to make the public understand the nature and role of knowledge; knowledge resources are located considering regional contexts; priority is given to improving knowledge infrastructure; all members of society have access to careers in knowledge-based activities; the city is promoted as a centre of excellence; incentives and mechanisms are offered favouring investment in local knowledge resources; the city has a forward-looking vision, which emphasises knowledge and other immaterial factors and; civic leadership is developed.

The rationale for developing or transforming cities into ‘cities of knowledge’ or ‘knowledge cities’ is widely accepted by scholars, decision-makers, practitioners and developers (Carrillo, 2006; Van Winden et al., 2007; Yigitcanlar et al., 2008b; Ergazakis et al., 2009). However, traditional urban planning and development approaches do not provide a clear picture of how to form new development strategies that are knowledge-based or how to use urban planning mechanisms effectively to realise the knowledge-based development of cities. These vital questions put urban planning under the microscope and question its compatibility with the new conditions of the era of knowledge economy.

The rise of the knowledge economy has become the new main driver of global and local economic development, and achieving sustainable development – by creating a strong urban core, harnessing its economic strength, addressing social exclusion, and avoiding physical and environmental dereliction – has been the aim of urban planning in
the era of knowledge economy (Yigitcanlar et al., 2009). However, traditional normative urban planning lacks the vision and capacity to deliver a sustainable and knowledge-based development. To date, the structuring of most of the cities has proceeded organically, as a dependent and derivative effect of global market forces. Urban planning has either responded slowly or not responded at all to the challenges and the opportunities of the global knowledge city (Yigitcanlar et al., 2008c). A decade into the new century the economic success of knowledge-based development policies in a number of cities and nations have led urbanists to consider whether existing policies are applicable to the knowledge-based development of cities – in other words, whether or not knowledge-based development can be planned. In recent years, this has led urban planning to consolidate its interest in the paradigm of post-modern social production under the rubric of ‘KBUD’ (Yigitcanlar and Velibeyoglu, 2008; Velibeyoglu and Yigitcanlar, 2010). Today examples around the globe (Yigitcanlar, 2009) confirm that it is possible to develop cities as or transform cities into knowledge cities, as long as appropriate and tailored KBUD policies are developed and implemented successfully.

3 Knowledge-based urban development

KBUD is a new form of development in the era of knowledge that aims to bring economic prosperity and environmental sustainability with a just socio-spatial order to cities (Yigitcanlar et al., 2009). The goal of KBUD is to produce a city purposefully designed to encourage the production and circulation of abstract work – a knowledge city (Cheng et al., 2004; Yigitcanlar et al., 2008c). The promise of KBUD is a secure economy in a human setting, and it has four major purposes: economic, socio-cultural, enviro-urban and institutional development.

Economic development codifies technical knowledge for the innovation of products and services, market knowledge for understanding changes in consumer choices, financial knowledge to measure the inputs and outputs of production and development processes, and human knowledge in the form of skills and creativity, within an economic model (Lever, 2002; Laszlo and Laszlo, 2007). Particularly in the era of knowledge, success in economic development is highly correlated with a city’s ability to adapt in the knowledge economy (Nguyen, 2010).

Socio-cultural development indicates the intention to increase the skills and knowledge of residents as a mean for individual and community development (Gonzalez et. al., 2005). Social and human capitals of a society are seen highly interrelated with its high level achievements in socio-cultural development (Frane et al., 2005).

Enviro-urban development builds a strong spatial network relationship between urban development clusters while driving an urban development that is ecologically friendly. In this sense, sustainable urban development and quality of life, particularly in the knowledge community precincts, play a significant role in the spatial formation of the citywide sustainable KBUD strategies (Yigitcanlar et al., 2008d; Yigitcanlar, 2010c).

Institutional development is key to orchestrating the KBUD and bringing together all of the main actors and sources so that they are able to organise and facilitate necessary knowledge-intensive activities and plan strategically for knowledge city formation (Yigitcanlar, 2009). The literature indicates that governing the KBUD via institutional leadership makes a big difference in achieving the knowledge city status (Baum et al., 2007).
These four development areas form the key pillars of the KBUD: economy, society, environment, and management. Along with these four pillars, sustainability and organisational capacities are also crucial for successful knowledge-based development of cities and regions (Figure 1).

Figure 1. Pillars of knowledge-based urban development

4 Evaluating the knowledge-based development levels of cities

Accurate evaluation of KBUD is central to determining knowledge-based development performance and levels of cities and benchmarking their achievements in knowledge-based development against successful knowledge cities. It is also central to informing policy-making as it points towards new strategic directions that will support realising development that is more sustainable and knowledge-based.

Analysing and evaluating cities’ knowledge-based development performances requires utilisation of an accurate KBUD assessment framework. Although there are a number of frameworks developed for ranking cities considering their different characteristics by various institutions (i.e. Anholt, City Mayors, Foreign OECD, Policy, Mercer, UNDP, World Bank, World Capital Institute), currently there are not any knowledge-based development assessment frameworks available for a comprehensive KBUD evaluation. The research reported in this paper develops a ‘KBUD assessment framework’ to specifically evaluate knowledge-based development performances of cities. Specifically tailored for the nature of the comparative KBUD assessment study presented in the following parts of this paper, the assessment framework contains two indicator sets for each of the four KBUD pillars, and four indicators for each of the eight indicator sets, totalling to 32 indicators (Table 1).

Following key literature’s lead, each of the 32 indicators are selected on the basis of measurability, analytical soundness, comparability, geographic coverage, data
availability, and relevance. In order to provide more accurate comparison, the use of proxy data for indicator values is avoided. All of the indicators are selected from a large indicator pool by using a multivariate analysis to determine the most suitable ones for each of the KBUD pillars. Multivariate analysis is also employed to see the correlations between indicators, look for causal relationships, and identify the dominance of any indicators.

4.1 Economic development

The first domain or pillar of KBUD is economic development (see Figure 1). The literature indicates that in determining the economic development level of a city, in the era of knowledge-economy, the key variables or indicators are mainly selected in relation to city’s ‘economic structure’ in general and its ‘knowledge economy performance’ in particular (Anand and Sen, 2000; The New Zealand Government, 2007; World Bank, 2008).

In this KBUD framework, indicators related to ‘economic structure’ are selected as: Gross domestic product; Gross domestic product growth; Foreign direct investment, and; Household disposable income (see Table 1).

Indicators related to ‘knowledge economy performance’ include: Research and development expenditure; Patents; Knowledge workers, and; Knowledge intensive services.

4.2 Socio-cultural development

The second pillar of KBUD is socio-economic development and, in line with the literature findings, the key indicators used in the evaluation of socio-cultural development are grouped under the ‘social and human capitals’ and ‘culture and dependency’ indicator sets (World Bank, 1996; OECD, 1998; Stone, 2001).

Indicators related to ‘social and human capitals’ consist of: Educational attainment; Tertiary education students; Major university reputation, and; Access to broadband.

Indicators related to ‘culture and dependency’ are: Workplace cultural diversity; Societal cultural diversity; Socio-economic dependency, and; Unemployment.
<table>
<thead>
<tr>
<th>Pillars</th>
<th>Indicator Sets</th>
<th>Indicators</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic development</td>
<td>Economic structure</td>
<td>Gross domestic product</td>
<td>Gross domestic product per capita</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gross domestic product growth</td>
<td>Rate of total gross domestic product growth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign direct investment</td>
<td>International share in foreign direct investment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Household disposable income</td>
<td>Growth rate of household disposable income</td>
</tr>
<tr>
<td></td>
<td>Knowledge-economy performance</td>
<td>Research and development expenditure</td>
<td>National share in research and development expenditure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patents</td>
<td>Share of national patents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge workers</td>
<td>Ratio of knowledge workers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge-intensive services</td>
<td>Ratio of knowledge-intensive service employment</td>
</tr>
<tr>
<td>Socio-cultural development</td>
<td>Social and human capitals</td>
<td>Educational attainment</td>
<td>Educational attainment rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tertiary education students</td>
<td>Ratio of tertiary education students to population</td>
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<td></td>
<td></td>
<td>Major university reputation</td>
<td>Global ranking of the major university</td>
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<td></td>
<td></td>
<td>Access to broadband</td>
<td>Access to broadband rate</td>
</tr>
<tr>
<td></td>
<td>Culture and dependency</td>
<td>Workplace cultural diversity</td>
<td>Cultural diversity ratio at workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Societal cultural diversity</td>
<td>Ratio of overseas and interstate migrants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Socio-economic dependency</td>
<td>Age-population ratio of those in- and not in the labour force</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unemployment</td>
<td>Unemployment rate</td>
</tr>
<tr>
<td>Enviro-urban development</td>
<td>Sustainable development</td>
<td>Eco-city status</td>
<td>International eco-city ranking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sustainable transport</td>
<td>Ratio of sustainable transport</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sustainable urban development</td>
<td>Statutory development plans emphasising sustainability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Climate change mitigation</td>
<td>Strategies in place for climate change adaptation or mitigation</td>
</tr>
<tr>
<td>Quality of place and life</td>
<td>Housing affordability</td>
<td>Housing affordability</td>
<td>Median house price ratio to median annual income</td>
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<tr>
<td></td>
<td>Cost of living</td>
<td>Cost of living</td>
<td>International cost of living ranking</td>
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<tr>
<td></td>
<td>Personal safety</td>
<td>Personal safety</td>
<td>International personal safety ranking</td>
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<tr>
<td></td>
<td>Quality of life</td>
<td>Quality of life</td>
<td>International quality of life ranking</td>
</tr>
<tr>
<td>Institutional development</td>
<td>Governance and planning</td>
<td>Dedicated development authority</td>
<td>Knowledge-based urban development authority</td>
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<td></td>
<td></td>
<td>Strategic planning</td>
<td>Strategic planning for knowledge-based development</td>
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<td></td>
<td></td>
<td>Partnerships</td>
<td>Triple helix and public-private partnerships</td>
</tr>
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<td></td>
<td></td>
<td>E-Governance</td>
<td>International e-Governance ranking</td>
</tr>
<tr>
<td>Leadership and community</td>
<td>Local and regional leadership</td>
<td>Local and regional leadership</td>
<td>Local and regional level leadership</td>
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<tr>
<td></td>
<td>City branding</td>
<td>City branding</td>
<td>International city branding</td>
</tr>
<tr>
<td></td>
<td>Public participation</td>
<td>Public participation</td>
<td>Public participation in decision making</td>
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<tr>
<td></td>
<td>Income inequality</td>
<td>Income inequality</td>
<td>Income inequality</td>
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</tbody>
</table>
4.3 **Enviro-urban development**

Enviro-urban development is the third pillar of KBUD, and a thorough literature review supports the key indicator sets – ‘sustainable development’ and ‘quality of place and life’ (Hemphill et al., 2004; Hezri, 2005; Singh et al., 2009).

Indicators selected for ‘sustainable development’ include: Eco-city status; Sustainable transport; Sustainable urban development, and; Climate change mitigation.

Indicators related to ‘quality of place and life’ consist of: Housing affordability; Cost of living; Personal safety, and; Quality of life.

4.4 **Institutional development**

The final pillar of KBUD is institutional development. In light of the literature findings, the key indicators in the assessment of institutional development are clustered around two main indicator sets of ‘governance and planning’ and ‘leadership and community’ (Aron, 2000; Wilson and Beaton, 2003; Brinkerhoff and Morgan, 2010).

Indicators related to the ‘governance and planning’ indicator set include: Dedicated development authority; Strategic planning; Partnerships, and; E-Governance.

Indicators of ‘leadership and community’ are: Local and regional leadership; City branding; Public participation, and; Income inequality.

5 **A comparative knowledge-based development analysis**

In order to demonstrate the utility of the KBUD assessment framework, this paper reveals the results of applying the framework in a comparison of four successful city cases across the globe – Boston, MA, USA; Vancouver, BC, Canada; Melbourne, VIC, Australia; and Manchester, UK. The purpose of this comparative study is to demonstrate how the framework operates and provide a *raison d'être* for further in-depth analysis of KBUD of cities across the globe.

The first criterion for selecting these case studies was that the city was either considered for nomination, or nominated, or acknowledged by receiving a mention or an award at the World Capital Institute’s Most Admired Knowledge Cities Awards (MAKCi – www.worldcapitalinstitute.org/makci.html – also see Garcia, 2009) within the last four years. The second criterion was cities within English speaking countries, so as to ease the comparison process – i.e. data availability in English and comparability of the governance systems.

The study area boundaries take into account metropolitan impacts, and therefore, rather than city boundaries, areas containing metropolitan urban centres and localities have been selected for the four cases (i.e. Greater Boston, Greater-Metro Vancouver, Metro Melbourne, and Greater Manchester). Boston, Vancouver, Melbourne, and Manchester, when considered with their metropolitan regions, have a comparable population, area, density and median age. These salient features of the four case studies are listed in Table 2 below.
Table 2. Salient characteristics of the case cities

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Boston</th>
<th>Vancouver</th>
<th>Melbourne</th>
<th>Manchester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>4,588,680</td>
<td>2,116,581</td>
<td>3,371,888</td>
<td>2,573,500</td>
</tr>
<tr>
<td>Area</td>
<td>7,393</td>
<td>2,422</td>
<td>6,816</td>
<td>1,281</td>
</tr>
<tr>
<td>Density</td>
<td>620</td>
<td>874</td>
<td>495</td>
<td>2,009</td>
</tr>
<tr>
<td>Median age</td>
<td>34.50</td>
<td>34.00</td>
<td>36.30</td>
<td>35.00</td>
</tr>
</tbody>
</table>

This empirical study’s key comparison factors, the indicator pool, have been selected by considering the recently expanding literature on knowledge-based development. As explained in the previous section, a multivariate analysis was undertaken to refine the number of the indicators – eight for each of the KBUD pillars. In order to explore and evaluate the generic KBUD potentials of Boston, Vancouver, Melbourne and Manchester, the research focuses on the aforementioned 32 important features, or key indicators, of KBUD (see Table 1).

The methodology used in this analysis includes literature review, best practice analysis, government and international non-profit organisation policy document content analysis, review of the city rankings conducted by non-profit and commercial surveying organisations, and statistical analyses of the fundamental data from governmental and non-governmental organisations that provide a comparison between the four knowledge cities.

The main datasets used for the statistical analysis are obtained from the following resources:

- The World Bank, World Development Indicators Database
- The United Nations, e-Government Survey
- OECD, Statistics Portal
- OECD, Composite Leading Indicators Database
- MERCER, Worldwide City Rankings
- The Anholt City Brands Index
- QS, World University Rankings
- Internet World Statistics, World Internet Usage and Population Statistics
- USA Census Bureau, Census 2000 and 2006-2008 Community Survey
- Australian Bureau of Statistics, Census 2006 Community Profiles
- Statistics Canada, Census 2006 Community Profiles
- Local Economic Development Agency Reports
- Local Social and Community Development Agency Reports
- Local Environmental Protection Agency Reports
- Local Urban Planning and Development Agency Reports
- Local Institutional Development Agency Reports
- Relevant Literature and other (non-)Government Policy Documents

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Once the datasets were collected, each indicator value was normalised in order to allow comparison between cases. Normalisation of the datasets is particularly helpful for identifying outliers and highly skewed values, so that scale adjustments can be made when necessary.

Assigning an appropriate weighting for indicators is important and helps to verify correlation and compensation between indicators. However, for this comparative study, in the interest of simplifying the analysis, an equal weighting (3.125%) was assigned to all indicators (see Appendix 1).

This empirical study has several limitations. The first limitation is that the indicators are equally weighted. Ideally, different weighting values need to be assigned to each indicator based on their importance. In this instance, the purpose of an equal weighting for all indicators is to simplify the assessment process.

For comparative studies of this kind, the robustness of the findings needs to be tested by focusing on the process of inclusion or exclusion of single indicators, normalisation, the imputation of missing data, the aggregation method, and the choice of weights that might influence the scores and rankings. The second limitation of this study is that only a brief testing of the robustness and sensitivity of the findings, through the review of the literature on different KBUD aspects of the cities of comparison, has been done due to complex nature of working in four different country contexts.

The last limitation of the study is that data was not available from the same period for all of the indicators. This is mainly due to the extensive limitation of data availability. In this comparative study, dates of the datasets fluctuate between a time span of 2005 and 2010, which is a relatively short limiting time frame.

5.1 Economic development analysis

The literature raises the importance of analysing various geographic levels to determine the economic development capacity of a metropolitan region (Agenor and Montiel, 2008; Pacione, 2009). In this empirical analysis, hence, the macro (national and international) and meso (state or regional) geographic level economic performance indicators are measured along with the micro (local) geographic level economic indicators. In all case studies, out of eight economic development indicator values, three are collected in national, two in regional (state) and three in local levels.

The first indicator set in the economic development pillar of KBUD is the economic structure. While in the ‘gross domestic product’ and ‘foreign direct investment’ areas Boston was leading other three cities with the figures of $81,499 and 17.54% respectively, in the ‘gross domestic product growth’ Melbourne and in the ‘household disposable income’ area Vancouver took the lead with 2.29% and 5.66% respectively. The scores of these four indicators determined the overall economic structure, and assigned Boston the top ranking, followed by Melbourne, Vancouver and Manchester.

The second indicator set in this pillar is the knowledge-economy performance. In measuring the knowledge-economy engagement of the four case cities, Melbourne showed the best performance in the eras of ‘research and development expenditure’ and ‘patents’ with the figures of 29.31% and 21.40%. On two factors Vancouver and Boston easily outperformed the other cities: Vancouver with 47.51% on the ‘knowledge workers’
and Boston with 50% on ‘knowledge intensive services’. In the knowledge economy indicator set, Melbourne led, followed by Vancouver, Boston and then Manchester.

Not surprisingly in terms of overall economic development, Boston ranked best performing city and receives the normalised top score of 100, while Melbourne becomes the first runner-up (94.23), Vancouver the second (76.26) and Manchester the third runner-up (53.88) (see Appendix 1 and Table 3).

5.2 Socio-cultural development analysis

The research measures socio-cultural development at the local level by focusing on the critical social and cultural development aspects of the four study areas.

The first indicator set of the socio-cultural development pillar of KBUD is social and human capitals. In this indicator set, Vancouver shows a higher performance than the other three cities, particularly in the areas of ‘education retainment’ and ‘access to broadband,’ with 45.93% and 42.60% respectively. In the ‘tertiary education students’ variable Melbourne with 3.57% and in the ‘major university reputation’ Boston, with Harvard University being the world’s top ranked university, dominate the other cities. In the social and human capitals indicator set Vancouver’s lead is followed by Boston, Melbourne and then Manchester.

The second indicator set of the socio-cultural development analysis is culture and dependency, and in this area Boston and Vancouver show a clear dominancy over the other cities. For the indicators of ‘workplace cultural diversity’ and ‘socio-economic dependency’ Boston with 44.40% and 0.76 respectively, and in the indicators of ‘societal cultural diversity’ and ‘unemployment’ Vancouver with 21.09% and 4% respectively are proved to be much stronger than the other competitors. In the culture and dependency indicator set Boston takes the first place and Vancouver, Manchester and Melbourne follow Boston’s lead.

In the overall ranking of the cities in the socio-cultural development pillar of KBUD Vancouver (99.70) lags behind Boston (100) by a small margin, and Manchester (83.11) and Melbourne (78.41) take the third and fourth places.

5.3 Enviro-urban development analysis

The KBUD assessment framework evaluates enviro-urban development through two key indicator sets that measure the levels of sustainable urban development and the quality of life.

The first indicator set of this pillar is sustainable development. In three indicators of this set, ‘sustainable transport’ (45.3%), ‘sustainable urban development’, and ‘climate change mitigation’, Boston receives the highest scores, but the other three cities each score very well and only a narrow margin behind. Among the four case studies, Vancouver ranks the best in moving towards achieving the ‘eco-city status’ (13th in 100 cities). The overall ranking for the sustainable development indicator set is, from the highest first, Boston, Melbourne, Vancouver and Manchester.

The second indicator set to define the levels of enviro-urban development is quality of place and life. Vancouver and Manchester dominate this category. Vancouver takes the first place in the international ranking of ‘personal safety’ and ‘quality of life’ (22nd and 4th in 100 cities). Manchester is ranked the best in the comparison in ‘housing affordability’ (4.57%) and in the ‘cost of living’ (ranked 141st in 150 cities). This result
marks Vancouver as the city with highest quality of life and place. Manchester comes as the second, then Boston and Melbourne.

The overall ranking of enviro-urban development places Boston (100) to the top of the list, Vancouver (87.23) takes the second, Melbourne (82.56) with a small margin the third and Manchester (72.25) the fourth place.

5.4 Institutional development analysis

The final pillar of KBUD is institutional development. The KBUD framework utilises two indicator sets to evaluate institutional development: governance and planning, and leadership and community.

The first indicator set is governance and planning. In this set, Boston dominates other cities with achievements in ‘partnership’ and strong ‘e-governance’ systems and experience. Vancouver demonstrates outstanding ‘strategic planning’. With the ‘Manchester: Knowledge Capital’ institution, Manchester shows world leadership in having ‘dedicated development authority’ to oversee knowledge city formation and KBUD. Melbourne follows Manchester with the ‘Office of Knowledge Capital’ and ‘Enterprise Melbourne’ institutions. In this indicator set the ranking of the cities emerged as Manchester, Boston Melbourne and Vancouver.

The second indicator set for the institutional development evaluation is leadership and community. In this indicator set, Boston and Melbourne strongly dominate the other cities. Boston leads the other three cities in establishing ‘local and regional leadership’ and ‘public participation’, where Melbourne is extremely successful in ‘city branding’ (8th in 100 cities) and in achieving relatively lower levels of ‘income inequality’ (0.30).

In the overall ranking of institutional development in comparing the four case studies, Boston (100) leads the other cities by only a small margin: Melbourne (98.53), Vancouver (97.20) and Manchester (91.37).

5.5 Knowledge-based urban development analysis

The analysis has shown that in all four pillars of KBUD Boston overachieves when compared to the other three knowledge cities. Vancouver took the second place twice in the socio-cultural development and enviro-urban development pillars, where Melbourne took second place in the other two KBUD pillars, economic development and institutional development. On the pillars where Melbourne ranked second, Vancouver ranked third. Melbourne ranked third in the socio-cultural development, and Manchester ranked third in the enviro-urban development. Overall, Manchester underachieved against Boston, Vancouver and Melbourne.

The overall ranking of the four case cities are formed by averaging and normalising the scores they received from each pillars of KBUD. The analysis result has revealed that with the normalised top point of 100, as expected, Boston is the city with highest capacity and achievements in KBUD. Boston is followed by Vancouver with a score of 90.42 and Melbourne with 88.68 and lastly Manchester with a score of 75.85 (Table 3).
Table 3. Results of the comparative analysis

<table>
<thead>
<tr>
<th>Pillars</th>
<th>Indicator Sets</th>
<th>Boston Score</th>
<th>Normalised</th>
<th>Vancouver Score</th>
<th>Normalised</th>
<th>Melbourne Score</th>
<th>Normalised</th>
<th>Manchester Score</th>
<th>Normalised</th>
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<td>100.00</td>
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<td>62.82</td>
<td>70.27</td>
<td>26.56</td>
<td>29.71</td>
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<td>Knowledge-economy performance</td>
<td>60.34</td>
<td>77.08</td>
<td>67.89</td>
<td>86.79</td>
<td>78.28</td>
<td>100.00</td>
<td>54.12</td>
<td>69.14</td>
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<td>Economic development total</td>
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<td>100.00</td>
<td>57.10</td>
<td>76.26</td>
<td>70.55</td>
<td>94.23</td>
<td>40.34</td>
<td>53.88</td>
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<td>Social and human capitals</td>
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<td>93.41</td>
<td>76.97</td>
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<td>82.73</td>
<td>58.13</td>
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<td>Culture and dependency</td>
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<td>100.00</td>
<td>77.26</td>
<td>93.51</td>
<td>57.62</td>
<td>69.59</td>
<td>70.44</td>
<td>85.07</td>
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<td>78.41</td>
<td>64.29</td>
<td>83.11</td>
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<tr>
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<td>Sustainable development</td>
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<td>100.00</td>
<td>69.44</td>
<td>71.92</td>
<td>72.95</td>
<td>75.56</td>
<td>48.34</td>
<td>50.07</td>
</tr>
<tr>
<td></td>
<td>Quality of place and life</td>
<td>65.42</td>
<td>91.06</td>
<td>71.64</td>
<td>100.00</td>
<td>60.77</td>
<td>84.59</td>
<td>68.69</td>
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<td></td>
<td>Enviro-urban development total</td>
<td>80.99</td>
<td>100.00</td>
<td>70.64</td>
<td>87.23</td>
<td>66.86</td>
<td>82.56</td>
<td>58.52</td>
<td>72.25</td>
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<tr>
<td>Institutional development</td>
<td>Governance and planning</td>
<td>82.81</td>
<td>94.79</td>
<td>81.18</td>
<td>92.93</td>
<td>82.20</td>
<td>94.09</td>
<td>87.36</td>
<td>100.00</td>
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<td></td>
<td>Leadership and community</td>
<td>94.49</td>
<td>100.00</td>
<td>91.15</td>
<td>86.47</td>
<td>92.50</td>
<td>97.89</td>
<td>74.64</td>
<td>78.99</td>
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<tr>
<td></td>
<td>Institutional development total</td>
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<td>100.00</td>
<td>86.17</td>
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<td>87.35</td>
<td>98.53</td>
<td>81.00</td>
<td>91.37</td>
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<tr>
<td>Knowledge-based urban development</td>
<td>Knowledge-based urban development total</td>
<td>80.46</td>
<td>100.00</td>
<td>72.75</td>
<td>90.42</td>
<td>71.35</td>
<td>88.68</td>
<td>61.04</td>
<td>75.85</td>
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</tbody>
</table>
It is important to note that the ranking provided by the empirical research should not be interpreted to say that any of these cities is not performing well enough to sustain the knowledge city status. One of the purposes of using the KBUD assessment framework on highly successful knowledge cities is to show how the KBUD performance levels of the cities compare with the other benchmark cities. In this case, Boston (Greater Boston) was selected as a benchmark city to compare how Vancouver, Melbourne and Manchester’s perform in KBUD.

The analysis has shown that Vancouver is quite a competitive city, with opportunities in economic performance and institutional development, and in particular having a dedicated authority to oversee the KBUD of the city and the region.

Melbourne continues to rise in the Asia-Pacific region and is moving rather quickly to become the ‘Boston of the Southern Hemisphere’, with strong support from state and local governments, industry and businesses, university and research institutes and the unique ‘Office of Knowledge Capital’ and ‘Enterprise Melbourne’ Institutions. However, Melbourne still has a long way to go particularly in the socio-cultural and enviro-urban development areas in order to rival Boston’s performance.

Manchester seems to be endeavouring diligently to regain the performance levels realised during the industrial revolution by fully adapting to the era of knowledge economy. The Manchester example also shows us that staying on top often proves a much harder and daunting task than to getting to the top. Particularly, Manchester illustrates to cities aspiring to hold knowledge city status the importance of institutional development with its successful institution of ‘Manchester: Knowledge Capital’ and its achievements in a relatively short period of time.

6 Conclusion

In the knowledge era, cities need to adjust their local economies so as to be compatible with the global knowledge economy, and to develop strategies to become more competitive in order to succeed in the global competition for attracting investment and talent. However, just having a strong economy is not sufficient for cities to become competitive knowledge cities. Socio-cultural, enviro-urban and institutional developments are also as important. Therefore, this paper revealed that in the age of knowledge economy, in order to achieve prosperity, spatial restructuring of cities requires considering and responding to the all four pillars of KBUD for a successful knowledge city formation.

Cities focused on the KBUD can adjust their local economies and spatial development policies so as to be compatible with the global knowledge economy. Also, by developing KBUD strategies to become more competitive, cities set the course that will enable them to gain the success they seek in global competition by providing socially just, ecologically sustainable, and organisationally strong city structures for attracting the right investment and talent. In the knowledge economy, urban areas can and should pursue knowledge-based development. Succeeding in such development will raise standards of living in the region and expand economic opportunity for residents.

The literature review and the comparative cities study provide some useful insights that other cities could consider while planning KBUD. These insights are grouped under five key points:

Firstly, a comprehensive approach is needed to develop knowledge cities. Solely focusing on economic means proved not to be successful. Therefore, cities should give
enough and equal attention to all pillars of KBUD – economic, socio-cultural, enviro-
urban and institutional development pillars. Beyond these pillars, the comprehensive
KBUD approach should also embed a strong sustainability and organisation capacity in
its development process.

Secondly, KBUD is a daunting task, and therefore, policy makers need to be aware of
the global economic, science and technology conditions operating in the world today.
There is an increasing competition from other regions to attract scientists and industry
talent; knowledge carriers and whole teams are often targeted by other players to move
institutions and knowledge bases. Therefore, planning and commercial strategies can
certainly be structured directly to enhance the relevance of knowledge produced in a
 certain space but the conditions for high intensity of knowledge traffic are much more
complicated than, for instance, the strategic use of land.

Thirdly, government policies, also at the local level, have a critical role to play in
‘fostering the conditions’ where intellectual vitality is made up of intensive collaboration
networks that attract and retain knowledge carriers – i.e. agents, firms and workers.
Partially this emphasis on the ‘local’ responds to the view that local institutions,
businesses, organisations and academia are partners in fostering local development and
are part of the local innovation system where they are embedded.

Fourthly, although learnings from other city experiences and exogenous assets are
most valuable in strategising KBUD, policy makers also need to build their niche and also
unique development characteristics based on their endogenous assets. Only in this way
cities could be able to achieve a successful KBUD that will help them to form their
successful knowledge cities.

Lastly, benchmarking analysis like in the case of the KBUD assessment framework
presented in this paper would help cities to compare their potential and achievements and
benchmark their progress against the high achiever knowledge cities such as Boston. It is
the comparative analysis that makes possible the gap analysis which informs the specifics
of KBUD strategies and how they could be re(formulated) to close the gap and move the
city in the needed direction.

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Knowledge Management, 8(5), 28-46.


## Appendix 1. Comparative knowledge-based urban development analysis

| Pillars             | Indicator Set          | Indicators            | Definitions                                                                 | Parameters                      | Weightings | Value | Score | Value | Score | Value | Score | Value | Score | Value | Score | Value | Score |
|---------------------|------------------------|-----------------------|-----------------------------------------------------------------------------|---------------------------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| **PROFILE**         | Basic profile          | Population            | Population                                                                  | Boston, 2015 & 2016             | 0.14       | 3,000 | 0.6   | 2,000 | 0.4   | 3,000 | 0.6   | 2,000 | 0.4   | 3,000 | 0.6   | 2,000 | 0.4   |
|                     |                        | Area                  | Area                                                                        | Boston, 2015                   | 0.14       | 5,000 | 0.6   | 2,000 | 0.4   | 5,000 | 0.6   | 2,000 | 0.4   | 5,000 | 0.6   | 2,000 | 0.4   |
|                     |                        | Density               | Density                                                                     | Boston, 2016                    | 0.14       | 620   | 0.6   | 470   | 0.4   | 620   | 0.6   | 470   | 0.4   | 620   | 0.6   | 470   | 0.4   |
|                     |                        | Median age             | Median age                                                                  | Boston, 2016                    | 0.14       | 34.2  | 0.6   | 34.2  | 0.6   | 34.2  | 0.6   | 34.2  | 0.6   | 34.2  | 0.6   | 34.2  | 0.6   |
| Economic development | Economic structure     | Gross domestic product | Gross domestic product per capita                                           | Boston, 2015                    | 3.325      | 12,490 | 0.6   | 18,050 | 0.4   | 12,490 | 0.6   | 18,050 | 0.4   | 12,490 | 0.6   | 18,050 | 0.4   |
|                     |                        | Gross domestic product growth | Rate of change in gross domestic product growth                            | National, 2016                   | 3.325      | 2.12  | 0.6   | 2.12  | 0.6   | 2.12  | 0.6   | 2.12  | 0.6   | 2.12  | 0.6   |
|                     |                        | Foreign direct investment | International share in foreign direct investment                           | National, 2016                   | 3.325      | 17.14 | 0.6   | 17.14 | 0.6   | 17.14 | 0.6   | 17.14 | 0.6   | 17.14 | 0.6   |
|                     |                        | Household disposable income | Growth rate of household disposable income                                   | National, 2016                   | 3.325      | 3.5   | 0.6   | 3.5   | 0.6   | 3.5   | 0.6   | 3.5   | 0.6   | 3.5   | 0.6   |
| Knowledge-economy performance | Research and development expenditure | National share of research and development expenditure | | Boston, 2009-2015 | 3.325 | 5.54 | 0.6 | 5.54 | 0.6 | 5.54 | 0.6 | 5.54 | 0.6 | 5.54 | 0.6 | 5.54 | 0.6 |
|                     |                        | Patents               | Share of patents                                                             | Boston, 2015                    | 3.325      | 6.78  | 0.6   | 6.78  | 0.6   | 6.78  | 0.6   | 6.78  | 0.6   | 6.78  | 0.6   |
|                     |                        | Knowledge workers     | Ratio of knowledge workers                                                   | Boston, 2009-2015                | 3.325      | 43.38 | 0.6   | 43.38 | 0.6   | 43.38 | 0.6   | 43.38 | 0.6   | 43.38 | 0.6   |
|                     |                        | Knowledge intensive services | Ratio of knowledge intensive service employment                           | Boston, 2009-2015                | 3.325      | 58.89 | 0.6   | 58.89 | 0.6   | 58.89 | 0.6   | 58.89 | 0.6   | 58.89 | 0.6   |
| Socio-cultural development | Social and human capitals | Educational attainment | Educational attainment                                                        | Boston, 2009-2015                | 3.325      | 25.7  | 0.6   | 25.7  | 0.6   | 25.7  | 0.6   | 25.7  | 0.6   | 25.7  | 0.6   |
|                     |                        | Tertiary education students | Ratios of tertiary education students to population                          | Boston, 2009-2015                | 3.325      | 2.24  | 0.6   | 2.24  | 0.6   | 2.24  | 0.6   | 2.24  | 0.6   | 2.24  | 0.6   |
|                     |                        | Major university reputation | Ratio of major universities to population                                   | Boston, 2009-2015                | 3.325      | 1.68  | 0.6   | 1.68  | 0.6   | 1.68  | 0.6   | 1.68  | 0.6   | 1.68  | 0.6   |
|                     |                        | Access to broadband    | Ratio of access to broadband                                                  | Boston, 2009-2015                | 3.325      | 72.10 | 0.6   | 72.10 | 0.6   | 72.10 | 0.6   | 72.10 | 0.6   | 72.10 | 0.6   |
| Culture and dependency | Workplace cultural diversity | Cultural diversity | Cultural diversity rate at work place                                         | Boston, 2009-2015                | 3.325      | 44.40 | 0.6   | 44.40 | 0.6   | 44.40 | 0.6   | 44.40 | 0.6   | 44.40 | 0.6   |
|                     |                        | Societal cultural diversity | Ratios of various and multiple reports                                       | Boston, 2009-2015                | 3.325      | 6.56  | 0.6   | 6.56  | 0.6   | 6.56  | 0.6   | 6.56  | 0.6   | 6.56  | 0.6   |
|                     |                        | Socio-economic dependency | Age distribution of the various and multiple reports                          | Boston, 2009-2015                | 3.325      | 6.75  | 0.6   | 6.75  | 0.6   | 6.75  | 0.6   | 6.75  | 0.6   | 6.75  | 0.6   |
|                     |                        | Unemployment           | Unemployment rate                                                            | Boston, 2015                     | 3.325      | 4.17  | 0.6   | 4.17  | 0.6   | 4.17  | 0.6   | 4.17  | 0.6   | 4.17  | 0.6   | 4.17  | 0.6   |
Appendix 1. Comparative knowledge-based urban development analysis (continued)

<table>
<thead>
<tr>
<th>Pillars</th>
<th>Indicator Sets</th>
<th>Indicators</th>
<th>Definition</th>
<th>Parameters</th>
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<td>Eco-city ranking</td>
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THE 3RD KNOWLEDGE CITIES WORLD SUMMIT

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FROM THEORY TO PRACTICE

PARALLEL SESSION PAPERS
Science cities in the UK

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Structured Abstract

Purpose – The purpose of the paper is firstly to review previous attempts to define the idea of the science city and in particular try to place the UK science city experiment within a context of an evolving concept internationally. Our second aim is to examine how the science city agenda is attempting to connect with wider academic and policy debates. Finally we outline a set of potential benefits from the science cities based on emerging experiences from the UK science cities.

Design/methodology/approach – The paper is a review based on documentary evidence and participation in meetings with science city staff.

Keywords – science cities, UK, innovation policy, urban development.

Paper type – Academic Research Paper

1 Introduction

'As part of their £100 million technology investment programme, the northern Regional Development Agencies will promote 'Science Cities' for the North, starting with Manchester, Newcastle and York.' Gordon Brown, Pre-Budget report statement to the House of Commons, December 2004

The 2004 announcement of a first round of designated English science cities by the then chancellor Gordon Brown was a dramatic new development in sub-national science policy in the UK. These first three cities were followed up by three more in 2005 but apart from announcements by the cities themselves there has been relatively little published information or indeed debate on science cities in either academic or policy circles (for partial treatment see Webber 2008, OECD 2008, DIUS 2008a). Such neglect is surprising given the concerted effort, large scale investment and series of activities that are being undertaken by an array of mainly sub-national actors to deliver the science city plans. Evidence of such delivery is manifest through the formation of new coalitions and partnerships, the creation of novel innovation and science based projects, and the
reconfiguration of the built environment in some of these science cities. However, since
the announcement of science cities there has been a distinct lack of guidance, benchmarks
or even metrics to help those in charge of delivering the agenda.

This paper therefore has three main aims. Firstly we review previous attempts to
define the idea of the science city and in particular try to place the UK science city
experiment within a context of an evolving concept internationally. Whilst previous
definitions have focused on the importance of science investments and on the planned
nature of developments (Anttiroiko, 2004), the UK appears to be part of a movement to a
new form of more integrated approach to science and the city, and as such may represent
a new phase of science cities.

Our second aim is to examine how the science city agenda is attempting to connect
with wider academic and policy debates. The science city programme represents a
positive endeavour to connect with and take up new practices concerned with science
based economic development, models of innovation and multi-level governance.
However we feel there are yet more lessons that could be learned, and that leads us on to
our third aim. This is to outline a set of potential benefits from the science cities based on
emerging experiences from the UK science cities.

Broadly following on from these aims the structure of the paper is as follows. We
begin by defining and placing science cities into their historical context and tracing their
theoretical, geographical and conceptual lineage. A new typology of three waves or
phases of science cities is proposed with an assessment of their implications for
innovation outcomes and regional development. This is followed by an overview of the
UK science city programme. This highlights the main aims and aspirations of the UK
national government for the science cities, how the UK science cities are organised and
governed and also the scientific pillars upon which most of the UK science cities are
based.

Finally, the paper sets out and discusses five areas of benefit from science cities based
on the experiences of the science cities in the UK, before concluding with some caveats
about the operationalisation of these benefits.

2 Defining the science city concept

The definition of a science city is an elusive and inconstant notion but important for
assessing the kinds of policies that should be implemented within a science city strategy
in order to achieve successful outcomes. Castells and Hall (1994, 39) argue that, in their
simplest form, ‘science cities are new settlements, generally planned and built by
governments, and aimed at generating scientific excellence and synergistic research
activities ….. within a high quality urban space’. And certainly there are planned
concentrations of this nature in other countries, but we argue that the UK science cities
belong to a broader concept, within a typology which is developed below.

Science city initiatives are designed to advance and reap prosperity for cities by
helping to build up infrastructure and skills around predefined scientific areas. A cadre of
universities, research institutes, governments and local partnerships work together to
undertake science based investment and activity and foster synergies and linkages
between the partners. Such collaboration aims to support and underpin a scientific milieu,
produce a territorialized set of knowledge assets that raises local competitiveness and
potentially attracts inward investment.
Universities and research institutes are ascribed a central role in science cities in the context of governments across the world placing increasing emphasis on them engaging more actively with the corporate sector (Lambert 2003, Sainsbury 2007). Such emphasis is based on the widely held view that universities, through the production of knowledge and human capital, are one of the cornerstones of the knowledge economy (Chatterton and Goddard 2000, Goddard and Puukka 2008, Garlick 2000, DTI 1998). Universities help provide and produce a skilled workforce with the relevant skills to operate in the knowledge economy, they are also seen to produce new knowledge and concepts, establish spin-off companies (although this contribution has a tendency to be over-exaggerated), foster knowledge transfer to local companies and facilitate international science and innovation collaborations. Although true to a certain extent, more recently such perceived wisdoms about the extent of universities contribution to their localities are being increasingly questioned (Harloe and Perry 2004, Power and Malmberg 2008, Christopherson et al 2008). The specific local impact of universities would seem to depend not just on the university, but the wider policy and institutional context within which it is located, and science cities aim to influence that context.

Crucially, however there is no fixed definition of what a science city is and the criteria to define them are loosely defined (Anttiroiko 2004). Furthermore some initiatives can transcend conventional city jurisdictions and scales, and take the form of science belts or corridors. Likewise the term science city can become an umbrella concept similar to the technopole which is a generic term that refers to large concentrations of science and technological expertise, closely related to the ideas underpinning science cities. In short, the definition of science cities remains open to interpretation about how narrow or broadly the concept is used. In the context of the English science cities such ambiguity surrounding the definition has both strengths and weaknesses. The lack of definition could provide considerable scope and freedom for those delivering the agenda to define their science city in their own ways, although the vagueness raises questions about whether a meaningful and tangible impact will be realised in each of the cities.

3 Science cities in historical context

The concept of planned or designated science cities is not new. Historically rulers have often sought to foster centres of learning and knowledge often in the context of urban development projects. Many of the mediaeval universities were established at the core of cities which have grown up with intimate interdependence between city and knowledge centre. Even earlier, in the Islamic world, cities such as Baghdad and Cairo were deliberately fostered as centres of knowledge and learning more than a millennium ago (Morgan, 2007).

In the twentieth century the earliest and most enthusiastic proponent of science cities has been Russia and the former Soviet Union, with the designation of some 65 science cities since the late 1940s (Anttiroiko, 2004), the most well-known of which is Akademgorodok, located in Siberia (Castells and Hall, 1994). Since then there has been a steady growth of science cities spreading across the globe from their Asian origins.

Science cities have evolved along different developmental paths, premised on different models and assuming various forms. As a guiding heuristic, and for the purpose of this report, we have organised the evolution of science cities into three broad waves, although in reality we recognise that each wave is not mutually exclusive of the other and overlaps between the waves invariably exist.
1st Wave: The term science city emerged in the context of purpose-built, campus-based new towns, nationally instigated and hosting new public basic research. Examples include Akademgorodok in Siberia and Tsukuba in Japan.

2nd Wave: Several Asian countries developed the concept into large scale capital developments funded by national governments, often on the outskirts of existing cities, heavily orientated towards developmental applied science and the attraction of multinational research centres as well as supporting local and national industry. Examples include Biopolis in Singapore, Hsinchu in Taiwan and Daedeok in Korea.

3rd Wave: The more recent science city designations tend to place science-based economic development within existing metropolitan areas. A broader social mandate concerned with social inclusion and public engagement with science emerges in many of the cases as a wider local partnership is constructed to develop the vision.

Below we briefly outline each of the waves and some of the characteristics that are central to them.

The first wave of science cities reflected the visions and experiments of national governments conceived purely to support national scientific development and supplement national competitiveness (Hall and Castells 1994). These centrally orchestrated plans aimed to increase technological advancements and investments in scientific activity via new town projects, but were centred around research intensive universities focussed on engineering, mathematics and natural sciences. A high proportion of research institutes in the first wave of science cities undertook mainly basic level scientific research, concentrated mainly in the natural sciences rather than on new and emerging high technology activities or manufacturing.

A characteristic pertinent to first wave science cities included their design which tended to mimic a campus model. Tsukuba science city for example was built on a picturesque greenfield site to attract high quality scholars and researchers who could pursue their scientific endeavours undisturbed from the rest of society, surrounded by a stock of high quality urban amenities (Anttiroiko, 2004). An assumption ascribed to the campus model was that the physical proximity afforded between the university, research institutes and subsequently developed industrial enterprises would produce linkages to enable knowledge exchange and facilitate a scientific milieu. Evidence suggested however, that there was only modest interaction between the various components (Cooke 2001, Castells and Hall 1994). Moreover these science cities also tended to be isolated from the rest of the national economy and such a paucity of linkages were attributed to the way science cities were, at their outset, centrally initiated and government-led developments pursuing only basic research which didn’t necessitate collaboration and cooperation.

Central governments expected the benefits of the scientific research to percolate progressively though the entire national economy but this did not happen: the basic research undertaken did not add much value to the locality nor attract new flows of knowledge and people into them.

Second wave science cities were constructed as motors for economic development and formed part of a broader national economic development strategy and apply to places such as Daedeok Science Town or Innopolis in Korea (Shin, D-H., 2001), Hsinchu in Taiwan (Chou, 2007) and Research Triangle in South Carolina. These developments were not intended to be vehicles for new towns, rather, they were extremely large scale
science parks adjacent to existing towns. Informed in some cases by the failures of the first wave of science cities, a deliberate strategy was to focus on mobilising the universities and industries to align their activities to improve economic development at both national and regional scales. A central characteristic is they were orientated around fostering closer links and synergies between industry and research to promote applied developmental research for a particular sector. This endeavour was fuelled by the large scale funding and investment from national government. In turn, such relationships and scientific focus would not only bolster the performance of local economies and strengthen their industrial and research bases, but would contribute to national competitiveness. Overall these strategies were enormously successful and attracted significant inward investment.

More recently a third wave of science cities, predominantly with their origins in Europe have emerged. This includes cities such as Ulm and Jena in Germany, Kista in Sweden and the UK science cities. Instigated by a mixture of national governments and sub-national actors to create more contextually specific innovation and science policies the first aim of third wave science cities is to use science (broadly conceived) as a tool for regeneration in existing cities, through science based economic development. Third wave science cities then mark a departure from the traditional new town projects or large extended science parks adjacent to pre-existing towns as they are schemes deliberately woven into pre-existing metropolitan areas. The second aim of third wave science cities is that they tend to have a broader mandate, other than delivering improved innovation and research outcomes and increasing the attractiveness and strength of local and national companies. This broader mandate involves delivering and contributing to social objectives. Most notably this is through increasing public understanding and engagement with science, encouraging children at all stages of their education to study science related subjects, and to reconfigure parts of the urban environment to make new knowledge based urban science precincts. Drawing on successes and failures from the previous two rounds of science cities, third wave science cities tend to be more multifaceted in their science base, conducting cutting edge research, and enduring multiple connections within and between universities, research institutions and business, but also promoting links with local civil society. Given a greater emphasis in recent years on the interconnected nature of centres of innovation and the flows of talent, capital and knowledge, third wave science cities tend to be more highly networked than some of their predecessors and are constructed as hubs of innovation and research in the global knowledge economy.

Unlike the centrally orchestrated first wave, third wave science cities are based on coordination and guidance through a partnership of sub-national agencies and organisations that span the public and private sector. These sub-national governance networks tend to provide the strategic vision and delivery of the science cities and ensure synergies are stimulated between government, university and enterprises. Also given the emphasis on context specific science and innovation policies, it is felt that local and sub-national agents are better placed to deliver the agenda as they are presumed to have more local knowledge.

4 The English Science Cities

The announcement of the first three Science Cities by Gordon Brown in 2004, with three more the following year, was a momentous step in linking national science policy with territorial issues, albeit that the proposals themselves were very modest and almost
an afterthought to the ten year Science and Innovation Investment Framework. The Pre-Budget report provided some justification for the establishment of a science city policy in terms of both the importance of cities as areas of critical mass for innovation, and the role that universities, usually located in such cities, can play in fostering clusters.

‘Cities and urban areas can attract a critical mass of knowledge-based businesses and industries which improve prospects for growth, through mutually reinforcing factors, such as the availability of skilled workers, a strong research base, urban infrastructure and supportive locally-driven policies. High-performing universities and research establishments can contribute to such an effect, and Government has been encouraging universities to work with RDAs to exploit synergies and so help foster knowledge-based clusters around city university hubs.’ (HM Treasury, 2004a, 60)

So the interest in developing an English science city agenda falls within a longer policy trajectory concerned with an increasing awareness of the importance of territorial competitiveness within the knowledge economy, and the central role of innovation as a key driver for economic growth. Within UK policy this has been a growing issue, especially since the DTI white paper on science and innovation policy in 2000 which specifically raised the need for different priorities between regions.

‘While some elements of the framework for innovation can only be determined through national action, there are significant differences in innovation between regions, calling for different approaches. …. While all regions must participate in the economic success of the country through innovation, priorities for action within the regions differ. (DTI, 2000)

This perspective fits with a general acceptance that building economic success in the knowledge economy hinges on developing critical mass, developing a territorially embedded stock of knowledge assets not ubiquitously available elsewhere, and creating a virtuous circle of competitive economic activities linking research, development and innovation. In the UK this notion of critical mass has always tended to imply a national policy focus however, and a concentration of public resources in the South East. During the mid 20th century the expansion of public R&D was almost wholly located in the South East, despite industrial policies at the time to decentralise investment away from London (Heim, 1988). More recently though the notion of regional innovation strategies has been imported into the UK via the European Commission and has become a key element in the regional economic strategies of the RDAs (Charles 2008).

Since the 1980s the UK had also pursued a fascination for science parks as focused property developments linked with universities and research institutes (Massey, Quintas and Wield, 1992), but unlike the French idea of the technopoles which married the science park with growth poles and urban strategies (Sunman 1986), the UK science parks remained modest in scale and in breadth of ambition. The point of departure of the new Science City initiative from this tradition is how Science Cities are using science activity as a way of also creating signature urban features and regenerating run down urban areas in addition to improving the usual indicators of innovation outputs, productivity and growth rates. So Science Cities connect between the broader regional concerns on innovation and productivity and the idea of systems of innovation, and the renewed focus on cities as the places where greater intensity of interaction fosters greater innovative potential. (ODPM, HMT, DTI, RDAs 2004). There has been a view in the UK that the potential of provincial cities had been neglected relative to similar sized cities elsewhere in Europe, partly through under-investment in science, and that national
performance is increasingly dependent on a greater contribution from the provincial cities to the knowledge economy.

The belief that both science and cities are, in their own right, key drivers for economic sustainability and competitiveness fuels the case for science cities. By marrying these two dimensions, that traditionally have been separate (Perry 2007), in an effort to produce knowledge based urban environments it is hoped that science policy is beginning to see and recognise the innovative potential of cities whilst urban policy recognises the contribution that science can make to vibrant urban environments and science spaces.

Announced by Gordon Brown, as Chancellor, the first public mention of science cities in the 2004 Pre-Budget Report was an unexpected introduction within a set of measures to promote useful science in stimulating innovation, competitiveness and growth in England. The initial set of three, Manchester, Newcastle and York, were added to in May 2005 as a result of the additional designation of Nottingham, Bristol and Birmingham. The programme remains an England-only initiative as the devolved administrations in Scotland, Wales and Northern Ireland have the responsibilities for science and innovation policies but have chosen not to follow the English example. To date, however, there has been no dedicated funding for these Science Cities. The science city agenda is neither a policy, nor a programme nor even an instrument, but rather a guiding heuristic to deliver improved innovation outcomes.

Consequently in the absence of a top down definition of the programme or even the notion of a science city the concept has remained chaotic and undefined. The six science cities have been challenged to develop their own concepts and definitions and there are multiple interpretations as to what ‘it’ is. Arguably such fuzziness could be strength or a weakness when it comes to delivering and making science cities in reality. Science Cities can develop their own strategies and approaches without being constrained by a national definition, but it is equally possible for them to fall back on rhetoric and publicity as an excuse for real delivery in practice.

4.1 The aims of the Science Cities

The aim of the science cities agenda was broadly twofold. Firstly, science cities would be able to serve national interests by adding to national competitiveness and increasing the attraction of investing in UK plc. Secondly, science cities would be a mechanism to reduce persistent regional inequalities by developing a set of innovation assets beyond the golden triangle of Oxford, Cambridge and London (Perry and May 2007). Partly then, the agenda represents an attempt to try and alter the geographically skewed concentration of science funding and the location of major science infrastructures that tend to be spatially concentrated in what are already the most economically dynamic parts of the UK (Charles and Benneworth 2001). The way in which the two main aims of science cities would be achieved was by bringing together investments in the science base of six designated English cities, whilst simultaneously improving the quality of the urban environment to create new kinds of urban knowledge-based growth.

The six science cities present a range of different socio-economic characteristics, mostly lagging economically, and in terms of innovation, behind the South East of England and the golden triangle of London, Oxford and Cambridge. The first three to be designated are in the three northern regions of England which is an area in receipt of significant levels of economic assistance, although the cities themselves are more prosperous than some other parts of their regions due to their asset base. Manchester is
the largest city in this group with a population of over 2 million and has the most
developed service industry and a strong university and science base, yet with considerable
economic disparities within the conurbation. York is a much smaller city of around
100,000 population with a declining manufacturing sector based on engineering and
confectionary but a strong tourism sector and increasing high tech and service industries.
Newcastle is at the heart of an old industrial conurbation over just over 1 million
population, which has seen long term industrial decline, but again has a strong university
sector but with a relatively small high tech sector.

The second round cities are in economically stronger regions lying between the
peripheral regions and the core south east regions in terms of performance. Birmingham
is the UK’s second city and retains a strong manufacturing sector as well as a well
developed service sector. Nottingham is a smaller conurbation (under 1 million) with a
diverse economy, and Bristol is also a smaller city which has benefited considerably in
recent years from office spillover from London. All three have high quality universities
and some presence of corporate R&D activity.

Additionally, the science city agenda is expected to have far wider reaching benefits
for localities than just increasing levels of innovation and productivity by improving
social development, urban regeneration and providing other civic benefits. This includes
improving levels of health through advances in the health sciences, improving levels of
education through science education permeating the curriculum, contributing to
environmental sustainability by improving the urban environment, tackling and
overcoming social exclusion and worklessness through participation in science and
generally helping to foster new a innovative culture across whole communities. To what
extent excluded communities can participate in and from such a knowledge-based
environment or innovative enterprises, aside from the predictable jobs for cleaners,
caterers and maintenance will be debateable and is going to be a significant challenge for
each of the science cities.

Each science city ‘project’ is governed by a coalition of the designated city’s local
authority, at least one research intensive city university, the regional development agency
and representatives from industry and business. Several of the science cities explicitly
draw upon the notion of the ‘triple-helix interactions’ between universities, industry and
government in the composition of these coalitions (Leydesdorff and Etzkowitz 1998), and
have sought to build new kinds of ‘space’, physical or virtual, in which dialogue between
these groups can take place.

4.2 Implementation

Since their conception, each science city, with the possible exception of Bristol, has
set about identifying a set of endogenous scientific assets that will form the
pillars/foundations of their science cities and which in their opinion has the potential to
become prominent on a global scale. Notably some of these scientific assets identified
had already been identified and integrated into pre-existing regional strategies as
developed by the regional development agencies. Inevitably as the science cities contain
some of the main research universities of their regions the strengths identified will have
already been seen as regional strengths in the emerging regional science and innovation
policies that RDAs have been developing. In the case of the North East region the RDA
has developed a ‘Strategy for Success’ which includes three ‘scientific pillars’ which
comprise health technologies, process industries and energy, and the Newcastle Science
City themes reflect this by the inclusion of energy and the environment, stem cells and human genetics and ageing. This illustrates the complex nature of the relationship between the science cities and pre-existing regional science and innovation strategies and their being inserted into an already busy policy landscape (Webber 2008).

Table 1. Composition of each of the science city coalitions and their scientific strengths
(Source: Science city websites – accessed 9th and 10th December 2008)

<table>
<thead>
<tr>
<th>Universities</th>
<th>Newcastle University</th>
<th>York University of York</th>
<th>University of Manchester</th>
<th>University of Salford</th>
<th>Manchester Metropolitan University</th>
<th>Bath Spa University</th>
<th>University of Bath</th>
<th>University of Bristol</th>
<th>UWE</th>
<th>University of Birmingham</th>
<th>University of Warwick</th>
<th>Staffordshire University</th>
<th>Aston University</th>
<th>Nottingham Trent University</th>
<th>The University of Nottingham</th>
</tr>
</thead>
<tbody>
<tr>
<td>Councills</td>
<td>Newcastle City Council</td>
<td>York City Council</td>
<td>Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford, Wigan</td>
<td>Bristol City Council</td>
<td>Birmingham City Council</td>
<td>Nottingham City Council</td>
<td>Nottinghamshire County Council</td>
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<tr>
<td>Regional Development Agency RDAs</td>
<td>ONE</td>
<td>Yorkshire Forward</td>
<td>North West Development Agency</td>
<td>South West of England Regional Development Agency</td>
<td>Advantage West Midlands</td>
<td>EMDA East Midlands Development Agency</td>
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<tr>
<td>Other stakeholders (if highlighted)</td>
<td>Government office for the North West</td>
<td>Greater Manchester Learning and skills council</td>
<td>Manchester Enterprises MIDAS</td>
<td>Greater Manchester Strategic Health Authority</td>
<td>The West of England Partnership</td>
<td>Bristol Natural History Consortium</td>
<td>BCDF</td>
<td>Stemset</td>
<td>GWE Business West</td>
<td>At Bristol</td>
<td>Government Office West Midlands</td>
<td>NIFS West Midlands &amp; Department of Health</td>
<td>West Midlands Regional Assembly</td>
<td>Atkins</td>
<td>CBI</td>
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</table>

In addition to identifying themes or priorities for the development of science, the science cities have also developed programmes of actions relating to commercialisation
and innovation as well as wider education and public engagement. The balance between these components vary from city to city, but most have a combination of commercialisation and education actions. Some have a distinct property component as well, although this may have originated outside of the science city process, and is usually dependent on funding that is independent of the programme.

In the case of Newcastle the commercialisation element takes the form of a project called the Innovation Machine in which entrepreneurs take unmet needs and work with the local research base to develop products and services that can be commercialised. The project is funded by the regional development agency and European regional funds and aims to create 500 new businesses up to 2025. There is an educational programme which seeks to help children understand career opportunities in science and technology – a problem in some parts of the city where educational aspiration and attainment is low and few proceed into higher education. The wider public engagement is fostered by events and a publicity programme with branding and advertising at transport hubs and on local buses.

The most prominent and controversial element however is a major physical project on the site of a former brewery on the edge of the city centre and near to Newcastle University. Here a new science quarter is under construction which will house some of the research activities of the university alongside businesses, student housing, and wider housing and recreational activities. The site is jointly owned by the City Council, regional development agency and the University and is to be developed over a ten year period. Development has been slowed by the global financial crisis, but the first step in the form of a new business school is due to open in mid 2011.

5 Potential and presumed benefits

Aspects of the science city programme suggest a positive attempt to connect with and take up good practice examples from the academic and policy literature concerned with science based economic development, models of innovation and governance. Consequently the science city agenda has the potential to bring numerous benefits and advancements to each of the cities in terms of their economic dynamism, governance and appreciation of the local context. These benefits can be summarised under a series of headings:

- An appreciation of local context in innovation policy
- Devolution of aspects of innovation policy to local levels
- Building up regional innovation systems
- Creating novel projects beyond the usual high tech sectors
- Engaging the public in science

5.1 Appreciation of the importance of local context

The science city agenda reflects a growing consensus in the regional development literature on the need for innovation policies to acknowledge and be complementary to, the local context, institutional architecture and regional history (Todtling and Tripp 2005 Sotarauta and Kautonen 2007). Over the past 20 years there has been a growing focus on innovation as a central element in endogenous regional development policy, and recognition that regions with different asset bases need different innovation policies.

Traditionally, the UK’s innovation policy has been concentrated on high-tech manufacturing. In the future, spatial innovation strategies must build on each region’s distinctiveness. (DIUS, 2008a, Innovation Nation, p78)
The quality, quantity and type of innovation activity undertaken in a given locality is shaped by the local innovation ecosystem, which consists of the configuration of actors and institutions (DIUS 2008a). Thus a place is not just a container within which innovative activity takes place. Traditionally national innovation policies have tended be a one size fits all model, rolled out at national level but mainly benefiting the most economically dynamic parts of the UK such as the South East where institutional support for innovation is richer and where there is a greater concentration of high technology industry (Benneworth and Charles 2001, Perry and May 2007). For less well-endowed regions national policies pose distinct obstacles and barriers: it can be difficult for an innovation-poor region to justify government investment which is targeted on reinforcing success, and difficult to access funds targeted on high technology when local industrial strengths are in more traditional sectors. Even when resources are made available, local policy makers have to weave a context blind policy into their locality which may not necessary have the same knowledge assets, capabilities and institutional architecture as the more successful regions where the policy was designed. This is a wider problem in regional development policy where much of the recent lessons have been drawn from successful regions and the policy recommendation for other regions has been to copy that success despite a different starting point.

A more spatially/place aware initiative like the science city approach should be celebrated as a noble attempt to inject a higher level of territorial specificity into the design and content of innovative activity and economic development in cities and regions. It should not however follow the standard model of seeking to ape Silicon Valley, Cambridge or Baden Württemberg, none of which succeeded on the basis of deliberate policy, but instead examine how other places have used science-based policy to improve their economic fortunes and take lessons from the processes used rather than the specific forms of that development. On this basis we would expect the six UK science Cities to develop in different ways dependent on their existing industrial and science strengths, and on the different priorities and opportunities they each pursue.

5.2 Devolution to local agents to govern innovation trajectories

The science city agenda has responded positively to a growing consensus that power and decision making should be devolved to sub-national agents and organisations who can be involved in shaping and setting the science and technology policy priorities more directly for their region (Perry and May 2007). This consensus emphasises that sub-national agents are better placed to develop and deliver said policies because they understand better the content, structure and needs of the region. The science city agenda then provides an opportunity for local agents to govern and shape their own development trajectories in ways that complement the local context.

The agenda follows developments in recent years that have seen new governance relationships and science policy institutions emerge at the regional and sub-national scale. In parallel as the emergence of innovation becomes a specialist policy area in its own right (Webber 2008), to support these developments there is a need for the meshing of policies at the local, regional, national and even European scales. More broadly then, the science city agenda represents a positive attempt at forging a new paradigm in multi-level governance in innovation and science policy in the UK at least (Perry, 2007).

Because science cities are expected to be delivered by local governance networks, new partnerships and coalitions incorporating local and regional actors and organisations
have been formed that otherwise may not have happened. This has the potential to strengthen regional governance. It also creates scope for a cadre of agents to deliver a step change in regional performance by fostering leadership and strategic direction in innovation strategies.

5.3 An opportunity to build up regional innovation systems

The science city agenda has the potential to be an effective lever to facilitate and strengthen regional innovation systems and increase regional capacity and performance. By affording power and decision making to new regional coalitions allows sub-national agents to set about managing and bolstering their own regional innovation systems. Here, sub-national agents can play a more interactive role in determining and shaping the innovative performance of their locale by having more power to initiate, modify and support innovative activity and generally shape the innovative capacity of the region more directly.

5.4 Creating novel projects beyond the usual sectors and industries

Traditionally discussions about innovation and metrics to gauge levels of innovative activity have tended to be animated through a set of usual sectors or specific industries. In tandem, innovation policy has tended to use a narrow definition of innovation (NESTA 2007). Such narrowly focussed discourses has meant that other sectors where innovative processes are happening have been neglected and debates about the multiple interpretations and forms of innovation have been closed down.

In lights of this recognition, the science city agenda is well placed to remedy these shortfalls and encourage each science city to move beyond the usual sectors that government has tended to champion in developing their strategies (DIUS 2008a). The agenda has the potential to pioneer and shift the gaze onto more unusual and novel sectors and in turn create more novel projects.

5.5 Public Engagement with Science

Aside from delivering improved innovation and research outcomes, the English science city agenda has a broader mandate to deliver and contribute to social objectives. One reason why this has been triggered is the widely accepted recognition that science can contribute to both social and economic wellbeing and the current push by DIUS who are keen to create a society enthusiastic about science (DIUS 2008b). Within the science city agenda these objectives and visions are being delivered through two main channels. First, widening public awareness, aspirations and engagement with science and second, encouraging young people at all stages of their education to engage with, and study, science related subjects.

In term of public engagement each science city is concerned with increasing scientific awareness and the benefits that science can bring to both young and old alike. Such awareness will be promoted by a variety of public engagement and promotional activities delivered through schools, museums and city-wide initiatives such as science festivals to attract and nurture people to science. Bristol Science City is notable for its emphasis on public engagement with science, rather than choosing a set of scientific pillars, three main streams shape and direct the trajectory of Bristol Science City, one of which is public engagement whilst the other two are connectivity and investment. Examples of Bristol’s
public engagement activities with science include the Cheltenham Science Festival, Festival of Ideas held in May and October Café Scientifique (also held in Newcastle) and STEM week (formerly national science week and sponsored by DIUS).

The science city agenda also aims to improve young people’s participation and attainment in science and technology subjects in primary, secondary and further education. Such engagement can serve to produce a well qualified future workforce, particularly adept in STEM skills and hence increase the stock of skilled workers to provide the human resources and skills base needed to support science cities (HM Treasury 2004a, DfES and DTI, 2006). In turn such encouragement aims to produce a critical mass of skills and set of knowledges serve to increase and supplement national competitiveness and levels of innovative activity for the future.

6 Conclusions: The UK science cities as a vital new opportunity

The designation of the six Science Cities recognises and underpins a new perspective that science and innovation can be a core driving force in all of the regions of the UK. It is a recognition that the fostering of suitable institutional infrastructure at the local level can stimulate greater innovation, that different places can develop their own routes to economic success, and that world class science and technology can be developed outside of the golden triangle of London, Oxford and Cambridge.

A key argument in favour of science cities is the need to recognise that the UK economy as a whole depends on a broader base of success than heretofore, especially in the light of the current crisis in the financial services sector that has dominated in the success of the South East. The UK, like the EU has set targets for increased innovation and R&D investment and if the UK is to achieve the EU target of 3% of GDP being spent on R&D (CEC, 2002) (even though the current official UK target is only 2.5%) then this will require significant growth in total investment. Given that the more successful parts of the UK are already above this level then the UK can only reach the target by significant growth in the under-performing regions – the national target cannot be reached by simply concentrating more research into Cambridge. This requires new nodes of major research investment to be developed in the less favoured regions and the Science Cities provides a platform for this.

The conventional argument has been that world class science needs critical mass. In the UK this has tended to be assumed to imply the golden triangle, although we see world class science and innovation occurring in a number of other countries which have a population as small as a UK region, and where centres of excellence may also be decentralised to a regional scale. If countries such as Finland can develop a successful and decentralised innovation system then the UK should be able to support centres of world class science in each of its regions. The Science Cities provide a test base of this idea.

The model being developed for science cities in the UK is qualitatively different from some earlier rounds of science city investments as the initiative is being implemented into existing cities and within the existing infrastructure and policy frameworks. It takes a broader agenda of science and innovation and seeks to develop solutions to wider economic and social development aims of the cities, some of which have considerable developmental challenges. The timescale for implementation and impact is extremely long however as there has not been a significant allocation of resources from central government, so projects have had to develop from the bottom up with existing funds. This presents high risks when faced with political change as has taken place recently, and with
the forthcoming abolition of regional development agencies by the new coalition government. Ongoing research is needed to monitor changes as a consequence of the initiative and the responses of the local partnerships to external developments to see whether this kind of model can have an impact without the sustained political commitment which has been apparent in the earlier Asian science city initiatives.

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Making MAKCi: identifying key elements in knowledge-cities benchmarking

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Structured Abstract

Purpose – Adopting a third-generation Knowledge Management (KM) approach, this article will advance a benchmarking methodology which has sought to identify patterns of collaboration and consensus amongst a group of knowledge-based development (KBD) experts who have readily undertaken a learning journey into knowledge-generative collaborative research through a consultation exercise known as MAKCi.

Design/methodology/approach – The paper collects aspects from the resulting experience of a four-year research consultation initiative known as the Most Admired Knowledge City Exercise (MAKCi). By using mathematical and statistical modelling, this piece or research work explores how knowledge-intensive networked learning develops patterns of collaboration within active members of those networks. A regression analysis (by means of simulation and pattern modelling) has allowed a first-hand testing and review on how variables interact within the MAKCi exercise processing.

Originality/value – A MAKCi index is proposed, created by means of logistical modelling that generated a probable ranking of cities. Such index is based on a quantitative process that aims to parallel the qualitative process furnished by the group of experts participating in the exercise.

Practical implications – The article will advance some applications on how emerging models of knowledge-intensive networks such as MAKCi foster tacit knowledge conversion into explicit scholarly knowledge yielding a sound pattern of Knowledge City benchmarking.

Keywords – generic capitals system, knowledge cities benchmarking, knowledge based development. statistical modelling.
1 Introduction

Researchers and practitioners have agreed that one of the difficulties in creating and sustaining knowledge cities is the lack of benchmarks to identify those cities and regions that are generating knowledge-driven initiatives, triggering development and collective value. In terms of knowledge-based development frameworks, some key notions have emerged in recent years to characterise such benchmarks.

From a knowledge-based development perspective, this paper presentation will report on results of applying statistical modelling to emerging Knowledge-City benchmarking methodologies. The main objective is to put forward the Generic Capitals System (GCS) taxonomy as a methodological tool to identify how tacit knowledge conversion generates quantitative intangible indicators by means of simulation and pattern modelling. For urban communities around the world, such research could provide valuable information to build their own knowledge-city quantitative taxonomy, and make comparative identifications of those key elements of knowledge-leveraging capabilities that greatly impact cities’ knowledge capitals.

Indeed, a parallel benchmarking difficulty is creating a city’s systemic accountable base or taxonomy once the city’s contextual benchmarks have been established. The first part of the paper will thus depict how at this point in the benchmarking process, the GCS emerges as a value-based third-generation KM model that attempts a systemic, global and comprehensive perspective for city taxonomy building. It elicits a systematic assessment of a city’s capital base (both tangible and intangible) and its capacity to recombine it in innovative ways. The taxonomy considers eight major capital categories, each one eliciting a number of subcategories according to the city it is attempting to characterise. The GCS categories adhere to the notion of knowledge as a social construction, in which the emergence of knowledge societies adopting knowledge-based frameworks (third generation of KM schemes) is encouraged.

In this regard, a number of international authors have explored paths into monitoring and developing capital systems taxonomies with the GCS as a point of departure or comparison in order to identify knowledge-leveraging as a core strategy in the landscape of emerging knowledge-based societies. The second part of the paper presentation will thus attempt a review of such research work and collaboration, triggered by the GCS taxonomy in recent years, and the metrical implications it has triggered.

The third part of the paper will introduce a practical application of the GCS through recent research on the construction of a Knowledge City index, built on statistical probability. It uses logistic models to identify city benchmarking, and has used the Most Admired Knowledge Cities (MAKCi) consultation experience as part of its input for statistical modelling. As a practical application of the GCS, the paper presentation will advance some applications on how emerging models of knowledge-intensive networks such as MAKCi foster tacit knowledge conversion into explicit scholarly knowledge eliciting consensus patterns of Knowledge City benchmarking.

2 A Generic Capitals System (GCS)

In considering different categories for potential knowledge cities in terms of size and nature, a parallel difficulty is creating a systemic accountable base once benchmarks have been established. A tool for Knowledge city benchmarking is the value-based Generic
Capital System (GCS) taxonomy. It adheres to the notion of knowledge as a social construction, in which the emergence of knowledge societies adopting knowledge-based frameworks (third generation of KM schemes) is encouraged. In this regard, a number of international bodies such as WB, UNO, OECD and the European Union have pointed out the path to monitoring and developing human capital (Carrillo, 2002:379) is through knowledge-creation and learning schemes as core strategies in the landscape of emerging knowledge-based societies. The GCS emerges as a value-based third-generation KM model (Carrillo, 2006:47) that attempts a systemic, global and comprehensive perspective building up on key points from successive generations of Knowledge Management frameworks. It elicits a systematic assessment of a city’s capital base (both tangible and intangible) and its capacity to recombine it in innovative ways. The taxonomy considers eight major capital categories:

1. Identity capital
2. Intelligence capital
3. Financial capital
4. Relational capital
5. Human Individual capital
6. Human Collective capital
7. Instrumental-material capital
8. Instrumental-knowledge capital.

The eight GCS capital dimensions adhere to definitions of the Knowledge City (KC) as a city “purposefully designed to nurture knowledge” (Edvinsson, 2002; in Dvir and Pasher, 2004:17). A k-city is “a region that bases its ability to create wealth on its capacity to generate and leverage its knowledge capabilities through knowledge-based extended networks formed by enterprises and people” (Chatzkel, 2004:62). In broader and also more concrete terms, a KC is one “in which its citizenship undertakes a deliberate, systematic attempt to identify and develop its capital system, with a balanced and sustainable approach” (Carrillo, 2004:34).

The underlying rationale for this taxonomy is to satisfy the formal requirements of value production as a complete, consistent and homogeneous system (Carrillo, 1998, 2002). The GSC builds upon other efforts to identify and value collective individual capital at either urban or national or regional levels. This taxonomy identifies the basic capital elements of productive systems and “meta-capitals”: those other forms of capital not productive in themselves but significantly leveraging the system’s overall capacity. The GSC advances that a global orientation in measurement would “advance accurate achievements, by means of a complete, consistent, systematic and inclusive capital system” (Carrillo, 2002).

2.1 Examples of each capital

In the following paragraphs, the eight capitals described in the MAKCi taxonomy will be illustrated with the most recent published data available: the 2009 edition of the exercise. Each capital is given a practical dimension as each city shows different shades and intensity of its traits and elements of intangible wealth.

Identity Capital in the MAKCi Framework refers to all formal and informal capital elements in the city that have contributed and/or are contributing to determine the city’s identity, its clarity and differentiation (i.e., historic profile, city characterization, Belongingness etc). For instance, in the 2007 edition of the MAKCi Awards, the first-
place score ranking corresponded to both Singapore and Bilbao, (9.20) followed by
Barcelona (8.45). A relatively new city-state, Singapore’s capacity to retain its native
citizens and attract new (talented ones), along with its comparative positioning (rankings,
awards, recognitions, benchmarks) in its region would have played a key role in
Singapore’s high ranking. On the other hand, Barcelona’s and Bilbao’s elements of
historical, archaeological, political and relational traditions and the endogenous profile of
its geographic, climatic and economic inheritance would have played a role in the space
of possibilities that attracted the votes of the MAKCi experts.

**Intelligence Capital** refers to the city’s systems capacity to sense, make sense of, and
respond to external agents and events which are significant to the city’s welfare (i.e. city’s
strategic planning agencies, city public/private future centres, prospective studies etc). In
the 2008 MAKCi Awards, the top place corresponded to Manchester (8.61), the second
place corresponds to Valencia (8.60) and the third to Singapore (8.36). Clearly, in
knowledge-based communities, creativity and innovation are key elements to economic
growth and international recognition. However, it has been observed that the element that
creates a strong Intelligence Capital in a city is the existence and quality of regional and
urban prospective Future Centres. These are public and/or private entities with
professional intelligence capabilities that give advice and support to cities’ regional
strategic planning, and knowledge-based strategic developments through specialized and
conscientious urban prospective studies over viewing the regional or even the national
level. For instance, in the case of Singapore, according to the National University of
Singapore (2007), there are at least 14 centres for city intelligence services in the city-
nation, monitoring and identifying different areas for future development. Such presence
could account for Singapore’s high score in Intelligence Capital.

**Financial Capital** refers to the city’s articulation of monetary denomination of
production value dimensions which elicit economic sustainability within the capital
system (i.e., macro indicators: investment, GDP, tax system, un/employment etc). In the
2009 MAKCi Awards, the MAKCi score identified for first place in Financial capital
corresponded to Valencia (9.50), followed by Melbourne (8.67) as the runner up. As an
example of financial capital, Valencia has put in place a number of taxing initiatives
aiming to a product optimisation policy. In Melbourne’s case, its Department of
Infrastructure developed The Melbourne 2030 focusing on planning for sustainable and
knowledge-based growth and change across the metropolitan and surrounding areas
with a 30-year plan. This plan “aims to create opportunities for innovation within
industries, research and education”. Melbourne is therefore actively seeking to further
develop its economy from commodity-based to knowledge-based and further into a
creativity-based one. Following such aim, the city has implemented a combined strategy
that has already increased the flow ratio of knowledge workers (vs. all workers) to 44.9
percent in 2006. In terms of Finance and business services, the number of employees in
these services was 53,810 in 2006, where the total employment grew from 322,158 to
376,434 persons between 2002 and 2006 (ABS, 2007; Melbourne City,2007b). Such
strategy is expected to trigger further financial outcomes for the economy in the long run.

**Relational Capital** refers to the city’s articulation capital that provides cohesion and
makes social integration possible (i.e. ethnic diversity, individual health habits,
intellectual and cultural competencies, etc). In the 2007 MAKCi Awards, The highest-
ranked city in Relational Capital was Ottawa (9.50), followed by Singapore (9.10) and
Bilbao (9.00). From a Relational Capital Perspective, Ottawa’s and Singapore’s first-
ranking scores are highly significant. It gives a different dimension to Ottawa’s attempts
for culture integration and tolerance. On the other hand, Singapore’s score would indicate milestones of progress in social integration and political dynamism in its society, which appeared to register human right issues in its recent history as identified by participant experts in the MAKCi Platform.

**Human Capital** in its **individual base** refers to the value-generating capacity of individual citizens that contribute to the city’s system of capitals (i.e. health: biological inheritance, and physical development; education: holistic personal development). In the 2008 MAKCi Awards, the top place corresponds to Valencia (8.73), the second place corresponds to Ottawa (8.69) and the third place to Manchester and Montreal (8.22). The highest-ranked city in terms of Human Capital according to the 2008 MAKCi Panel of Experts is Valencia. Indeed, amongst other indicators, it is the European city that attracts more ERASMUS students in all Europe, with knowledge-intensive areas for education, both in terms of numbers of institutions and in variety of course programs (3,618 graduates in 30 courses). The city relies on a comprehensive network of educational infrastructure only challenged by the brain drain to Madrid, Barcelona or other European cities to recent graduates. On the other hand, the capital city of a very multicultural country, Ottawa enjoys high levels of education and human development, as well as an average physical and mental welfare of individuals, according to international standards. In the same line, Education, especially technological education has a lot of planning for younger generations in Manchester. Some examples are science-based businesses, (MANCAT) to be completed in 2008; and the e-Science North West Centre, managing a portfolio of e-science projects and Grid technologies in the North West region.

**Human Capital** in its **collective base** refers to the collective cultural fitness and team-based value-generating capacities of all citizens that contribute to the city’s system of capitals (i.e. demographic structure, public health, social welfare, intellectual heritage, civic culture, innovation and entrepreneurial capacities etc). In the 2009 MAKCi Awards, the MAKCi score identified for first place in Human Collective capital corresponded to Valencia (9.67), followed by Montreal (9.00), as the runner up. Valencia has highlighted the importance of its public health services as part of its human collective capital. Hospitals with multiple specialities operate in the city: with 6 hospital centres, 4 specialist centres and 26 local clinics, nearly 11,000 healthcare employees work in Valencia’s metropolitan areas. Montreal’s score in human collective capital stems from the city’s relentless transformation into a services-oriented economy. The city has made real progress in terms of life expectancy and reduction of mortality rates over recent years. Between 2003 and 2005, child mortality decreased by 50% compared to existing rates in early 1980s. Such population dimensions, along with traditional Montreal’s cultural wealth and capacity to develop innovative technologies confer a definite advantage on the Montreal economy.

**Instrumental Capital** in its **tangible base** refers to material-based means of production through which other capitals leverage their value-generating capacity. Instrumental capital includes a) Natural: existing before the settlement, such as geography, climate, physical landscape, environmental conditions, etc. And b) Infrastructure: created incorporated or adapted by the settlers, such as historical sites and archaeological records, sewage, wire networks, urban configuration, green and recreational areas, Urban sprawl, urban transportation, connectivity, communications and telecommunications, productive, commercial and service infrastructure. In the 2008 MAKCi Awards, the top place corresponds to Singapore (9.23), the second place corresponds to Valencia (8.73) and the third place to Ottawa (8.62). Singapore has been
distinguished with a high index of attractiveness mainly because of its solid material-based infrastructure. Moreover, Singapore as a modern city came into being because of a privileged duality: its location and its harbour. Both assets have remained major sources of its economic vitality as the island-nation was transformed into a major transportation and communications hub. In the same line, The Port of Valencia is a driving force and leader in growth in the Mediterranean, becoming an emerging cruise destination, with a solid technological infrastructure for advanced telecommunications that guarantee businesses and employees the best support. Last but not least, Ottawa’s urban physical infrastructure is world class. This is evident in its transportation and telecommunications connectivity. In terms of land connectivity, it is supported by multiple methods of transport ranging from: air travel, rail, bus, and automobile. Moreover, virtually 100% of Ottawa’s schools, universities, hospitals, libraries, research institutes and municipal facilities are wired with high-speed internet access. No other city in Canada has the breadth and depth of fibre optic connectivity as Ottawa – making it Canada’s most connected city. Last but not least, a solid £400m has been invested on the Manchester Airport, for additional terminals and a second runway that will increase yearly passenger numbers to 39 million by 2015. It is the second largest regional airfreight facility, with 117 tone capacity (Work Foundation, 2002). Also, over £750m have been invested for office, retail and leisure facilities in some areas of the centre (MIDAS, 2004); amongst which the ’MIDAS touch’ was present in Piccadilly Train Station. In parallel to the Greater Manchester area, Greater Montréal’s key economic sectors, including aerospace and gaming, corporate investments have been increasing at a steady rate. These investments have made the metropolitan area a dynamic high technology centre that is well positioned within major international innovation networks. With a bold development plan (Montreal 2025: Imagining and Building Montreal), in partnership with the players concerned, Montreal intends to develop over 130 projects and initiatives, representing total investments of several tens of billions of dollars which will have structuring effects on Greater Montréal’s quality of life, economic competitiveness and attractiveness.

**Instrumental Capital** in its intangible base is complemented by capital contained in a knowledge-based means of value-generation capacity: intangible instrumental capital. It includes the social organization structure and the social innovation systems, such as productive innovation, (i.e. ISO certifications by sector) educational, scientific and technological innovation (technology indicators), and government innovation (number of NGOs operating, e-government services etc). Intangible instrumental capital also refers to extensive use of traditional and ITC-based information and communications. It presupposes data repositories about the civil society, private industry, education and government through knowledge records, publications, bases and systems (printed or electronic) readily available as documents. In the 2009 MAKCi Awards, the MAKCi score identified for first place in intangible instrumental capital corresponded to Valencia (9.67), followed by Istanbul (9.25), as the runner up. Valencia in intangible capital terms, expects to settle the basis for a more extended use of e-government in its municipality, and cascade down professional training for City Council staff on new technologies. Turkey’s Internet service providers, on the other hand appear to be heavily concentrated in Istanbul (34 of a total of 49 carriers). However, Istanbul and its wider region (Marmara) have launched innovative e-governance and e-local government projects (i.e. Istanbul, Bursa, Yalova) that have dominated Turkey’s e-governance awards thus promoting applied ICT quality projects and initiatives.
3 MAKCi Impact within the KBD Community

The Most Admired Knowledge City (MAKCi) Awards have been established to create knowledge-based benchmarks, which over time will provide public sector officials and business and social leaders with the tools and measures needed to improve knowledge creation, dissemination and re-use – ultimately resulting in an improved standard of living for all members of that community or region (Chase, 2007). MAKCi study insights have indeed been relevant to the KBD community for a few reasons: it is clear that several cities and/or regions are in the process of forming a top tier of MAKCi winners. Moreover, another group of urban areas is actively pursuing a knowledge-driven strategy with a goal of entering the top tier. On the other hand, there is growing evidence that most cities and regions have yet to understand the significant implications of not strategically managing societal knowledge creation, dissemination and re-use. Researchers from different regions around the world have understood such needs, and have regarded MAKCi as an innovative option amongst the existing KBD indexes and taxonomies.

The knowledge-based development literature has long recognised the role that local communities within specific regions, and more specifically cities, may also play in the furtherance of the wellbeing agenda (Dvir and Pasher, 2004; Chatzchel, 2004). Passerini identifies the MAKCi as a useful multi-rater technique with its eight capital dimensions (Passerini and Wu, 2008) in a conceptual discussion on how to identify the level of creation of knowledge and wellbeing of cities, while Ergazakis, K. (2009) uses it as an a comparative tool for research on K-Cities. On the practitioner side, Duekert, S.; Hiegl, M. and Trinkwalter, J. (2009), state how by generating an annual MAKCi nomination, the taxonomy has proved useful for city marketing and communication, while Batra (2008) uses the MAKCi taxonomy as a framework for developing Regional Knowledge Development Indices, which can be used for evaluating the extent and effectiveness of the processes for acquisition, sharing and utilization of knowledge across regions (not necessarily only countries or cities, but also at a micro-level such as villages) (Batra, 2008). Moreover, Chatzkel, (2009) takes the MAKCi framework as a starting point in his journey into a sound exercise of reviewing it and evaluate if applications by cities and regions for the MAKCi Award are actually demonstrating a sound KC development effort. The assumption is that the MAKCi 2.0 proposed can provide a more verifiable working model to evaluate if a city/region is galvanizing the necessary elements to achieve a sustainable knowledge-based environment (Chatzkel, 2009). Indeed, as Wang, et.al. (2008) put it in their own context, MAKCi as a Knowledge City framework has brought great inspirations on urban construction in China both from theoretical and practical perspectives. These highlights exemplify how a knowledge-based taxonomy and index are intensely sought after in the universe of the knowledge societies, and how MAKCi can be relevant to a number of like-minded researchers around the globe.

4 A contextual Case: The MAKCi Exercise

Launched in November 2006, the Most Admired Knowledge City Awards (MAKCi Awards) is a consensus study that includes an annual consulting exercise established to identify and recognize those communities around the world who are successfully engaging in formal and systematic knowledge-based development processes under the flag of Knowledge Cities (WCI, 2007). The MAKCi on-line consultation was first convened in early 2007, as a joint knowledge-based initiative of Teleos’ Most Admired
Knowledge Enterprises (MAKE) and the World Capital Institute (WCI)’s. MAKCi merged the MAKE Awards methodology, with the WCI Generic Capitals System (GCS) taxonomy, resulting in the MAKCi Framework©, described earlier. Following these perspectives, the MAKCI Awards can be defined as a “knowledge-based initiative whose contribution to innovation depends largely on human imagination and creativity and the knowledge assets available at a point in time and context” (Malhontra, 2000; in Goh, 2004). The MAKCi exercise, as a collaborative research study, represents a community space to build meaningful, collective knowledge that would contribute on an annual basis to the understanding of Knowledge Cities dynamics and transformations. Hence, the MAKCi exercise aims at structuring and mapping knowledge – working on tacit knowledge conversion through process mapping and MAKCi knowledge products (i.e. 2007 MAKCI Report). It also aims to developing knowledge databases – documenting best practices, expert directories, K-Cities intelligence etc. and embedding knowledge in the MAKCi process.

4.1 A Delphi Iterative Cycle

The cornerstone of the MAKCi exercise is a consultation to a Panel of Experts, which is integrated on an annual basis by invitation only. A MAKCi executive committee invites the participation of researchers and practitioners with credentials in Intellectual Capital (IC), Knowledge Management (KM) Knowledge-based development (KBD), and/or Knowledge-based Urban Development (KBUD) practice. As part of such emerging global network, experts are invited to interact on a virtual platform with fellow researchers and practitioners, all of them coming from diverse disciplines, regions, nationalities and ways of life. They converge in this consultation space to discuss and establish the relative future development capacities of worldwide urban communities by assessing their capital value base in a knowledge-based world. In practice, the MAKCi Panel of Experts seemingly acts as a social knowledge network. Even further, as it conglomerates experts from a number of specific KBD regional CoPs, it fits the identified notion that characterises it as a Network of Practice (NoP). Network membership seems to encompass knowledge-generating (learning) experiences tightly linked to the benefits members perceive in belonging to the MAKCi network. Indeed, their membership motives include a sense of professional commitment to their local knowledge-based development (KBD) community, a desire to increase and collaborate to the KBD emerging field and a willingness to be part of the greater KBD community, especially where KM/KBD practitioner groups are limited or isolated in their local setting (Wasko and Faraj, 2008).

Indeed, MAKCi draws together some of such membership motives. By becoming a member of the MAKCi Panel, panellists get to interact with colleagues with whom they would usually have not the opportunity to interact with. Thus, cross-fertilization, cross-disciplinary and also cross-regional activity can be highly valued by experts linked to disciplines such as the emerging knowledge-based development (KBD) field. They also have prime access to resulting products from the exercise:
- A yearly MAKCi Executive Summary.
- A yearly MAKCi Full Report.
- A yearly Knowledge Cities Summit, an Award Presentation Ceremony fostering academic discussion on KBD topics.
Hence, panel members are offered access to first-instance information on knowledge-based development and Knowledge City trends that could be of interest in their academic research activities, business-related ventures, research socialisation and/or public sector activities.

4.2 MAKCi Process and Methodology

The MAKCi consultation follows the Teleos adaptation of the Delphi technique used in the MAKE Awards, which has been replicated for MAKCi purposes. The Delphi Technique facilitates the identification of perceptual knowledge within a group of specialists involved in knowledge-intensive research. It therefore involves intensive and focused discussions, interactions and collective agreements that are supported by a virtual discussion platform during the 3-stages duration of the MAKCi Exercise. Congregated around the annual MAKCi consulting exercise, the invited Panel of experts selects nominee cities, finalist cities and winner cities in three successive voting rounds that actually reflected the profiles and dynamics of cities succeeding in the application of knowledge-based development initiatives, as follows:

**MAKCi Round 1: Nominations**

The first round of participation requires invited experts to nominate as many cities as they consider have the merits to be included as candidates and to provide reasons for each nomination. It is based on the MAKCi Framework© and the MAKCi Nomination Form® as the tools to standardize the key elements of each nomination. Nomination information is made available at a discussion platform so as to allow the exchange of views on candidate cities on a permanent basis.

**MAKCi Round 2: Selection of Finalists**

During this stage of the MAKCi process, and based on previous discussion on the MAKCi platform, participants choose amongst the nominated cities their Knowledge-City finalists and send their votes on an automated survey platform for final count.

**MAKCi Round 3: Selection of Winners**

During this final stage of the MAKCi process, participants choose amongst the finalists their three favourite k-city winners and send their votes by the MAKCi automated survey which will count for the final voting results. Experts are encouraged to cast their vote over eight (see p. 3) specific capital-based criteria stated in the MAKCi Framework, which is based on an assessment of a city’s capital base (both tangible and intangible) and its capacity to recombine it in innovative ways. The major capital categories are derived from the Generic System of Capitals, from which capitals criteria are emphasized. The MAKCi Framework, along with the MAKCi Nomination Form, are the key instruments to assist the panel of experts in determining which cities are worth the recognition and awarding status that the MAKCi exercise conveys.

5 Modelling the MAKCi Case

The information considered for our statistical modelling was all data available from experts voting during the third round of the exercise during three consecutive years: from 2007 to 2009.
5.1 Statistical Modeling for MAKCi

The analysis of regression is a methodology that aims to establish a statistical relation between two or more quantitative variables by means of a model with the goal of predicting the existence of a variable by the outcome of the others (Kutner, 2004). There are many types of models of regression, but we will focus the attention on the model of linear multiple regression and on the model of logistic regression.

The model of linear multiple regressions is shown by the expression

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_{p-1} x_{ip-1} + \xi_i$$

Where:
- $y_i$ represents the value of the variable of response (variable of interest) for the $i^{th}$ observation;
- $\beta_0, \beta_1, \beta_2, \ldots, \beta_{p-1}$ represent the parameters of the model;
- $x_{i1}, x_{i2}, \ldots, x_{ip-1}$ represent the values of the predicting variables (related variables) for the $i^{th}$ observation.
- $\xi_i$ is the error term related to the $i^{th}$ observation.

This model is adjusted using sample data by the square minimums method, which to be adapted needs that the term of the error, considered itself a random variable, fulfills the following structure: they must be independent, normally distributed with mean zero and constant variance.

Once the parameters are obtained for the adjustment model it is important to perform a test of variance analysis (ANOVA) to verify that the opposing relation has scope at population level and not only it is a matter of a sample behaviour. If the population relation is verified from forecastings, then the efficiency of the model is checked through the coefficient of determination and if this measurement turns out to be satisfactory, tests should be performed to verify the adequacy of the model.

Researchers such as Hunter and Hunter (1978) emphasize the fact that finding a statistical relation does not necessarily come from a causal relation, which can be alone a relation of behaviour and it is the researcher’s responsibility to decide on the causality of the variables. Montgomery (2006) highlights that the relevancy of this type of models remains determined by the moment they are utilized, preferably in interpolations that remain endorsed by the sampling evidence.

It is necessary to mention that if it is proved that the model is suitable, the variable of interest must be considered as a randomly continuous variable that is normally distributed, which can impact in the forecasting and the interpretations derived from the use of the model.

Other type of predictive models is The Logistic Regression Model:

$$\log \left( \frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_{p-1} x_{ip-1} + \xi_i$$

Where
- $p_i$ represents the probability of success in the $i^{th}$ observation.
- $\beta_0, \beta_1, \beta_2, \ldots, \beta_{p-1}$ represent the parameters of the model.
$x_{i1}, x_{i2}, \ldots, x_{ip}$ represent the value of the predictive variables (related variables) in the “$i$” observation.

$\xi_i$ is the error term related to the “$i^{th}$” observation.

These type of models are developed for the study of a binary variable alone where two possible results are expected, one of them is considered to be the success and other as defeat (Christensen, 1997) and, one more time, once the model is obtained, the scope, the efficiency and the adequacy of the model should be checked through statistical $G_2$. Indeed, the analysis of regression is a very powerful and well founded statistical tool to forecast data behaviour, Therefore, the success of the analysis depends completely on the correct use of the tests and on making maximum use of the conclusions derived from Tests.

By means of a Delphi method, data was elicited on an electronic platform during years 2007, 2008 and 2009, in which the Panel of Experts would vote for the knowledge cities they considered with enough credentials to be the first, second and third place winners of the year. Each city was benchmarked against a capitals system, the eight capitals that compose the MAKCi framework. These capitals were taken into account to perform the following statistical modelling and resulting in a MAKCi *endogenous* index.

Table A1. Correlation coefficient of Pearson for the year 2007 data

<table>
<thead>
<tr>
<th>r-Pearson 2007</th>
<th>Place</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>-0.68</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>-0.67</td>
<td>0.77</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>-0.46</td>
<td>0.69</td>
<td>0.70</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>-0.61</td>
<td>0.71</td>
<td>0.70</td>
<td>0.71</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>-0.48</td>
<td>0.65</td>
<td>0.73</td>
<td>0.69</td>
<td>0.79</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>-0.57</td>
<td>0.76</td>
<td>0.83</td>
<td>0.63</td>
<td>0.71</td>
<td>0.76</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>-0.55</td>
<td>0.70</td>
<td>0.76</td>
<td>0.82</td>
<td>0.75</td>
<td>0.81</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>-0.59</td>
<td>0.61</td>
<td>0.76</td>
<td>0.62</td>
<td>0.76</td>
<td>0.78</td>
<td>0.71</td>
<td>0.77</td>
<td>1.00</td>
</tr>
</tbody>
</table>

By comparing the results of three successive editions of the MAKCi exercise, the possibility of establishing a model which could predict the relative position of the cities from the evaluation with the eight capitals was explored. This, in the aim of establishing an index with which each individual city can be identified, benchmarked and recognized as advancing initiatives of knowledge-based development. A first approach to the data was run with the information of the years the 2007 and 2008 by means of the correlations between different capitals and inference from multiple regression models (see Tables A1 to A3).

In Table A1 Highly similar correlations were observed between the different capitals, as well as with the order voters conferred to capital scores.
Table A2. Correlation coefficient of Pearson for the year 2008 data

<table>
<thead>
<tr>
<th>Place</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>-0.33</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>-0.32</td>
<td>0.73</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>-0.24</td>
<td>0.60</td>
<td>0.60</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>-0.30</td>
<td>0.71</td>
<td>0.71</td>
<td>0.54</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>-0.34</td>
<td>0.63</td>
<td>0.64</td>
<td>0.48</td>
<td>0.51</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>-0.34</td>
<td>0.56</td>
<td>0.63</td>
<td>0.51</td>
<td>0.59</td>
<td>0.70</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>-0.33</td>
<td>0.70</td>
<td>0.63</td>
<td>0.68</td>
<td>0.64</td>
<td>0.50</td>
<td>0.58</td>
<td>1.00</td>
</tr>
<tr>
<td>C8</td>
<td>-0.42</td>
<td>0.70</td>
<td>0.65</td>
<td>0.59</td>
<td>0.63</td>
<td>0.65</td>
<td>0.74</td>
<td>0.69</td>
</tr>
</tbody>
</table>

In contrast to the observed correlations in the table A1, in the table A2, low correlations are observed between the capitals and the place, while the capital correlations remain similar in both years.

Table A3. Correlation coefficient of Pearson for the year 2009 data

<table>
<thead>
<tr>
<th>Place</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>0.36</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>0.25</td>
<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>0.36</td>
<td>0.72</td>
<td>0.71</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>0.38</td>
<td>0.81</td>
<td>0.81</td>
<td>0.71</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>0.32</td>
<td>0.80</td>
<td>0.77</td>
<td>0.68</td>
<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>0.38</td>
<td>0.77</td>
<td>0.77</td>
<td>0.76</td>
<td>0.80</td>
<td>0.84</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>C7</td>
<td>0.29</td>
<td>0.72</td>
<td>0.76</td>
<td>0.76</td>
<td>0.72</td>
<td>0.70</td>
<td>0.70</td>
<td>1.00</td>
</tr>
<tr>
<td>C8</td>
<td>0.42</td>
<td>0.77</td>
<td>0.77</td>
<td>0.72</td>
<td>0.80</td>
<td>0.77</td>
<td>0.84</td>
<td>0.78</td>
</tr>
</tbody>
</table>

In the table A3, higher correlations appear among the capitals, but not very high as for the place variable.

By analysing the difference between the correlations from one year to other and comparing the results of tables A1, A2 and A3, the exercise of the Delphi method in the MAKCi Awards changed in the following way: in the year 2007 the experts postulated the city that they considered to be the first, second and third place in every capital of the capital system, they granted score from 1 to 10 (where 10 is the highest), whereas in the year 2008 and 2009, every expert proposed a city as the first place and then they separately granted a score to eight capitals, it was the same procedure for the second and third place.

Due to the difference in the data collection of the year 2007 with regard to 2008 and 2009, it was determined to only analyze the information of the year 2008 and 2009 to avoid discrepancies. From observing the correlations, several models of multiple regression emerged. The place assigned by the experts was considered as the response variable and the capitals variable was considered as the predicting variable in the model. Once the atypical observations were eliminated the resulting models are as shown in Table B1a:
Table B1. Model of multiple regression for place of the cities

Using the statistical software "Minitab" to analyse the obtained results, it is observed in table B1 that it is possible to model the variable \( \text{place} \) according to the eight capitals, the analysis of variance appears also with a lower p-value than 0.05, this leads us to conclude that there is a relation between the variable \( \text{place} \) and the eight capitals. Considering the variability value of 42 % in the variable \( \text{place} \) regarding the capitals system we can imply that for the resulting model, improvement is still needed.

The adaptation of the model can be verified by observing the graph B1 with the residuals obtained in the "Minitab". In this graph it is shown that the assumptions are not fulfilled in the structure of the error, which are established for the models of linear multiple regressions, therefore, this is not a suitable and reliable model to work with.

Graph B1a. ResidualsTest for the model in table B1
Despite the promising predictions, there are some considerations that must be taken into account for this benchmarking model:

1. The response variable for the regression model is a continuous variable, whereas in reality it represents an ordinal variable, which greatly impacts the interpretation of adjusted values.

2. The graph B1 of the fitted value against the residuals presents a pattern that was highly expected due to the nature of the variables showing the lack of error homocedasticity and the assumption of a binomial behaviour.

Therefore a second approach to the data was considered but this time through logistic models. Studying the form to apply the logistic models (which predict the probability of occurrence of an event) for the purposes of this research and trying to postulate an order for the cities with respect to being considered as the Most Admired knowledge-city. The data were reorganized and the response variable was considered as a dichotomizing variable:

The city is considered as a Most Admired Knowledge-City =1 or
The city is not considered as a Most Admired Knowledge-City =0.

### Table B2a. Model of logistic binary multiple regression for the variable "place" for cities

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>Z</th>
<th>P</th>
<th>Ratio</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-14.7250</td>
<td>2.21340</td>
<td>-6.65</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>0.177596</td>
<td>0.218180</td>
<td>0.81</td>
<td>0.416</td>
<td>1.19</td>
<td>0.78</td>
<td>1.83</td>
</tr>
<tr>
<td>C2</td>
<td>-0.143603</td>
<td>0.221756</td>
<td>-0.65</td>
<td>0.517</td>
<td>0.87</td>
<td>0.56</td>
<td>1.34</td>
</tr>
<tr>
<td>C3</td>
<td>0.0533521</td>
<td>0.184432</td>
<td>0.29</td>
<td>0.772</td>
<td>1.05</td>
<td>0.73</td>
<td>1.51</td>
</tr>
<tr>
<td>C4</td>
<td>0.0429494</td>
<td>0.210985</td>
<td>0.20</td>
<td>0.839</td>
<td>1.04</td>
<td>0.69</td>
<td>1.58</td>
</tr>
<tr>
<td>C5</td>
<td>0.0803247</td>
<td>0.209750</td>
<td>0.38</td>
<td>0.702</td>
<td>1.08</td>
<td>0.72</td>
<td>1.53</td>
</tr>
<tr>
<td>C6</td>
<td>0.412353</td>
<td>0.236410</td>
<td>1.74</td>
<td>0.081</td>
<td>1.51</td>
<td>0.95</td>
<td>2.40</td>
</tr>
<tr>
<td>C7</td>
<td>0.334628</td>
<td>0.213512</td>
<td>1.57</td>
<td>0.117</td>
<td>1.40</td>
<td>0.92</td>
<td>2.12</td>
</tr>
<tr>
<td>C8</td>
<td>0.671215</td>
<td>0.251246</td>
<td>2.67</td>
<td>0.008</td>
<td>1.96</td>
<td>1.20</td>
<td>3.20</td>
</tr>
</tbody>
</table>

Log-Likelihood = -100.801
Test that all slopes are zero: G = 95.093, DF = 8, P-Value = 0.000

Measures of Association:
(Among the Response Variable and Predicted Probabilities)

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Number</th>
<th>Percent</th>
<th>Summary Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>discordant</td>
<td>10210</td>
<td>85.7</td>
<td>Somer's D 0.72</td>
</tr>
<tr>
<td>discordant</td>
<td>1479</td>
<td>11.7</td>
<td>Goodman-Kruskal Gamma 0.72</td>
</tr>
<tr>
<td>ties</td>
<td>18</td>
<td>0.2</td>
<td>Kendall's Tau-a 0.33</td>
</tr>
<tr>
<td>total</td>
<td>11807</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

160
From this idea it is considered that positioning a city can be done by predicting the probability it has to be chosen as a Most Admired Knowledge-City considering the allocation the experts gave to the eight capitals. Considering the data of two years 2008 and 2009 and after the exposition of a series of models from a constructivist perspective it is considered that the best alternative of modelling is by means of the model of multiple logistic regression shown in table B2a.

The table B2 of logistic regression shows the considered values of the parameters of the model along with the associated p-values, but they will be interpreted with reserve due to the possible presence of multi-collinearity (a relation that enters the assigned evaluations to the capitals). A review to detail of the complete model and its predictive power with each of the capital dimensions is needed.

Apparently, as the levels of the Human Collective capital and Instrumental-knowledge capital increase, it could have a significant effect on the probability of being considered as a Most Admired Knowledge-City to have an odds-ratio quite greater to one. This means that those Cities that count on major values in these two capitals will have high probabilities of being considered as the best.

As the statistical G is used to resist the hypothesis that all the coefficients in the model associated with the predicting variables are null, the associated p-value of 0.000 (see table B2) ratifies that at least one of the capitals explains the probability of the city to be considered as a Most Admired Knowledge-City, or MAKCi.

In the section of Goodness-of-Fit Test, in table B2, the associated p-values are the tests of Pearson, Deviance and Hosmer-Lemeshow are greater than 0.05, it is not possible to reject the model as it adjusts suitably to the observed data, as shown in Table B2b.

Finally, by observing the previous graph we can remark that the majority of the observations are explained by the model itself, which helps to confirm that the model of logistic binary regression is adapted for the forecast of the probability that every city has to be considered the Most Admired Knowledge City (MAKCi)

Considering the information of the table B2, the logistic model of regression is established as follows:

$$\ln\left(\frac{p}{1-p}\right) = F(C_i)$$
where
\[ F(C_i) = -14.725 + 0.17759C_1 - 0.1436C_2 + 0.05335C_3 + 0.04294C_4 + 0.08032C_5 + 0.41235C_6 + 0.33462C_7 + 0.67121C_8 \]

it is deduced from here that the probability that a city has to be classified as the most admired knowledge city is given for:
\[ p = \frac{1}{1 + e^{-F(C_i)}} \]

So that any city that is evaluated using the capitals system will be able to be represented by a probability.

6 Findings and Discussion: MAKCi Benchmarking tools

By considering the average evaluations established by the experts in the different capitals for some cities assumed in a three-year period of MAKCi Awards, the information contained in Table B3 has been obtained. In Table B3, the column of \( F(C_i) \) shows the prediction that the logistic model esteem for each city, the column of \( p \) establishes the probability corresponding to each city to be considered as a Most Admired Knowledge-City and the column of MAKCi Index are the square root of the probability as a form to attenuate the values of the probabilities. From the full quantitative analysis displayed during this first research steps, it is advanced that MAKCi index consists of the root of the probability associated with the logistic binary model to be considered as the Most Admired Knowledge City choice.

Table B3. Index MAKCi for the cities nominated in the exercises MAKCi 2007, 2008 and 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
<th>FCI</th>
<th>p</th>
<th>MAKCi Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Barcelona</td>
<td>9.2</td>
<td>9.0</td>
<td>7.9</td>
<td>9.4</td>
<td>8.8</td>
<td>9.0</td>
<td>9.7</td>
<td>8.4</td>
<td>-0.30</td>
<td>0.42</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Bilbao</td>
<td>9.2</td>
<td>8.3</td>
<td>8.3</td>
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A MAKCi index positioning is therefore here advanced for the corresponding values obtained, which has been able to objectively determine a subjective Panel of experts consensus. An advantage in establishing this model is that the index can be flexible/mobile by re-ordering the annual information as it becomes available, consequently updating the valuable information at each edition of the exercise. It has therefore become apparent that the logistic models represent a valuable tool to establish
the relation between these variables, nevertheless, until this moment the information obtained is limited. It is important to emphasize that from the statistical point of view this MAKCi endogenous index turns out to be very appropriate to explain the relation between the value in each one of the eight capitals and the position as the Most Admired Knowledge City. For future MAKCi Exercises, it is through this model that experts evaluate finalist cities for a better appreciation of the information made available during the annual exercise.

7 The MAKCi Benchmarking potential

This paper has attempted to explore statistical modelling capabilities in order to use the capitals that define the MAKCi taxonomy resulting in a MAKCi endogenous index. Although in this opportunity it has been found that most variables (except C6 and C8) are not highly significant statistically (which means that the model is not accurately forecasting the dependent variable namely the MAKCi Index yet), it is expected that a new path into research could be open to seek for other statistical exercises in order to better define a MAKCi index from a knowledge-based development perspective.

In the meantime, the MAKCi study aims to continuously provide new statistical data which aim to enable planners, politicians, economists, and business and social leaders to create robust, viable strategies and approaches for enhanced urban design and development. MAKCi findings, are building a knowledge city observatory in which emerging urban development trends are evidenced, challenging us to understand and learn from these trends. Indeed, MAKCi has firmly started a trailblazer journey as an authoritative resource for both the academic and practitioner communities. However, as with any recently-established research program, there are opportunities to learn and improve, for which the World Capital Institute (WCI) is investing time and resources to improve the MAKCi framework and methodology while envisioning the future.

References


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10
Borderland tele-centres: learning & connectivity at the edge

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Structured Abstract

Purpose – This research paper explores a regional Latin American telecentre development strategy initiative from a knowledge-based development (KBD), perspective.

Design/methodology/approach – From such approach, the paper takes the discussion away from information and communication technology (ICT) applications, connectivity access or digital divide perspectives. It will rather focus on relational capital concepts, linked to that of knowledge for community development, in order to map out the nature, development and impact of collective knowledge on sustainability. It would therefore explore how conventional telecentres could be transformed into knowledge hubs in a fast-paced route into becoming knowledge networks, built on key strengths of the city-region’s Systems of Learning.

Originality/value – It is sought to highlight how regional systems of Learning, as modern Agora, continue building knowledge-based communities and social networks. It is expected that a network outlook will better highlight such networks, strengthening the region’s relational capital.

Practical implications – Hence, this piece of research work advances that the aspirational transformations of telecentres into knowledge hubs and knowledge networks is possible in a context of knowledge-based development initiatives. As the Mexican North-East region and other Latin American regions seek to re-invent themselves as knowledge epicentres, the possibilities for sustainable development through k-networks are greatly increased. Therefore, the paper will seek to emphasize the importance of telecentres for information and knowledge sharing. Most importantly, it will attempt to highlight the trade-off between top-down connectivity and computer literacy programs vs the community-prone and development-led efforts that telecentres represent in some Latin American regions. In such contexts, telecentres could become knowledge hubs and knowledge networks for more extended cases of sustainable development.

Keywords – tele-centres, ICTs for development, Knowledge-Based Development (KDB), Knowledge Cities (KCs), digital policy.

Paper type – Academic Research Paper / Practical Paper
1 Introduction

Connectivity and the use of information and communication technologies (ICTs) for development is unavoidably linked to that of knowledge management and social knowledge sharing practices. However, sharing knowledge remains the biggest challenge in our knowledge-based development (KBD) dimension (Halal, 2005:7). In such context, this paper aims to explore the case of Tele-centres, a practical case of connectivity that provides a social knowledge-generating space for communities, cities and societies. Some Tele-centres around the world are seemingly undergoing a process of transformation from information kiosks into knowledge hubs. The impact on the social Systems of Learning they are part of is yet unexplored, and necessary to map out as key knowledge-based social dynamics if telecentres are eventually to assume a knowledge network role in their communities and city-regions.

In such context, the first part of the paper attempts a literature review and discussion away from technological applications that support knowledge sharing communities, connectivity access or digital divides. It will rather focus on how social capital concepts, linked to that of knowledge for community development, in order to map out the nature, development and impact of collective knowledge. The paper will advance that the key to improve knowledge-based development practices in telecentres is learning facilitation, particularly social learning facilitation in informal and formal networks. They could become spaces for conversations where knowledge is transformed into a value system that benefits the city (Carrillo, 2004). This review will be followed by a deeper inquiry on the role of social learning networks and social knowledge networks, on how they add value to the social capital of members through access negotiation, autonomy and participation.

The third part of the paper will explore a case for Telecentres in the Latin American (Mexico’s) context, where their impact and effectiveness has been intensely questioned at the connectivity level. The project initiated in February of 2001, with the first CCA operating in the Mexican North East (near the Monterrey city-region). A few evaluations on real impact have already taken place, not all of them have been positive. In any case, the Monterrey city-region and the North East of Mexico are territories that have been both at the leading and bleeding edge of Mexico’s socio-economical history. Shaped by their unique geo-historical conditions, they are once more developing new forms of social capital, defined and characterized by their condition of ‘borderland’. Even if the Monterrey city-region is yet to prove that Telecentres in these borderland territories can indeed act as the first knowledge networks given its singular knowledge-generating environment, the city-region seemingly presents alternatives for national public policy, knowledge transformation and sustainable development that are worth exploring.

2 Telecentres and knowledge sharing

Access to information has the potential to bring about the necessary social and economic change in a society. In that sense, telecentres seem to bridge the connectivity promise with shared facilities for people who cannot individually afford them because they are too expensive and/or too complicated to use (Ariyabandu, 2009:2). The fact that the users share the cost of telecom infrastructure and local facilities within their community at an affordable cost, brings a strategy for telecentres to operate: they could effortlessly encourage knowledge sharing. Nevertheless, sharing knowledge remain one of the key challenges of our time (Halal, 2005:7).
2.1 The impact of collective knowledge on-line

Indeed, as collective knowledge continues to grow in volume and complexity, we are progressively challenged to make sense of the co-evolutionary processes between learning (as knowledge creation) and its relationships and interdependencies with the new information and communication media available (Tuomi, 2005). Moreover, with telecentre activities and a number of other on-line, self-paced development processes, we seem to keep building multi-cultural, multi-ideological information highways. Indeed, our globe is seemingly turning into a world of parallel systems of meaning (Toumi, 2004a:1). In this multi-meaning universe, the emerging societies in different parts of our world are increasingly depending on international links and networks to live on: their communication activities become critically important in the social construction of communities that learn (Tuomi, 2004a:1). In these emerging societies, our culture-led communication artefacts and culturally-based arrangements such as technologies, information systems and connection infrastructures such as telecentres are seemingly making our communication activities more intense and more relevant to others and their communities. At the same time, access to meaningful communication (or the lack of it) is shaping our self-perceptions as individuals; and our perceptions about other humans, cultures, and value systems in many ways. Hence, our unconventional exchanges of information, knowledge and experiences over the Internet are becoming permanent and personal processes of meaning negotiation. Message significance depends on who and where are the users at the moment of interaction. This meaning negotiation is the new reality of on-line environments and Internet-based interactions happening world-wide on a 24/7 basis: an increasing flow of continuous and creative interaction. At the core of this complex makeover of the social, economic and technical sub-systems, sits the System of Learning on which each of our societies rely on. Our systems of learning are historical societal structures now seemingly developing into Systems of Meaning-Creation (Tuomi, 2004a:2). Indeed, the learning systems in our societies appear to be challenged by the power of networked communication with varying levels of intensity. More than an information revolution, the new millennium has openly confronted us with a learning revolution (Sloman, 2001). Intranets, virtual communities and on-line learning are seemingly only the tip of a gigantic iceberg in this emerging revolution. Predictably, given the emphasis of communication in meaning-creation processes, information and communication technologies (ICTs) are indeed playing a major role in the System of Learning of emerging knowledge-based cities, regions and societies.

2.2 Collective knowledge in networks

On the other hand, the notion of knowledge networks is attracting an immense amount of interest within the international community. Networks by nature assume a globally distributed international audience, working 24/7 from the most diverse points of the planet. They are compared to, but distinguished from concepts such as Communities of Practice or CoPs. In CoPs, learning is generally situated and therefore the local context is essential to construct the meaning of such interactions. While an on-line environment might not be able to support situated learning (Lave and Wenger, 1991), the kind of exchange reached within a knowledge network (k-network) is seemingly overcoming typical on-line barriers of meaning construction by generating a common theoretical base and language of exchange. Indeed, user-friendly, internet-based networking technologies have accelerated the development of new forms of exchange: open and public
technologies have enabled the creation of strong networked communities, and "virtual" networks by underlining the role of shared community repositories (documents, databases, research outputs) that enable the network to generate a common language or practice. Networks can seemingly overcome the constraints posed by situational learning by establishing ground for common understanding (Brown and Duguid, 2000). Wenger (1998) has also proposed a network model within social communities as a constellation of interrelated CoPs, while Brown and Duguid (1991) have introduced notions of surrounding knowledge ecology systems. In any case, networks are seemingly developing a stronger ability that allows the transfer of knowledge and the facilitation of learning through social links. However, networks come in different shapes and forms. Indeed, in recent years a number of scholars have attempted to define the elements and characteristics of networks, especially those who add value to the social capital of organisations. For instance, Monge & Contractor (2003), suggest three kinds of value-adding, on-line networks:

- **Social Networks.** It's not what you know, it's who you know. These networks are created mainly to exchange social information amongst their members, such as their personal preferences, hobbies and leisure time activities etc.

- **Cognitive Social Networks.** It's not who you know, it's who they think you know. These networks are created to strengthen the relationships of its members within their network and beyond, bridging professionals’ participation in a variety of interconnected memberships and groups.

- **Knowledge Networks.** It's not who you know, it's what they think you know. These networks are created by relationships between people who discover each other through their own knowledge (content, projects, comments, questions, answers): not just social information (who knows what? instead of the who knows who of the typical online social network services.

For the purposes of this paper, the third classification, that of knowledge networks (also known as social knowledge networks) is the more relevant to retain and explore in combination with telecentres, as presented in section three.

However, as well as for communities when working within networks, implementing ICT systems does not guarantee that people will stay connected. “It is important to remember that although it might be the technology that helps to connect people, it is the social capital that helps them stay connected” (Huysman and Wulf, 2005:86). Therefore, by linking the social capital concept to that of the concept of communities, this paper adheres to Marleen Huysman and Volker Wulf’s proposal to focus on shared practice and social networks of technology-supported communities (Huysman and Wulf, 2005). It is affirmed that only with increased understanding of development in all its various dimensions, can knowledge-based development practices be improved. Key to this process is learning, particularly social learning in informal and formal networks (Cummings, et.al., 2003). This is how it is becoming progressively apparent for knowledge-based development (KBD) scholars that “there is a convergence between the ‘sciences of development’ and the ‘sciences of knowledge’ as together, they refer to the whole domain of human experience and potential”. (Carrillo, 2002:384). Such insights into the evolution of social capital in communities can bring clarity to the state of the art of emerging knowledge-based models as the next paragraphs will elucidate.
2.3 Social capital, knowledge networks & development

As a counterpoint for rational neoclassical economic views of market transactions, social capital finds its conceptual roots in political science and sociology. In their comprehensive literature review on the evolution of social capital conceptualisations, Marleen Huysman and Volker Wulf (2005) propose a working definition for social capital, adopted here for the purposes of this paper:

*It refers to networked ties of goodwill, mutual support, shared language, shared norms, social trust and a sense of mutual obligation that people can derive from. Social capital is about value gained from being a member of a network. Social capital is often seen as the glue that brings and holds communities together* (Huysman and Wulf, 2005:2).

Such definition is the result of years of collective action. The first systematic contemporary analysis of social capital was produced by Pierre Bourdieu, who saw it as a durable network of relationships (1980, in Portes, 1998:3). But it was Granovetter in 1985, (in Huysman and Wulf, 2005) the one who introduced the concept of embeddedness of social action, bringing the element of trust into the scene. Also, on a theoretical level, Coleman (1988), Burt (1992) and Portes (1998) have provided key contributions to the discussions on human capital and its relation to social capital. Later, it was Putnam (1993, in Huysman and Wulf, 2005) the one who brings social capital to the level of civic engagement, and applies it to cities, regions and whole nations. Social entities, especially city-regions, are more pre-eminent in the analysis of learning, and we witness the emergence of learning city and knowledge city (KC) knowledge-based models, with integrative and global aspirations. Social capital becomes the prevalence of the network, through which information and knowledge are transmitted more efficiently (Halal, 2005:13). Networks have become synonyms of virtual working groups, and are “basically organizational forms of connecting people based on infrastructures offered by internet” (Huysman and Wulf, 2005:81). Now that technology affordances allow it, a conceptual and practical convergence between telecentres and knowledge networks is emerging as part of the development dynamics in different parts of the world.

3 Telecentres as knowledge hubs & networks

The origin of the *community access points*, or telecentres dates back to 1980s, when the first *telecottages* were established in Scandinavia and *community technology centers* (CTC) were established in the US (Ariyabandu, 2009). According to Molnár and Karvalics (2001), the first community technical centre was opened in Harlem, USA, in 1983, with the primary aim of bridging the growing digital divide between the upper and lower levels of society. CTCs offered free access to technologies and placed great emphasis on training at low cost. This same idea of creating places where the members of a community could access Information and Communication Technologies (ICT) was also followed in 1985 in the villages of Vemdalen and Harjedalen in Sweden (Molnár and Karvalics 2001). From these beginnings, two basic telecentre models can be identified: a) the Scandinavian model with the social aim of connecting the rural and village societies thus supporting their development, and b) the more profit-oriented Anglo-Saxon model, providing long-term access to the ICT devices primarily aiming at profit production (Rega, 2010).

However, since *telecentre* is a generic term which has acquired variety of names depending on the type of use (they could range from *Multipurpose Community*
Telecentres, Community Tele- Services Centres, Community Information Centres, Community Learning Centres, Telekiosk, Telecottages, etc.), for the purposes of this paper, a working definition of telecentre is proposed as follows:

A telecentre is a public ICT access point with value-adding knowledge, training, and services to support its community’s economic, social and educational development, reducing isolation, promoting education, employment, health and like services, empowering women and bridging the digital, economic, social and gender divides that polarize our societies (adapted from Ariyabandu, 2009:10).

As the new century progresses, the role of such conventional telecentres is transforming to more development-oriented knowledge networks. Knowledge hubs are the key intermediate step between common telecentres and knowledge networks, as emerging actors in the regional scenario. A conventional knowledge hub can be described as:

A vibrant public ICT access point which is accessible to communities to gain, share and organize knowledge depending on their needs and environment. (adapted from ESCAP 2006, in Ariyabandu, 2009:10).

Knowledge hubs can localize knowledge gained from peer ICT-based access points in other regions and serve their community. They will also contribute to creating knowledge by providing experience gained from the local communities to the benefit of the global networks at large. Indeed, knowledge networks, as knowledge hubs, are thought to trigger many other knowledge functions such as education, employment, agriculture and health besides providing conventional ICT facilities to bridge the digital divide. It is thus thought that rural/marginal community empowerment can be attained if the community is provided with access to information and knowledge to improve its livelihood and seek for sustainable development. However, such process involves the emergence of new partnerships, governance structures, participation and business plans. Such partnership dynamics could capture and manage relevant information, and eventually generate more knowledge from the fragmented and otherwise lost collective knowledge of communities. Hence, a working definition for a social or community-based knowledge network is proposed as:

A group of expert institutions working together on a common concern, to strengthen each other’s research and communication capacity, to share knowledge bases and develop solutions that meet the needs of target decision-makers at the national and international levels. (Creech and Willard 2001).

Moreover, it is thought that the development of knowledge networks could facilitate bridging not only the digital divide but also the economic, social and gender divides now polarizing our societies (Ariyabandu, 2009:10). Knowledge networks seem thus to be working out beyond the connectivity promises of last century.

Hence, the process of transformation from telecentres to knowledge hubs and the eventual role they could play as knowledge networks it’s worth exploring. Only recently a lot of emphasis has been put in transforming telecentres into knowledge networks, underscoring the role of knowledge hubs as they could empower rural and marginal communities to face their connectivity and development challenges. As the role of knowledge networks in development is acknowledged, a clearer view could be drawn to facilitate the process leading to sustainability in development. However, knowledge sharing as mentioned before, is a collective process: “telecentres are expected to generate and share new knowledge through global and local networks, and they are also expected
to harness local and traditional knowledge to add value to knowledge networks” (Ariyabandu, 2009:3). Unfortunately, more often than needed, fragmentation and underutilization of knowledge have been observed in telecentres of the Latin American region, resulting in low capability of communities in accessing, adapting and utilizing knowledge, isolation of disadvantaged communities and general decrease in socio-economic development. In such context, knowledge sharing in a networked environment is yet a connectivity promise to be fulfilled.

In that sense, some urban communities in Latin America have seemingly taken a leading role in developing connectivity, playing as new epicentres for their regions. By being re-defined by their history, their experience and their level of development, they are bringing new elements to the knowledge-based development scene. For instance, a city-region’s identity, the way its citizenship use knowledge to build their infrastructure, their institutions and their future strategies are playing a role in how they trigger knowledge-hubs and knowledge networks within and beyond their areas of influence. In the process, most of them are also building knowledge repositories or depots of information and know-how schemes from which they can withdraw elements of creativity to thrive in challenging times. Seemingly, in these city-regions generically known as knowledge-cities (KC), “people link to form knowledge-based extended networks to achieve strategic goals, cultivate innovation and successfully respond to rapidly changing conditions”. (Chatzkel, 2004:62). Such networks are part of the city’s capital, and it can take different forms. With time, as the city’s population grows and diversifies, so does its knowledge, and the channels and networks through which it is distributed. Portes indicates: “whereas economic capital is in people’s bank accounts, and human capital is inside their heads, social capital inheres in the structure of their relationships… To possess social capital, a person must be related to others, and it is those others, not himself, who are the actual source of citizens’ advantage” (Portes, 1998:7). Social capital is therefore perceived as the contextual complement of human capital (Burt, 2000:3) and potentially a close complement of social capital. (Healy, 2002:78). These are on-going processes in different parts of the planet, but for the purposes of this paper, we would like to have a glance into the Latin American window, and the Northern border of Mexico in particular. Such outlook is recorded in the following paragraphs.

4 Telecentres in Latin America

Even though several countries in Latin American have been world leaders in implementing universal access/service programs aimed at increasing access to telephones and the Internet in rural and isolated areas (i.e.: Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Paraguay, Peru, and the Dominican Republic), Latin America joins the telecentre connectivity race much later than other regions in the globe. It has been till the early 1990’s that central government policies attempted to favour remote rural or low-income urban communities by installing a telecentre within their reach. Today, Latin American telecentres vary widely (in concept and practice) throughout the region, but in general these are at “venues open to the public offering access to telephone, computer, Internet, and other communications and information resources, sometimes run on a purely commercial basis and sometimes linked to broader economic and social development policy goals and supported distinctively by one or more of these entities: public governmental institutions, NGOs and funding (private) organizations” (see Table 1 from Menou, et.al., 2004). In the beginning, most
telecentres in the region, were established in the aim to provide communities with access
to computers and telecommunications facilities for purposes of socio-economic and
community development (Menou, et.al. 2004). Their scope intended to address long-term
social issues such as social exclusion and capacity building in marginalized communities.
However, funding for such long-term social projects was seldom secured. Often,
telecentres concentrated in bringing relevant solutions to technological access issues,
forgetting the issues that telecentre users actually face (Huerta, 2007, Dewan & Riggins,
2005). In Latin America, telecentre users’ efficiency such as gathering information,
managing relevant information, and generating knowledge they can actually apply, are
highly intangible issues yet to be explored (Huerta, 2007).

Table 1. Telecentres in Latin America by supporting entity.

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<th>Initiatives Supporting the Telecentre</th>
<th>2002</th>
<th>Projected 2005</th>
<th>Projected 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central &amp; Local Government based in Communities</td>
<td>4 560</td>
<td>6 410</td>
<td>7 110</td>
</tr>
<tr>
<td>Central and Local Governments based in Educational Institutions</td>
<td>1 780</td>
<td>3 280</td>
<td>4 890</td>
</tr>
<tr>
<td>NGO’s and Private Sector</td>
<td>106</td>
<td>940</td>
<td>5 870</td>
</tr>
</tbody>
</table>

Source: Adapted from Menou, et.al. 2004 and www.telecentre.org

Nevertheless, the presence of telecentres since the mid to late nineties left a rich
heritage for networking and a form of knowledge-based networks. Some of them have
since disappeared; new ones emerge and others continue to work and have become part of
an active community fostered and supported by telecentre.org (Caicedo, 2009). In
Colombia, for instance, the Colombian National Telecentre Network led by Colnodo is
“on its way to becoming a sustainable initiative that will offer continuous support to
telecentres in Colombia and the region” (Caicedo, 2009). Of a special note amongst such
success stories of Colombian telecentres is CINARA’s knowledge network dealing with
Water Supply, Environmental Sanitation and Water Resources Conservation in hydric
stressed areas such as the Alta Guajira near the Atlantic coastal border (Latorre, 2010).
This particular group is benefiting from telecentres’ networked technologies to build
permanent focus groups that include local government institutions, private sector and
hydric-stressed communities. Also a skills development process was triggered by
participatory research within the community, in which the indigenous knowledge was re-
valued: partnerships were built, horizontal relationships were created and participation
was the articulating principle of the whole project. As they work in consultation teams,
solutions to the communities’ acute lack of water emerge as they follow principles of
knowledge-based development initiatives that are environment-friendly and people-
centered. Researchers report above all, a clear shift in paradigms of policy
implementation, research approach and community participation: a net impact on regional
development (Latorre, 2009).

4.1 Telecentres in Mexico

Since the 1960’s, a rich tradition for Distance Education moved Mexico ahead in the
use of networked technology for development purposes. Successive federal and regional
government initiatives have since implemented telecentre initiatives, amongst which are
the following (see Table 2):
a) As part of the School Network, a federal government initiative in the early 1990’s set up Educational Technology Centres in primary schools all over the country. They are spaces within schools that foster children’s computing skills. They are shared computing rooms that combine different connectivity elements such as Internet, videoteque, and satellite television. Similar strategies started up as Knowledge Centres in Guanajuato or as Tyldes in Puebla (central Mexico), also operated at school level.

b) Internet in my Library initiative is part of a Digital Library strategy launched nationwide by the Libraries Directorate within the National Council for Culture & Arts (www.cnca.gob.mx or www.cnca.edu.mx).

c) Communitarian Plazas is another telecentre initiative launched by the National Institute of Education For Adults (www.sep.gob.mx) which is piloting experiences for adult learners under the Education for Life and the Workplace scheme.

d) From a more systemic telecentre initiatives, the first Information and Communication Systems Regional Centre (SICOM, in Spanish) was inaugurated on 12th December 1996 in Puebla (central Mexico) and other five systems followed in 1997 within the region. SICOMs offer access to information of diverse nature: regional computer science, information and skills development, educational programme broadcastings on radio and television, with centre facilitator guidance, and like services.

e) Amongst the private sector initiatives, in 2002 the northern state of Nuevo Leon launched a telecentre initiative with 34 new Learning Community Centres (CCAs, in Spanish). By 2005 the e-Mexico initiative (see below) had 622 CCAs in operation, administered by Monterrey Tec (ITESM). Telecentres were located first in target marginalized counties in the south of the state, and deprived areas within city of Monterrey. Today they have expanded operations to the rest of the country and five other foreign countries in Latin America (Guatemala Colombia, Ecuador, Panama and the Dominican Republic), and the United States under a partnership scheme led by the Social Development Secretariat.

4.2 The e-Mexico National System initiative

The CCA initiative is apart of a more integrative, systemic view of telecentres, under the scheme known as e-Mexico. The e-Mexico National System initiative attempted to produce coherency in the interests of the Federal, State and Local public administrations, public offices, telecommunication operators, chambers and associations regarding information and communication technologies, academic and economic agents, and diverse institutions to develop digital services (e-Mexico.gob.mx, 2010). Launched in 2001 by the executive federal government, e-Mexico was thought as an integrative set of strategies to foster, maintain and enhance the use of computers and access to the Internet.
It aims to allow citizens to benefit from information and Communication Technologies through a Digital Sharing Process, and recognizes that education and knowledge should be regarded as basic public services for all citizens. It seeks to converge the efforts of different public and private actors who are joining this Digital Sharing integral process. The initiative follows three main action lines: a) Connectivity, b) Contents and c) Systems. The three action lines focused mainly in services of e-Learning, e-Health, e-Economy and e-Government, with paramount emphasis on communities and people, especially the marginalized ones (e-Mexico.gob.mx, 2010).

The issue of connectivity is vital in the initiative, aiming to bring citizens all around the country to the effective use of ICTs. In such aim, e-Mexico encourages investments from the private sector to increase the telecentre infrastructure, in which CCAs play a significant role. However, from a public investment point of view, e-Mexico fosters and sponsors the establishment of a nationwide network of Digital Community Centers (DCCs) in every single one of the municipalities of the country. DCCs are physical spaces where the members of a community access digital services and contents, as well as the use of internet using computing equipment. These centers are installed in public places such as schools, health centers, libraries and government service offices. DCCs attempt to provide connectivity to isolated communities –through their municipalities, with access to learning, health, economy and government services. In brief, e-Mexico aims to connect every Mexican citizen with all his/her countrymen, and with the rest of the world (e-Mexico.gob.mx, 2010).

Some resulting figures from the first stages of the initiative include the following: on June 5, 2003 the First e-Mexico Satellite Network was launched; since then, connectivity is provided to 3,200 DCCs covering all the municipal heads in Mexico (2,445, although more than 75% of the DCCs are located in schools and academic centres in the nation). Two more satellites launched later added 4,300 additional DCCs to the e-Mexico national network to date. In brief, the e-Mexico National System has already deployed 7,500 Digital Community Centres (DCCs), and 1918 Learning Community Centres (CCAs), run by private initiatives. Today, it is estimated that 5 million monthly visitors access the DCCs and 250+ million web pages are displayed in their facilities. Potentially, DCCs could serve more than the 60% of Mexican population in need of connectivity. It is in this dynamic and effervescent context that CCAs emerged in the Monterrey city-region.

5 A social/relational capital for Monterrey

5.1 A research methodology for borderland telecentres

Monterrey has been the context in which a form of telecentre network is taking shape as Mexico progresses in providing digital services to all sectors of its citizenship. CCAs, along with DCCs, are complementary partners in the nation-wide efforts to stay connected, and act as the private sector arm to strengthen Mexico’s connectivity. CCAs
are prone to be sustainable and likely to become knowledge hubs gathered around Monterrey as its epicentre for a simple reason: the high capacity for relational/social capital already existing in the city-region (Garcia, 2009). Indeed, Monterrey’s business culture has managed to establish a tacit agreement between labour and entrepreneurship (now embedded in the city-region) that has attracted specific industry clusters as today’s backbone of Monterrey industry. With such prominent position, Monterrey has nevertheless been both at the leading and bleeding edge of Mexico’s socio-economical history. Shaped by its unique geo-historical conditions, Monterrey has developed original forms of human collective capital, defined and characterized by its condition of ‘borderland’. By becoming a city ‘purposefully designed to nurture knowledge” (Dvir and Pasher, 2004:17), Indeed, Monterrey is focused in becoming a knowledge epicentre and it has been in this context that CCAs are framed. In this context, Moreno (2003), has identified the core types of public policy evaluation earlier used by other researchers (Carter & Wharf, 1973:26 - 28; Patton, 1987:346 - 347 and Rossi & Freeman, 1987:14 - 15), that could be classified as quantitative, qualitative or a combination of both, according to the approaches and specific evaluation aims (Moreno, 2003). Amongst the qualitative methodologies (impact obtained, formative, conclusive evaluation), for the purposes of this research, a qualitative, external and formative evaluation format has been chosen, which asks questions such as the following: How can the programme in course be improved? Which are the weakest and most consistent aspects amongst the daily activities of the programme? Can such activities be improved?

5.2 CCAs: Monterrey’s systems of learning & systems of knowing

Recently, Monterrey’s local government purposefully undertook Knowledge-City initiatives that intensified its knowledge-based industries. However, prior to that, ICTs were already playing a significant role in supporting social capital within existing and newly emerging communities in Monterrey: i.e. the city has traditionally been the home base for national and multinational corporations with a culture for networks. Moreover, the city-region is home to over 20 chief universities, with several of them located in Monterrey and actively seeking for ICT infrastructure deployment. Relevant to the CCAs initiative, and with a strong tradition at local and national level is the city’s technological institute (ITESM) also known as Monterrey Tech.

Monterrey Tech or ITESM was founded in the city of Monterrey in 1943, to grow into one of the largest private university systems in the Americas, with 30 campus in Mexico and 1,240 field offices of its Virtual university programmes in Mexico and Latin America (Shapiro, et.al., 2000:45). At the beginning of the century, ITESM growth strategy was driven by two major trends: globalization and network capability, emphasizing the extensive internal use of ICTs (Shapiro, et.al., 2000:48). An example of this is the infrastructure investment approved in 1997. Deployed in about 2 months, central servers for information management were set up, new campus software for course redesign was bought, 3,000 network gates for laptop connectivity were installed and 18,000 laptops were (credit) distributed amongst students (Shapiro, et.al., 2000:49). Although an integral culture based on teamwork, collaboration and time management is still on course, ITESM has a lead in the region, taking part in the effort to develop telecommunications in Mexico and Latin America. ITESM has already a technology-based educational model, which matched the requirements of CCAs under the e-Mexico scheme.
It was in such context that back in February of 2001, Monterrey Tech (ITESM) joined the distance education private initiatives around Mexico to reach isolated or marginalized communities with quality (technology-based) educational services. The first Community Learning Centre (CCA) was established in the southern Nuevo Leon locality of Doctor Arroyo (a three hour drive from Monterrey) considered one of the most deprived and marginalized areas of the state. This centre became immediately the access door to a formal education for many children, young people and adults who would not have such possibility otherwise. Later in April of that same year, in partnership with the Education Secretariat and Telmex (the main Mexican telecom supplier) ITESM began to operate another 30 CCAs in different locations. By May 2001 Monterrey Tech signed an agreement with the Mexican Social Development Secretariat (SEDESOL) to establish a CCA in each one of the micro regions of greater marginalization in the country, which started to operate by 2002. ITESM serves today around 2,100 telecentres 90% of which are within Mexico’s territory. But its linking social capital has also expanded the CCAs network into North Carolina, Florida, Georgia and Texas, where they serve Mexican and other Latino immigrants in about 90 telecentres helping them access their community opportunities. CCAs operate on an ITESM technological platform and ITESM (undergraduate) students play the role of tutors for CCA users in this computer-based educational initiative (Cronica Intercampus, 2003:1/4). They aim to advance emerging educational models based on innovation, ICT use, learner-centred methodologies and partnership building. And their ultimate goal is to create learning opportunities for marginalized communities and generate alternatives to social exclusion and inequity by fostering the development of ICT abilities (computer literacy) for people in such communities. Indeed, any private or public institution can apply to open a CCA. Data for this study were collected from CCAs that are sponsored by ITESM, with purpose-built facilities and an average of 6 to 10 desktop computers and (mostly) with Internet connection. Computers have a Pentium processor and a hard disk of 40 to 60 gigabytes. Depending on the demand, computers are leased an average of 45 minutes (Huerta, 2007). It is believed that such use of technology by a university system is having considerable impact in its surrounding community and beyond. Initiatives such as the CCAs are also a platform for innovative ways of using ICTs. For instance, it is believed that an inclusive initiative of “telecommunications for the poor” is to intensify radio broadcast as a means to raise their awareness an familiarity to information interaction and feedback. This proposal sees radio programmes as clear development opportunities for the marginalized, as they prepare them for the mainstream information flow of the internet. (Kenny, 2002:154). This logic has been followed by CCAs supported by ITESM, and have included a new technological communication tool for community support: the Radio Chat. It combines audio broadcasting on Internet with the simultaneous ability to send written messages to radio broadcasters and the general public listeners. The Radio Chat is thus another tool for guaranteed interaction and social learning in networks, and possibly knowledge creation.

Indeed, as we first approached the exploration of the Systems of Learning and the Systems of Knowing underneath the CCA emerging culture, a case study was identified focusing on skill development for knowledge facilitators (namely CCA operators or promoters) of five CCAs in Nuevo Leon (Flores, 2005). This study sets out to measure the level of efficiency of the promoters/operators as knowledge facilitators of CCA users’ learning processes based on their qualifications and/or profile at the time of being contracted for the role. The study tries to determine if the work of the promoters
(operators) reaches the main target for the CCAs to reach all the members of its community. The context of the study concentrated in the municipalities of Villa de Santiago, Allende, Villa Juarez Cadereyta, Gral. Terán, Montemorelos, Hualauises, Linares and Rayones. Back in 2005, these communities hosted most of the CCAs in Nuevo Leon, (known as the citrus region of the state), some considered marginalized areas of slow development. The study considered visits to six (6) CCAs to observe promoters’ behaviour towards the users, realising these visits with a frequency of 2 daily ones to different centres to obtain 3 visits by CCA altogether. The visits faced streets without paving, that in rainy weather they made the access to the CCAs rather difficult (as it is the case of Allende), or localities with poor, scarce resources, like Cadereyta, Montemorelos and General Terán. CCAs in such context struggled to create cognitive learning spaces within their Nuevo Leon community. For instance, Flores (2005) observed that 35% of the Centres operate in their communities without Internet. Even without connectivity, cases of CCAs with proactive initiatives were observed. A CCA promoter for example, looked for encyclopaedia software to feed CCA computers with it so that users had the opportunity to find what they looked for their job or homework. Nevertheless, the study also detected that an important percentage of promoters (operators) do not know the emergent theories of learning (i.e. Andragogy, Knowles, 1970 in Flores, 2005:87). And this researcher found that 85% of the interviewed people have not designed any activity of directed support to solve problems within their community: only one user has offered a solution proposal to unemployment issues in her community in the 12 previous months to the visit, and a 30% of the promoters had never taken at least one course on line. In such case, the promoters’ role as a learning facilitator dropped 50% according to the case study criteria(Flores, 2005:42). Hence, the study determined that the CCAs in Nuevo Leon were not fulfilling the mission for which they were created, that is to promote the learning and “to offer to the inhabitants of a community new opportunities at educative matter with a view to fortifying its knowledge and to develop its abilities to sum up in such a way that they can apply them to consolidate an improvement in his quality of life, contributing to the development of its community” (ITESM, 2004, in Flores, 2005:25). From this perspective, it is of extreme importance that the promoter dominates theoretical aspects of the cognitive learning process (Learning as knowledge creation). Evoking constructivist theories of learning, the study considers that “each subject (for example, the promoter) constructs systems of knowing from its cultural surroundings”. Hence, the promoter finds him/herself constructing, manipulating, exploring, discovering, listening to and setting out his/her ideas to others. According to these models, if the promoter is not familiarized with learning processes, he would be unable to support or guide his/her users correctly or will not be able to offer learning options to trigger significant learning amongst the CCA users” (Flores, 2005:47). The study thus detected that the CCAs are not yet clearly contributing to the improvement of their communities. It concludes that CCAs are an optimal context for well trained promoters, suitably enabled to guide the users in how to take advantage of the digital technology and the learning how to learn frameworks (Flores, 2005:75). Flores then advances a model and a manual to train CCA promoters that is yet to be tested. Under this framework, it is hoped that knowledge facilitators within the CCA scheme can be empowered (through training) to become self-taught and independent learners, who become multiple facilitators to advise on activities and active courses addressed to the young adults and adults that CCAs serve. Such kind of facilitator
could become a companion who helps others to become aware and sensitive to on-line learning, guiding others to learn on a self-taught and independent basis.

6 First conclusions on research

In this opportunity, we were able to explore the converging forces behind telecentres as networked knowledge-based engines for development. Leaving behind the focus on technology and digital divides, this paper attempted a systemic understanding of telecentres as knowledge hubs whose potential to become knowledge networks in the Latin American context that could be worth exploring. By presenting a knowledge-network conceptualization and literature review, it is hoped that this paper advances research on telecentres under a new approach that deepens the knowledge and research interests of the knowledge-based development (KBD) community has of telecentres.

Furthermore, the case study introduced aims to start an account for telecentre performance assessment that can be content-based and KBD-oriented. In fact, such outlook allowed us to grasp how the founding organization’s conceptualization of a telecentre is perceived by people working in the telecentres, by people using it, by non-users (members of the local community who do not use the telecentre yet) and at the different locations (in the case of networked telecentres) which could bring further understanding on how a telecentre fosters community development and social capital. As we observe how CCAs reach out to contribute for the development-related needs of their communities, our trained eye is also allowed to examine the existing patterns of culture, relationship and trust, in order to trace back the kind of social capital and systems of learning that the CCA network is building in the northern areas of Mexico. Moreover, our empirical findings on the interrelation between community development and the appropriation of technologies has led us to discuss whether and how CCAs could play a significant role in supporting social capital within existing and newly emerging communities in a city-region in the Mexican North East. The example of Monterrey as a city and of ITESM as a university system involved in development initiatives, have led us to confirm that the use of ICTs and the existing social capital through the networks in the region could multiply the positive effects the recent knowledge-based initiatives have started.

Even though first results are far from encouraging, we must consider that Telecentres are both a commercial venture and a metaphor linked to ongoing changes and issues in public policy—each local project must meet demand, cover its operational costs and sustain itself, whereas the information generated and distributed should converge with a growing citizen demand for transparency in government as well as educational and cultural resources. If this citizen-driven demand not forthcoming, Telecentres may not prosper (Huerta, 2007). Hence, the CCAs already set up and thriving in the Mexican context may indeed constitute the ICT vanguard in rural towns and regions that is very much sought after under KBD schemes. With CCAs and DCCs, the Mexican scenario might be at the brink of dramatically lowering costs for local connectivity, if they could only manage to also integrate relevant, rich content to our community programmes. In that sense, the Monterrey city-region and relevant telecentres have already engaged in a development journey with new vision and new partnerships. Its universities, CCAs, DCCs and general networked capacity would play a strategic role for the city-region, in which the voices of learning systems’’ stakeholders would be simultaneously present in the diverse capital repositories of the city-region. Such variety of voices and the opportunity to hear and contrast them will be one of its key strengths in becoming a knowledge-based
hub, along with the complex and rich social capital repositories of this multilayered borderland.

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11
Cities cross benchmarking a meta ranking exercise

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Structured Abstract

Purpose – The purpose of this paper is to propose an algorithm to make it easier to compare cities under MAKCi framework.

Design/methodology/approach – In the first stage a review of cities’ rankings was done to select and obtain those rankings with relevant, reliable and public information. On the second stage two tables were developed. Those tables will work as a tool to visualize the availability and relevance of public and reliable information. Finally, in the third stage, an algorithm was developed to evaluate cities under MAKCi framework. The algorithm was applied on this stage to evaluate sixteen cities. Those cities were selected by using the tables developed in stage two.

Originality/value – The MAKCi (Most Admired Knowledge Cities) Framework is based on the evaluation of the capital system of a city. In the MAKCi framework, each capital contains specifications for its evaluation; however, the same cities’ indicators are not always utilized to evaluate all the cities, which makes it a “subjective task”. Besides, when someone wants to find data to evaluate a specific city, the data could be nonexistent, not public, or the person could not know where to look for it. The present work solves those problems by selecting city rankings, in order to specify the way those rankings are relevant for the capitals in the MAKCi Framework; it also proposes an algorithm to evaluate cities.

Practical implications – The outcome of the application of the algorithm has three principal advantages: First, it allows an easy replicable evaluation, second, at the evaluation time, it uses the same sources of information for each city, and third, the algorithm is flexible in such way it is easy to add or remove rankings.

Keywords – ranking, benchmarking, MAKCi, algorithm, evaluation

Paper type – Practical Paper

1 Introduction

The role of an indicator is to make complex systems understandable or perceivable (knowledge cities, 2010). Nevertheless, one indicator, or a group of them, does not assure the evaluation of a system as complete and complex as the group of value elements a city has. The result is that the development is not sustainable and avoids the community wellbeing.

Cox et. al (2010) points out that the term ‘community wellbeing’ encompasses the broad range of economic, social, environmental, cultural and governance goals and
priorities identified as of greatest importance by a particular community, population group or society.

Looking for that sustainability and community wellbeing, some frameworks and rankings with indicators of different types have been proposed, but no one has been accepted fully. Cox et. al (2010) points out that while some promising models have been developed, progress has been patchy and limited by the lack of relevant local level data sets as well as by limitations in local government capacity to effectively link indicator tools with planning and policy making. That could be because, as Pûzîl and Rametsteiner (2009) express, some indicators or indicator frameworks are indexes covering a range of dimensions and several variables [...] other are single variables [...] however not all indicators are based on quantifiable information, some also capture phenomena in descriptive and qualitative formats.

Although each of these models can be selected and implemented by the decision makers of each city, the lack of standardization avoid the benchmark between cities based on the total value system that a city should develop to be sustainable and reach the community wellbeing.

Poll (2007) points out that the problem for benchmarking projects is to find consensus on a common set of indicators. Poll (op. cit) continues explaining that in most benchmarking projects the participants tend to doubt the informative content of one or more indicators, especially when they feel that a certain indicator has an unfavourable influence on their own score. Nevertheless Ergazakis et al (2006) point out that there is a consensus among researchers and practitioner communities that the challenges facing modern societies call for development strategies that are knowledge-based. In this sense, benchmarking should be focused to the models of knowledge management in the social level, the knowledge cities.

Golderberg et al. (2006) point out that the concept of knowledge city derives its principles and values from the field of knowledge management. [A knowledge city] is aimed at finding ways to contribute to the sustainable development and growth of cities in the twenty-first century.

The necessity of a sustainable development and integral growth has encouraged institutions and authors to develop methods to evaluate cities. Those methods are different from those that traditionally have focused on maximizing production as the principal regional’s evaluation factor, for example the GDP.

Martínez (2006) points out that the knowledge cities’ initiatives carry out the transition of the cities’ current status, from economies based on physical production to requirements of the knowledge-based economy.

Yigitcanlar et al. (2007) suggest that prosperity now depends less on access to physical resources and more and more on the ability to create economically useful new ideas. Goldberg et. al. (2006) point out that in many ways, knowledge cities derive their beauty from their openness to varied voices inside them, and their ability not only to tolerate diversity but also to use it as a source for knowledge and development. In that sense, Goldberg et al. (op. cit.) take care about the human capital when suggest that a town that wants to evolve into a knowledge city must, in many cases, empower its residents into knowledge citizens.

According to Ergazakis et al. (2004) a knowledge city is a city that aims at a Knowledge-Based Development (KBD), by continuously encouraging the knowledge management (KM) processes. This can be achieved through the continuous interaction between its knowledge agents themselves and at the same time between them and other
cities’ knowledge agents. The city’s appropriate design, ICT networks and infrastructures support these interactions.

The Knowledge Cities official website (“Knowledge Cities”, 2010) suggests that a Knowledge City (KC) is one that searches for the creation of value in all its areas. That means that the economical benefit or the increment in production is not the principal goal for this kind of city but the appreciation and capitalization of the total value produced by human activity. Carrillo (2010) suggests that the total value produced by human activity includes forms of knowledge capital such as those related to education, technology and innovation as well as identity, intelligence, cohesion, attractiveness, and so on.

All the characteristics above are described as a part of a value system in the Most Admired Knowledge City (MAKCi) framework. García (2008) explains that the MAKCi Framework is basically a knowledge-economy model which involves an assessment of the value base on which the future development of a city is made possible through a recombination or trading of actually existing capitals, both traditional and knowledge-based. García (op. cit.) continues explaining that the MAKCi Framework includes eight knowledge capital dimensions to stand as indicators for the whole exercise as the visible drivers of collective capital creation in knowledge-based development city-regions.

The World Capital Institute (2008) defines these capitals in the next way:

1. **Identity capital**: all those elements generated as an attempt to determine the essence and purpose of a city as a collective venture.
2. **Intelligence capital**: all those elements generated as an attempt to visualize and understand its context, to check against its identity and to develop into a strategy.
3. **Financial capital**: monetary denomination of a set of value dimensions.
4. **Relational capital**: the quality of the interaction between the city’s international significant agents, as well as between the city and its external significant ones.
5. **Human individual capital**: aspects of the individual’s physical constitution, its developments and health condition, depending on environmental and social factors and determining her/his organic integrity and overall potential.
6. **Human collective capital**: collective and team-based value generating capacities.
7. **Instrumental-material capital**: physical-based means of production through which other capitals leverage their value generation capacity.
8. **Instrumental-knowledge capital**: knowledge-based means of production through which other capitals leverage their value generation capacity.

Inside these categories all the resources (traditional and knowledge-based) required to leverage a sustainable and balanced urban city development can be classified. Each capital inside the MAKCi framework has specifications to be evaluated, however, not all the cities have the same information for the same indicators that is what makes it a subjective task depending on the available information for each indicator. Also, when a person wants to find the data of a particular city not necessarily finds the needed one or even does not know if it exists. If the data exists the person not necessarily knows where to look for it and the problem becomes bigger as long as the number of cities to be compared increases.

This work presents a proposal to solve this problem integrating different cities’ rankings, the way these rankings are related to the eight capitals mentioned before and an algorithm to evaluate cities as knowledge cities using two tables: “Table – Available of Information” y “Table – Reliability of Information”.

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2 Method

In the first stage, a ranking revision was done to select and obtain cities’ rankings. The requirements of those rankings were to be, completely or in part, free access. The rankings must explain, by public information, the indicators used in the ranking. The fifteen rankings selected to do this paper were selected according to those specifications and focused on essential knowledge-based development characteristics. The rankings are:

- 2thinknow Innovation Cities™ Global 256 Index (2thinknow, 2009)
- 2009 Anholt-GfK Roper City Brands IndexSM Ranking (GfK Group, 2009)
- 2009 City Crime Rate Rankings (CQ Press, 2009)
- Alpha World Cities 2008 (GaWC, 2008)
- Asian Cities for the Future 2009/10 (Fdimagazine, 2009/2010)
- European Cities Monitor 2009 (Cushman & Wakefield, 2009)
- Global Cities Index 2008 (Foreing Policy, 2008)
- Global Power City Index 2009 (Institu for Urban Strategies & The Mori Memorial Foundation, 2009)
- Mercer Eco-City ranking 2010 (Mercer, 2010a)
- Mercer Quality of Living Global City Rankings 2010 (Mercer, 2010b)
- Prices and Earnings 2009 – Prices (UBS, 2009)
- Prices and Earnings 2009 – Wages (UBS, 2009)
- Smart Cities 2007 (Vienna University of Technology, University of Ljubljana, Delft University of Technology, 2007)
- The Sustainable Cities Index 2009 (Forum for the future, 2009)

In the second stage, two tables were developed to serve as tools to visualize the availability and relevance of the information. Those tables allowed developing and implementing the algorithm that was designed. The first table, the “Table – Availability of Information”, counts with fifteen rankings in the X-axis and all the evaluated cities, at least by one of those rankings, in the Y-axis. In the intersection of X-axis and Y-axis will be the number of the position of the city in the ranking. If the city does not appear in the ranking, a ‘0’ will be in the intersection.

This table permits to notice if a city is evaluated by a ranking and which rankings and information could be useful to evaluate and compare cities. If a city appears in a ranking, that means that there exists availability of public and reliability information, relevant enough to evaluate the city according to the algorithm proposed in the section 3.1. Table 1 presents an example of the complete ‘Table – Availability of Information’. The complete table presents information for more than 700 cities that were evaluated at least by one of the fifteen rankings presented in the X-axis.
Table 1. Example of the ‘Table – Availability of Information’

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<td>9</td>
<td>0</td>
<td>13</td>
<td>18</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
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<td>City 3</td>
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<td>36</td>
<td>0</td>
<td>58</td>
<td>3</td>
<td>13</td>
<td>25</td>
<td>36</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>13</td>
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</tr>
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<td>City n</td>
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<td>9</td>
<td>2</td>
<td>1</td>
<td>13</td>
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<td>0</td>
<td>39</td>
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<td>21</td>
<td>1</td>
</tr>
</tbody>
</table>

The “Table – Reliability of information” points out the relevance of the information presented by the complete ranking. For relevance should be understood, in the context of this work, that the information presented by the ranking is part of the indicators used by the MAKCi framework to do its evaluations.

This table specifies the fifteen rankings and a weight column in the X-axis and the eight capitals of a knowledge city’s value system in the Y-axis. It shows two types of intersection. In the intersection ranking/capital, the number points out the percentage of indicators of the ranking that evaluates the capital that is intersected with. In the intersection of X-axis and Y-axis, exists an impact percentage, if none ranking’s indicator evaluates aspects of the capital that is intersected with, a ‘0’ will be appear in the intersection. On the other hand, if each of the indicators of the ranking evaluates elements of the capital a ‘1,0’ will be appear in the intersection. So, in the intersection of the first ranking and the Identity Capital (see table 2), the information indicates that the 100 percent of the indicators of the ranking evaluates elements of the Identity Capital.

The second type of intersection is weight/capital, where the number in the intersection points out the important of that capital during a particular exercise. As a result, the number that appears in the first row of the weight column (see table 2), indicates that the Identity Capital will have a relevance of 12.5 per cent with respect to the rest of the capitals. The values of these columns could vary from exercise to exercise in order of relevance of a capital in a particular moment or situation.
Table 2. ‘Table – Reliability of Information’

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
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<td>0.14</td>
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<td>0.00</td>
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<td>0.00</td>
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<td>0.00</td>
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<td>0.14</td>
<td>0.15</td>
<td>0.08</td>
<td>0.07</td>
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<td>0.00</td>
<td>0.28</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Finally, in the third stage, the two tables generated in stage two were used and an algorithm was designed and implemented. That algorithm allows the methodical utilization of information contained in the two tables. The goal was to obtain scores that allow comparing cities under MAKCi framework. Consequently, an exercise was done where the tools developed in stage two and third were used.

3 Development

To select the cities and rankings that were used in the exercise, the next steps were followed:
Step 1: The cities to be evaluated in the exercise should appear ranked by the same rankings. The goal is to evaluate cities around the world, so, only the rankings that are not regional were selected from the “Table – Availability of Information”. That is because regional rankings do not allow the comparison of cities from different regions. For that reason the rankings that are regional should be eliminated. Table 3 shows an example of how the “Table – Availability of Information” should look like once the regional rankings have been eliminated.

Table 3. Selecting Rankings

<table>
<thead>
<tr>
<th>COUNTRY 1</th>
<th>CITY 1</th>
<th>2009 Anhholt-GfK Roper City Brands IndexSM Rankin</th>
<th>Global Cities Index 2008</th>
<th>Alpha World Cities 2008</th>
<th>Global Power City Index 2009</th>
<th>Mercer Eco-City ranking 2010</th>
<th>Mercer Quality of Living Global Cities Index 2010</th>
<th>Prices and Earnings 2009 – Price***</th>
</tr>
</thead>
<tbody>
<tr>
<td>COUNTRY 2</td>
<td>CITY 2</td>
<td>24 13 15 13 18 20 15 20 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COUNTRY 3</td>
<td>CITY 3</td>
<td>13 36 0 58 3 25 36 0 17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
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<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>COUNTRY N</td>
<td>CITY N</td>
<td>6 9 1 2 2 0 39 21 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Cities Evaluated By Ranking 10 75 246 60 35 50 50 73 73

Step 2: The next step is to select the cities with presence in at least seven of the nine rankings. This policy can change according to the exercise. Once it has been done, a table like table 4 should be obtained.

Table 4. Selecting Cities – First Approach

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NETHERLANDS</td>
<td>AMSTERDAM</td>
<td>3 0 23 8 23 39 13 51 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERMANY</td>
<td>BERLIN</td>
<td>12 0 55 6 17 0 17 47 36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BELGIUM</td>
<td>BRUSSELS</td>
<td>24 0 15 18 13 41 15 54 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>CHICAGO</td>
<td>61 0 19 22 8 0 45 59 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DENMARK</td>
<td>COPENHAGEN</td>
<td>17 0 58 17 36 8 11 71 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERMANY</td>
<td>FRANKFURT</td>
<td>14 0 32 16 21 50 7 61 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>GENEVA</td>
<td>16 0 57 19 0 25 3 70 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>LONDON</td>
<td>6 3 1 2 2 0 39 53 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>LOS ANGELES</td>
<td>60 8 39 13 6 0 0 59 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 3: In Table 4 it is possible to observe two rankings that affect almost all the cities (‘2009 Anhholt-GfK Roper City Brands IndexSM Ranking’ and ‘Mercer Quality of Living Global City Rankings 2009’). If those rankings still in the exercise, almost all the cities should be eliminated in order to do the evaluation, because all the cities should be compared by the same rankings. For that reason, the two rankings mentioned will be eliminated. (See table 5)

**Table 5. Selecting Cities – Second Approach**
Step 4: At this moment, there are only five cities without information for all the rankings; Geneva, Los Angeles, Madrid, Munich, y Stockholm. These remaining cities should be eliminated too. Finally, each city can be compared to each other by the same rankings. This is the final table (See table 6)

Table 6. Selecting Cities – Third Approach
Also it is important to notice that at this moment, the policies of ranking and cities selection to be compared are established according to the goals of each exercise. Nevertheless, those policies always should give as a result a table like table 6. Once a table like the table 6 is obtained, where each ranking has information for each city, the application of the algorithm should proceed.

3.1 Algorithm

When in a ranking one city is in the 23rd position and another city is in the 14th position, the first city is in a worse position. No matter if the position’s number of the first city is bigger than the position’s number of the second city. If the position’s number (23rd or 14th) is multiplied by a common factor, the city in a worse position will obtain a bigger quantity.

If the result of multiplying the position’s number by a positive common factor (‘23 by X’ y ‘14 by X’) is subtracted from an initial score (obtained by the city in the 1st position), the result is that the city in the 14th position obtains a bigger number than the city in the 23rd position. As a result of that, the final result is bigger when the city is in a better position than another. According to that, the next algorithm is proposed.

**Step 1:** One hundred points are given to the city in the first place of ranking to work with (initial score). In the same way, twenty points are given to the city in the last place in that ranking.

\[ P - U = 80 \]

Where \( P \) are the points given to the first city in the ranking

Where \( U \) are the points given to the last city in the ranking

**Step 2:** The difference between the first and the last city in the ranking are eighty points. That difference is divided between the total cities evaluated by the ranking minus one.

\[ \frac{80}{N - 1} = Rs1 \]

Where \( N \) is the number of the total cities evaluated by the ranking

Where \( Rs1 \) is the operation’s result (common factor)

**Step 3:** The number of the city’s position in the ranking minus one is taken.

\[ Ps - 1 = Rs2 \]

Where \( Ps \) is the city’s position in the ranking

Where \( Rs2 \) is the operation’s result

**Step 4:** The result in step 2 is multiplied by the result in step 3. This is to multiply the value of each position (\( Rs1 \)) by the position the city (\( Rs2 \)) already has.

\[ Rs1 \times Rs2 = Rs3 \]

Where \( Rs1 \) is the operation’s result in step 2

Where \( Rs2 \) is the operation’s result in step 3

Where \( Rs3 \) is the operation’s result in step 4

**Paso 5:** Subtract the operation’s result in step 4 from the 100 points obtained by the city at the first place. This is to obtain a ranking score no matter the number of cities in the ranking. When \( Rs3 \) is higher, it implies that the city is in a worse position than another city, therefore, the \( Rs3 \) should be subtracted to the points obtained by the city in the first place.

\[ 100 - Rs3 = Rs4 \]
Where Rs3 is the operation’s result in step 4
Where Rs4 is the operation’s result in step 5

Note: Step 3 subtracts 1 from the position’s number of the city because the first city always should obtain 100 final points. And Step 2 subtracts 1 from the number of the total cities evaluated by the ranking in order that the last city always obtains 20 final points.

Paso 6: Each number in the weight column at the “Table – Reliability of Information” should be multiplied by the number that it is intersected within the ranking.

Pnd1 * Cls1 = Rs5
Pnd2 * Cls2 = Rs6
Pnd3 * Cls3 = Rs7
Pnd4 * Cls4 = Rs8
Pnd5 * Cls5 = Rs9
Pnd6 * Cls6 = Rs10
Pnd7 * Cls7 = Rs11
Pnd8 * Cls8 = Rs12

Where from Pnd1 to Pnd8 are the eight numbers in the weight column of the “Table – Reliability of Information”
Where from Cls1 to Cls8 are the eight numbers in the ranking column of the “Table – Reliability of Information”
Where from Rs5 to Rs12 are the eight operations’ results in step 6

Step 7: The operation’s result in step 5 (Rs4 – ranking score) is multiplied by each of the eight results obtained in step 6 (relevance scores). Rs4 represents the level in the ranking. The results obtained in step 6 represent the relevance of ranking’s information. So, in this step the relevance of information for each of the capitals in the MAKCi framework is multiplied by the score obtained by the city according to its position in the ranking.

(Rs4 * Rs5) = Rs13
(Rs4 * Rs6) = Rs14
(Rs4 * Rs7) = Rs15
(Rs4 * Rs8) = Rs16
(Rs4 * Rs9) = Rs17
(Rs4 * Rs10) = Rs18
(Rs4 * Rs11) = Rs19
(Rs4 * Rs12) = Rs20

Where Rs4 is the operation’s result in step 5
Where from Rs5 to Rs12 are the operations’ results in step 6
Where from Rs13 to Rs20 are the operations’ results in step 7

Step 8: The operations’ results in step 7 should be summed up to obtain the city’s final score obtained in the ranking.

Rs13 + Rs14 + Rs15 + Rs16 + Rs17 + Rs18 + Rs19 + Rs20 = Rs21
Where from Rs13 to Rs20 are the operations’ results in step 7
Where Rs21 is the city’s final score obtained in the ranking

Step 9: The previous steps are repeated in each ranking/city intersection. (See table 7)

Paso 10: To get the city’s final score, all the results of each city are added up in the total column. (See table 7)
This algorithm is composed by ten steps. The first eight steps could be replaced by the next formula:

\[
\{ 100 - \left[ \frac{80}{N-1} \right] (Ps - 1) \} \times \{ Pn1 \times Cls1 + Pn2 \times Cls2 + Pn3 \times Cls3 + Pn4 \times Cls4 + Pn5 \times Cls5 + Pn6 \times Cls6 + Pn7 \times Cls7 + Pn8 \times Cls8 \} = Rs21
\]

Where \(N\) is the number of the total cities evaluated by the ranking
Where \(Ps\) is the city’s position in the ranking
Where from \(Pn1\) to \(Pn8\) are the eight numbers in the weight column of the “Table – Reliability of Information”
Where from \(Cls1\) to \(Cls8\) are the eight numbers in the column of the ranking of the “Table – Reliability of Information”
Where \(Rs21\) is the city’s final score obtained in the ranking

### 3.2 Application of the formula

Once table 6 is obtained it is possible to apply the formula proposed at the section 3.1. So, the formula was applied for each intersection and the results are shown in the table 7.

**Tabla 7. Aplicación del Algoritmo**

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>2thinknow Innovation Cities™ 2008</th>
<th>Global 256 Index</th>
<th>Alpha World Cities 2008</th>
<th>Global Power City Index 2008</th>
<th>Global Cities Index 2008</th>
<th>Mercer Quality of Living Global City Ranking 2009</th>
<th>Prices and Earnings 2009</th>
<th>Prices and Earnings 2009</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETHERLANDS</td>
<td>AMSTERDAM</td>
<td>12.23</td>
<td>11.60</td>
<td>10.44</td>
<td>8.77</td>
<td>10.05</td>
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<td>10.56</td>
<td>6.92</td>
<td></td>
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<tr>
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<td>10.30</td>
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<td>11.93</td>
<td>7.50</td>
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<td>11.11</td>
<td>65.18</td>
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<td>11.77</td>
<td>6.32</td>
<td>11.31</td>
<td>3.52</td>
<td>4.44</td>
<td>10.69</td>
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<td>COPENHAGEN</td>
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<td>10.17</td>
<td>7.79</td>
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<td>12.50</td>
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<td>FRANKFURT</td>
<td>10.74</td>
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<td>8.09</td>
<td>9.11</td>
<td>11.28</td>
<td>4.17</td>
<td>11.39</td>
<td>66.01</td>
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</tr>
<tr>
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<td>12.33</td>
<td>4.74</td>
<td>5.28</td>
<td>9.72</td>
<td>68.61</td>
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<td>MILAN</td>
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<td>12.21</td>
<td>4.56</td>
<td>6.06</td>
<td>4.34</td>
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<td>52.52</td>
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<tr>
<td>UNITED STATES</td>
<td>NEW YORK</td>
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<td>2.70</td>
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<td>67.00</td>
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<td>12.16</td>
<td>5.77</td>
<td>3.61</td>
<td>9.58</td>
<td>67.50</td>
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<td>11.48</td>
<td>6.99</td>
<td>5.69</td>
<td>7.08</td>
<td>63.36</td>
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<td>SYDNEY</td>
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<td>12.26</td>
<td>8.68</td>
<td>9.96</td>
<td>10.66</td>
<td>7.64</td>
<td>9.86</td>
<td>68.71</td>
<td></td>
</tr>
<tr>
<td>JAPAN</td>
<td>TOKYO</td>
<td>11.42</td>
<td>12.30</td>
<td>11.62</td>
<td>11.99</td>
<td>4.54</td>
<td>3.06</td>
<td>10.14</td>
<td>65.86</td>
<td></td>
</tr>
<tr>
<td>AUSTRIA</td>
<td>VIENNA</td>
<td>12.36</td>
<td>11.11</td>
<td>10.74</td>
<td>9.62</td>
<td>12.50</td>
<td>3.47</td>
<td>10.00</td>
<td>69.80</td>
<td></td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>ZURICH</td>
<td>9.26</td>
<td>11.64</td>
<td>10.15</td>
<td>8.26</td>
<td>12.30</td>
<td>2.64</td>
<td>12.36</td>
<td>66.81</td>
<td></td>
</tr>
</tbody>
</table>

### 4 Results

The results shown in table 7 can be shown in a new ranking presented in table 8. Table 8 indicates that the most valued city as a knowledge city is Vienna, followed by Amsterdam and Sydney. By using table 3, it allowed finding faster and easily the cities
that can be compared by specific rankings. Table 4 makes easier to identify the relation ranking/capital and the algorithm proved that its utilization can be used to assign a systematic score for each city in the exercise. These results were obtained by using different sources of information (rankings) and the MAKCi framework.

Table 8. Final Scores

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA</td>
<td>VIENNA</td>
<td>9,80</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>AMSTERDA</td>
<td>9,21</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>SYDNEY</td>
<td>8,71</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>LONDON</td>
<td>8,61</td>
</tr>
<tr>
<td>GERMANY</td>
<td>BERLIN</td>
<td>7,89</td>
</tr>
<tr>
<td>FRANCE</td>
<td>PARIS</td>
<td>7,50</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>NEW YORK</td>
<td>7,00</td>
</tr>
<tr>
<td>CANADA</td>
<td>TORONTO</td>
<td>6,80</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>ZURICH</td>
<td>6,61</td>
</tr>
<tr>
<td>GERMANY</td>
<td>FRANKFURT</td>
<td>6,01</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>BRUSSELS</td>
<td>5,18</td>
</tr>
<tr>
<td>JAPAN</td>
<td>TOKYO</td>
<td>5,06</td>
</tr>
<tr>
<td>SINGAPORE</td>
<td>SINGAPORE</td>
<td>3,36</td>
</tr>
<tr>
<td>DENMARK</td>
<td>COPENHAGE</td>
<td>0,61</td>
</tr>
<tr>
<td>ITALY</td>
<td>MILAN</td>
<td>2,52</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>CHICAGO</td>
<td>2,45</td>
</tr>
</tbody>
</table>

5 Conclusions

Once the ‘Table – Availability of Information’ and the ‘Table – Reliability of Information’ are obtained, this method allowed comparing cities around the world easily and quickly. The cities presented in more rankings have more probabilities to participate in different exercises.
To use the tables and the algorithm to evaluate and compare cities has three advantages: First, it allows creating a replicable and easily evaluation. Second, it utilizes the same source of information to evaluate each city in a specific exercise. Third, it is flexible when it is necessary to change the weight of each capital, the source of information (rankings), and cities to evaluate for each exercise.

6 Future research

Also, it is important to notice that the results are obtained using public information. To show more realistic results, it would be necessary to select the best rankings over the world, acquire them (public and private information), and to classify all the indicators according to the MAKCi framework.

Further, it would be necessary to express a realistic capital’s weight in table 4. Values should be provided by experts, and not just to divide 100 per cent between the 8 capitals. After that, this method could be an excellent tool to measure in an integrated way the development of the cities as knowledge cities, because; it uses different sources of information (rankings) of different institutions, the information and the procedure used can be verifiable, and the MAKCi framework is widely known.

References


CITYCARD 2010: results, analysis and discourse

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Structured Abstract

Purpose – The publication and acceptance of international city ranking indices have been growing over the last decade with the prevalence of globalization and urbanization. Given the variety of benchmarks, indices and reports published to date, there is limited study on a comprehensive city index that would consolidate a wide-range of indicators for broad international audiences. This paper presents the results of the third installment of our research on city ranking indices and also enquires on the role of “niceness” in cities.

Design/methodology/approach – The research team developed CITYCARD 2010 – the first “Super Index” of its kind to comprehensively measure, score and rank 105 cities worldwide using a collection of 21 global indices arranged in five broad categories: global cities, nice cities, knowledge cities, intelligent cities and creative cities. We have refined our index and performed correlation analyses to determine relative impact and improved overall robustness.

Originality/value – Our research overcomes the challenges and limitations inherent in most single index by offering a new way of ranking cities.

Practical implications – In the current economic and financial upheaval around the world, city governments are increasingly interested in finding ways to measure and evaluate their knowledge-based development. This study on city ranking will prove to be invaluable for practitioners and decision makers in the planning and economic development fields.

Keywords – city ranking frameworks, ranking indices, knowledge city

Paper type – Academic Research and Practical Paper
1 Introduction

1.1 Changing global landscape

Many cities around the world have embarked on initiatives to manage the challenges of globalization and urbanization at the dawn of the 21st Century. Fuelled by the proliferation of information and communication technologies, urban centres are more than ever faced with competition from developed and emerging cities internationally. As cities invest major efforts and capital expenditures to gain competitive advantage in this global knowledge economy, there is a need to quantify, measure, compare and rank cities based on their performance.

In the current economic and financial upheaval around the world, city governments are increasingly interested in finding ways to measure and evaluate their knowledge-based development. This has spurred interests in a growing collection of international city ranking indices to compare the relative positioning of cities with various underlying value dimensions. The research team at the Ted Rogers School of Management, Ryerson University, has been examining the global competitiveness of cities through the use of international ranking indices. As most cities tend to specialize in their areas of competitive advantage, identifying cities’ relative positioning amongst global ranking indices yields information about its weaknesses and strengths. This will allow cities to improve their global competitiveness.

1.2 Study Purpose and Questions

Earlier version of our research methodology was presented at the 2nd Annual Knowledge Cities Summit in Shenzhen China (Grant et al., 2009). More recently, the research team at Ryerson developed a whitepaper entitled CITYCARD 2010 – the first “Super Index” of its kind to comprehensively measure, score and rank 105 cities worldwide using a collection of 21 global indices arranged in five broad categories.

Global Cities: Economic powerhouses which command and influence the world’s key functions in advanced producer services such as finance, law, consultancy, advertising, banking, as well as affecting the flow of capital and information.

Nice Cities: Perceived interpretations of city brands with the traditional assessment of quality of life focusing on factors such as education, healthcare, weather, crime rates and employability.

Knowledge Cities: The correlation between Knowledge Management and Knowledge-based Development has resulted in a new framework for city development known as Knowledge City (KC). KC is described as the specialization within a city to promote, foster, and retain knowledge-intensive activities and networks.

Intelligent Cities: A “smart” city, region or space with integrated dimensions of human, collective and artificial intelligence. Other features include: high level of human capital development, broadband networks, digital contents, and employment in the IT sector.

Creative Cities: The convergence of creative, talented and diverse mix of peoples and organizations. Such cities attract talented and innovative peoples, which in turn is the driving force behind urban prosperity, and provision of new jobs.
In this paper, we present the third installment of our research. Firstly, we begin by revisiting the importance of city ranking as a basis for measuring and comparing city success. We present the refined methodology employed for this study, the indices included and formulas used in calculations. We provide a conceptual framework of the five categories through a review of literatures. Secondly, the complete Super Index of 105 cities is presented with the CITYWEBs of the top 20 cities. Thirdly, a full analysis of the Super Index is carried out by examining its strengths and limitations. Finally, we conclude with a discourse on the role of “niceness” in knowledge based development and performing a correlation analysis on the Super Index to determine any strong relationships between category scores.

### 1.3 City Ranking

There has been rising interest in city rankings produced by governments, organizations and research institutes with the aim of understanding the correlation between successful cities and their fundamental attributes and capacity for economic success. This has resulted in a growing collection of comparators in the form of reports, indices and benchmarks. These can be particularly useful in a globalizing world in which cities are no longer characterized as entities within urban hierarchy and administrative boundaries, but rather as competitive forces across the globe.

A number of cities are frequently noted as innovative and global centres; namely New York, London and Tokyo. They have all consistently proven to be the primary contenders amongst most reputable rankings, leading in measurements of business activity, human capital, cultural experience and information exchange, yet may lack in areas of liveability. In contrast, places such as Barcelona, Singapore, Bilbao, Dublin, Phoenix and Montreal have typically been performing well on city rankings that compare the more traditional assessment of “good” cities in which to live and work.

Depending on which framework is used, cities are scored and ranked quite differently amongst indices and benchmarks. There is also wider adoption and acceptance of select city-ranking frameworks in certain global cities predominantly due to the cities’ own strategic visions and policies to manage growth. Further implications are recognized with how cities are ranked when considering perception (qualitative) versus performance (quantitative).

### 1.4 Why city rankings matter

City rankings serve as useful tools for policymakers and businesses to understand the degree to which globalization and urbanization impact our urban spaces. As cities are increasingly connected, they are directly competing with not only neighbouring cities, but with regions around the world. City ranking is an attempt at measuring the performance of cities in light of this global phenomenon. It is therefore essential for cities, nations, firms and citizens to be familiar with how cities are ranked in order to be better informed of their relative position in the global knowledge economy.

What makes a city successful? Why do certain cities perform well on economic performance measures yet underperform in social and environmental measures? For many city staff and consultants, city indices are powerful and multipurpose tools to gain insight in the relative positioning of a city’s success compared to other cities in the same region, country, continent or world. Comparative city-to-city measures can be examined for cities exhibiting similar levels of economic outputs, population sizes, global reputation
or quality of life standards. As claimed by Anholt’s City Brands index (2007), cities are competing with each other for a share of the world’s global capital, wealth, people and recognition; hence, indices are strong indicators of how cities are doing presently and predicting its success in the future.

1.5 Limitations and drawbacks to traditional ranking systems

Unfortunately, as with most city indices that have been published on international scales, there are drawbacks and limitations for city leadership to realistically build strategies based on interpreting these indices. These limitations and drawbacks include:

Selection of only a single or a few performance indicators: City indices typically focus on one or a select few generic areas of city performance. For instance, the Creative Class (Florida, 2002) indices examine population samples based on diverse, creative and talented households, occupations or industries. In this context, the creative class index does not holistically undertake a measure of cities using a variety of performance indicators—both qualitative and quantitative measures. Malanga (2004) critiques Florida’s work as lacking substantive statistical evidence and the correlation between diverse population and city success is not warranted.

Target Audience: In order for indices to be interpreted appropriately, it is important to understand the origin of the index. Many leading international rankings are produced by private firms – e.g. MasterCard Worldwide Centers of Commerce, Economist Liveability Ranking, and the Creative Cities Index. It is also worth noting that global non-governmental organizations such as United Nations and city government agencies regularly outsource index projects to outside consultants. This raises concern on whether an index was created with the target audience being the city agency or the international body. Hence, the development of these indices may be subjected to certain degree of bias.

Perception versus Reality: There are indices that either exclusively or largely place emphasis on opinions and feelings of individuals on city performance. These are typically referred to as “reputational rankings” based on brand and marketing. An example of such an index is the The Anholt City Brands Index (2007) which is solely based on perception. While reputational surveys are one indicator of whether tourists, businesses and capital investments will be drawn to a city with high “brand image”, they fail to consider the hard assets (infrastructures, institutions, culture and knowledge workers) that are available within a particular jurisdiction. In many instances, the perception (brand) of a city fails to meet its actual reality.

Lack of correlation between Input and Output Measures: Input measures refer to investment in people, infrastructure and communities in order to foster knowledge-driven activities. Output measures can refer to the number of patents produced, proportion of GDPs from value-added industries or the amount of research publications produced. Select city indices focus solely on either input or output measures without fully investigating the correlation between input and output performance. These indices do not necessarily provide a connection between a city’s strategic implementation with the final outcomes.

Comprehensiveness: Comparative frameworks usually rely on select datasets as the basis for claiming how cities are doing relative to other competing cities without building upon the work of other leading frameworks, theories, benchmarks and discussions. For a city-ranking index to be comprehensive, it should be interpreted and discussed from a
wider context encompassing various indices (assessing different functional areas), academic literatures (determining correlation between development theories or models with practice), and other leading reports produced by city governments and organizations.

2 Methodology

2.1 Stages of Research

We carried out this research in five main stages. Firstly, we began by examining the literature available on city-ranking indices and issues surrounding globalization and urbanization. Secondly, we developed categorization of different types of rankings based on: (a) the assessment objective of each index; and, (b) qualifying its usability and feasibility (e.g., the use of surveys versus statistical census data, sample sizes, or country-level data). Thirdly, we compared the key indicators from each shortlisted index list to uncover commonalities. Our re-organization of these indicators or factors used in indices identified five major categories of city development: Global Cities, Nice Cities, Knowledge Cities, Intelligent Cities and Creative Cities. Fourthly, we developed an integrated ranking model (“the Super Index”) based on the five categories. We used the index value from the Super Index to create spider webs (“CITYWEBS”) to visually illustrate the performance of any city. The final stage required our team to test the new model by inputting city-level data and regularly fine-tuning and updating information so that the model is as robust and representative as possible.

2.2 Categorizing Indices

In our review, we identified some 45 comparative frameworks focusing on ranking cities using different conceptual and empirical models. Some 21 major ranking indices had sufficient data to match them into the five main categories. Exhibit 1 shows the indices selected for each category.

<table>
<thead>
<tr>
<th>Exhibit 1. List of Indices used for each category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLOBAL CITIES</strong></td>
</tr>
<tr>
<td><strong>NICE CITIES</strong></td>
</tr>
<tr>
<td>5. The Economist Intelligence Unit: Livability Study (2008)</td>
</tr>
<tr>
<td>8. Anholt City Brands Index (2007)</td>
</tr>
<tr>
<td><strong>KNOWLEDGE CITIES</strong></td>
</tr>
</tbody>
</table>
2.3 *Index of indices: super ranking of city-ranking frameworks*

The ranking scores of cities and countries in the various indices depend to a significant degree on whether or not the developers of a particular index choose to include specific countries, regions or cities in their analysis. Some cities appear repeatedly in the top 10 (e.g. London, New York, Paris and Tokyo). Furthermore, certain assessment criteria have a tendency to be created selectively, targeting different audiences to support their particular case.

Therefore, attempting to determine the relative success of cities by interpreting a few select indices or group of indices can yield only a partial perspective on city performance on a global scale. In order to overcome this challenge, this paper proposes the development of an Index of Indices, offering a comprehensive overview of how cities perform on a consolidated index encompassing the five perspectives discussed in this paper, in essence, a “Super Ranking” of City-ranking Frameworks.

2.4 *The Methodology*

The super ranking approach proposes the standardisation and aggregation of a number of studies in each category to determine a single score for that category. The 45 indices were examined for suitability for inclusion. Since the focus of this study is cities, wherever possible we excluded country-level rankings. However, the lack of suitable city rankings in the creative cities category required the inclusion of some country-level data.

The ranking from each of the 21 indices was standardised in a scale where the top city in each index received 100 points, with each lower ranked city receiving a reduced score based on either the ordinal ranking or actual scores provided by the individual study. Details of the method of standardisation and aggregation of scores for each category are provided in the following sections.

Using this ranking approach, a city receives a score on a scale of 0-100 in each category, thus the addition of the five categories results in a city’s score out of 500. This score can then be used for an overall comparative ranking of cities.

We argue that, by using the standardised scores from a variety of studies, the individual bias of a single study can be reduced and a more comprehensive comparison carried out. In some ways, this might be considered an adaption of James Surowiecki’s
“wisdom of crowds” concept (Surowiecki, 2004). While each index is still produced by “experts” and not the general public, the combination of the different studies together does meet some of his key attributes (large group collective wisdom: diversity of the group; independence of opinion and conclusions that are free of manipulative and corrupting influence; decentralization of the group; and bottom up processes that aggregate information).

2.5 Calculations for super ranking

The super ranking of all city-ranking indices is based on a systematic aggregation of the scores from the studies. We use two distinct approaches depending on the ranking method used by the study, either actual scores or ordinal (ranking) scores for each city included in any of the ranking schemes.

Actual Scores: Cities from studies with actual scores have been assigned a particular value predetermined by the index maker. Since the range of these scores differ from one index to another, it is necessary to standardise these scores across all indices for consistency in comparison. All the scores in the rankings were standardised so that, in each index, the top city in the index receives a maximum of 100 points and decreases in proportion to the actual scores assigned. A standardised score is calculated by relative scale (i.e., \( \frac{100}{\text{highest score}} \)) times the actual score. See Equation [1] in Exhibit 2.

Ordinal Scores (Rank-based): If the only data available from the index are ordinal scores (rank-based), then there are two scenarios: indices with more than 100 cities; and indices with 100 cities or less. Firstly, when indices have more than 100 cities, the rank assigned in the assessment is adjusted in fixed proportion to reflect the relative position of the city in that ordinal scale out of 100 as seen in Equation [2] in Exhibit 2 below. This “pro rata” approach to calculating ordinal scores ensures that indices with a fewer cities are evaluated equally to the indices with more cities included. The maximum ordinal score for the first ranked city is 100 and decreases in proportion to the ranked score. Secondly, for those indices with 100 cities or less, the relative rank will reflect its ordinal scores (i.e., the first city is assigned 100 points; the second city is 99 points; the third city is 98 points, and so on).

2.6 The need to create a composite index for the creative cities category

While, conceptually, the requirements for inclusion of a category for “creative” cities are strong, the available survey data are quite inconsistent in their target. Thus, finding suitable international indices for creative cities proved difficult. To supplement the few available, we created our composite creative cities index using available studies from North America (Gertler et al., 2002), the United Kingdom (Demos, 2003) and China (Zhang and Kloudova, 2009). The techniques described above were used to create a standardised score within each of these local indices and these scores were then combined to create a composite index.

2.7 Aggregate score for each category

Index scores are only included for those indices in which the city participates. An aggregate category score for any city can then be determined by the addition of the combined scores (standardised and ranked score) for each category (global city, nice city,
knowledge city, intelligent city, and creative city), resulting in a score from 0-100 for the category. See Equation [3] in Exhibit 2 below:

Exhibit 2. Formulas used in calculations

\[
\text{Standardized Score} = \frac{\text{Actual Score}}{\text{Student Score} \times (n-1)} \quad \text{[Eq. 1]}
\]

\[
\text{Actual Score} = 100 - \frac{10^0}{n} \times \text{(n-1)} \quad \text{[Eq. 2]}
\]

Where

- \( n \) = total number of cities in index
- \( f \) = concentric position of subject city

\[
\text{Aggregate Score} = \frac{\text{Sum of Scores per Category}}{\text{N of Scores}} \quad \text{[Eq. 3]}
\]

3 Conceptual framework

A growing body of literature has been written in the last decade or so on knowledge-based development (Carrillo, 2006; Yigitcanlar, 2007), knowledge management (Wiig, 2007), city ranking (Clark, 2008), economic geography (Yeung, 2004) and urban innovation systems (Florida, 2002; Gertler et al., 2002). The following sections define each of the five categories through a review of literature.

3.1 Global cities

Patrick Geddes first used the term “World City” as early as 1915 to explain cities’ that influence and control on disproportionate amount of multinational entities. Since the popularization of “World Cities” by Peter Hall in the mid-1960s, the term “Global Cities” was coined by Saskia Sassen in 1991 to describe city networks as structural units of world economic systems (Sassen, 1991). The global cities concept is closely linked to other terms exemplifying unique characteristics and describing the relative positioning of city centres on a global scale. A “Megacity” is defined as a metropolitan region with population greater than ten million people and is used synonymously with terms such as conurbation, metropolis, metroplex and megapolis.

Critics argue that while a megacity is globally connected, it is locally disconnected due to the uneven growth brought on by globalization. In light of accelerated urbanized populations in the least-urbanized continents and regions (e.g. Asia and Africa), the urban hierarchy of the twenty-first century will be ever-more divided with the rise of “Primate City”. The “law” of the primate city, argued by geographer Mark Jefferson in 1939, defines a primate city as being “at least twice as large as the next largest city and more than twice as significant” (Jefferson, 1939); a city of this magnitude is usually the capital of the region or country, controlling disproportionate economic, political and social functions.

An “International Financial Centre” (IFC) is another conceptual framework in which a global city has a dominant role in international banking, finance and stock markets. The
Global Financial Centres Index published annually by the City of London, ranked London, New York and Singapore as the top three global financial centres.

Given the immense benefit and attraction of a “global city”, developed cities naturally aspire to attain the global city status. This growing interest has prompted research groups and city governments to classify cities that are of “world cities” or “non-world cities” status. There are a multitude of classification systems ranking world cities with specific sets of criteria. Amongst most city ranking literatures assessing global cities, these criteria encompass a city’s reputation and familiarity; international influence and involvement in global events; a large populated metropolitan area; advanced transportation system and international airports; diverse cultural communities; international advanced producer services; advanced communications infrastructure; creativity; and powerful and influential news media.

3.2 Nice cities

The Economist (2005) argues that material success as measured by the country’s gross domestic product (GDP) per capita is not sufficient to address the social, cultural and personal well-being fundamental to city dwellers. Examining economic performance as the sole indicator of a city’s prosperity fails to consider other factors and intangibles that impact socio-economic wellbeing.

The concept of ‘nice’ cities can be considered as a subjective terminology dealing with the perception of peoples and businesses in a particular city. While the perception of a city may differ from actual performance of a city, its understanding is increasingly important for local economic development in the tourism industry and in attracting high-skilled workers and corporate headquarters. Niceness can also be manifested as a result of marketing efforts to complement and enhance city brands. While the positive image a city is able to attract may not fully reflect its real value, “brand” plays a significant role for external decision makers. The’ brand narrative’ associated in people’s minds has strong correlation and influence on whether people will visit the city, buy local products, or relocate their businesses. As described by Anholt’s City Brands Index (2007), this brand narrative is partly rational and deeply embedded in people’s emotional perception.

A number of terms are used to describe cities of higher living standards; including: best cities, liveable cities, safe cities, best branded and good cities. Indices of “Nice cities” have a stable economy and political environment conducive to a safe business environment. In nice cities, the physical environment is central to an enviable lifestyle; for instance, environmental friendliness, cultural mosaic, relatively low population density and a pleasant climate year-round.

The study of nice cities is a useful measure for multinationals. In light of the current global financial crisis, multinational corporations are aggressively undergoing restructuring plans in order to reduce expenditures and review their international assignment policies. Expatriate compensation packages are closely aligned with quality of living criteria, to ensure corporate budgets match to that of the living environment.

3.3 Knowledge cities

Knowledge Management: Knowledge might be described as expertise, skills, education, whether from a theoretical or practical perspective, held by individuals in organizations in both tacit and explicit forms. There has been a continued interest in the
effective management of information with the emergence of Knowledge Management (KM) in the business world of the early 1990s.

Knowledge Management is the effective use of knowledge and intellectual assets and serves as a competitive advantage for many organizations with information systems architectures. However, not all information is available through tangible means. “Implicit knowledge” harnesses the learned experiences and skills that are not easily transferrable. In other words, if the management of implicit and explicit knowledge is critical to a firm’s success, the development of human knowledge capital can go beyond the traditional organizational boundary. But knowledge is also seen as a key asset of organizations and the major contributor to the “excess” over book valuation of business entities.

**Link between KM and Knowledge-based Development:** The application of KM has “evolved into a strategic management approach, finding application not only in the business world but also in other areas such as education, government and healthcare” (Ergazakis et al., 2006, p. 46). Upon a review of major international development organizations by Carrillo (2006), Komninos (2002) and Clark (2008), it was found that organizations like United Nations (2001), European Commission (2000), the World Bank (1998) and OECD (2001) “… have adopted KM frameworks in their strategic directions regarding global development, [which] clearly indicates that a new link has been created between KM and the knowledge-based development” (Ergazakis, 2006, p. 2). Therefore, the study of knowledge-based development is a convergence of knowledge management and urban development disciplines.

The development of knowledge city refers to the strengthening of regional economy through the creation of value-added activities, thereby effectively improving the quality of life, attracting capital investments and businesses, and establishing the global competitiveness of cities. Therefore, the application of knowledge-based development is a Knowledge City that encourages “the continuous creation, sharing, evaluation, renewal and update of knowledge” through citizens and government agencies enabled by information technologies and city infrastructures (Ergazakis, 2006).

### 3.4 Intelligent cities

The term, Intelligent Cities, popularized by Komninos (2002), is defined as islands of innovation in which the digital world of the twenty-first century seamlessly connect innovating processes in order to produce synergies and values. Both the governments and corporations are key driving force to enable businesses, citizens and city partners to be digitally connected via advanced information and communication services.

Komninos (2002) identifies three dimensions of the Intelligent City that agglomerate the physical, digital and institutional spaces. Firstly, the level of intelligence within the defined space is characterized by local people’s ability to create, innovate and invent added-values centred on knowledge intensive activities. The second dimension is the collective intelligence of people within the city. It is argued that the collective learning and creative process realized through exchanges of knowledge and intellectual creativity fosters knowledge creation and sharing (Komninos, 2002). Typically, this collective learning process is facilitated through academic institutions and research networks in order to feed research into instruction. The third dimension centres on artificial intelligence that is integrated into the city’s physical infrastructure available for access by the general public; for instance, communication networks and digital broadband access.
Cities have increasingly been involved in the creation and implementation of information and communication technologies as the basis for development. For instance, cities work in partnership with the private sector to offer incentives for organizations that create employment in the high-tech services sector. There are also city-region initiatives aimed at the development of higher broadband capacity (e.g. Toronto’s HydroOne WiFi Network) that support technology, innovation and knowledge development.

According to the World Knowledge Competitive Index (2008), human capital development in the IT sector is crucial to the success of building an intelligent city. This refers to the percentage of the population employed in the technology-oriented professions such as manufacturing, automobile, biotechnology and engineering. These knowledge workers are the drivers of a smart city with integrated dimensions of human, collective and artificial intelligence.

3.5 Creative cities

The concept of ‘creative cities’ has gained significant recognition and momentum amongst the scientific, research and political communities with the emergence of “The Rise of the Creative Class” by Florida (2002). The arrival of Florida’s team to the Martin Prosperity Institute at the University of Toronto underscores the City’s awareness in developing creative regions.

In examining the underlying features of the creative theory and the creative class demographics, Florida argues that “diverse, tolerant and ‘cool’ cities will outperform others” (Florida, 2002; Nathan, 2008).

A creative class is predominantly composed of professions in the arts, film, entertainment and cultural production fields. Central to his ideas is the convergence of “social [and cultural] diversity, high human capital, and the presence of high tech industry” to attract, retain and generate creativity within a city (Florida, 2002; Nathan, 2008). It is from these three cornerstones of city attributes that Florida has devised three main arguments in support of the creative class theory:

1. There is a distinctive population characterised as the creative class, which is attracted to diverse, talented, innovative and artistic cities.
2. The creative class population is the driving force behind urban prosperity and competitive development.
3. The provision of jobs and services is dependent upon where the creative population resides. A city with high level of creativity will encourage jobs to move to where skills are located.

The creative class theory is often controversial among academics and critical theorists, yet it has become increasingly popular and attractive for policymakers in North America and European countries. This has resulted in the construction of the “creative cities’ policy frameworks and strategic agendas among economic development agendas. Accordingly, leading organizations that regularly publish comparative frameworks have begun the development of indices with elements of creativity, for instance, The Travel and Tourism Competitiveness Report (2009); Competing on Creativity: Placing Ontario’s Cities in North American Context (Gertler, 2002).
4 The Super Index

4.1 Comparing indices based on the five categories of city ranking

Given the variety of city-ranking indices available to date, there are multiple perspectives on how cities are ranked, viewed and assessed by outside businesses, academics, political leaders and peoples. As outlined earlier, one of the main weaknesses to existing indices is the focus on a single or select few performance areas. Each respective index studied as a single entity offers only a ‘partial view’ of the city, often confined to the study design, budgetary, human and data restrictions (Clark, 2008). This study aims to overcome this challenge by consolidating multiple city indices for each of the five category of city ranking, namely: global cities, nice cities, knowledge cities, intelligent cities and creative cities. It is through this iterative process of categorizing city indices that inferences can be drawn by comparing the five categories of city ranking.

4.2 Category score substitutions

There are select cities in our Super Index that do not have a subtotal score in a category. In order to provide a fair representation of our Super Index, for cities that have a category value of zero, they have been adjusted by inserting the category average of the 105 cities. For example, Melbourne had a total score of 356.98 with a missing subtotal from the Intelligent Cities category. With the substitution of average score in the intelligent cities category, Melbourne’s total score went up to 408.40, placing it as the 15th city.

4.3 The Super Index: Top 105 cities

Exhibit 3 shows the Top 105 ranked cities in our consolidated Super Index. The table provides a final score with subtotals for each of the five categories.


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<tr>
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<th>Cities</th>
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Exhibit 3. Top 105 Cities (legend at the end of table)
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91
92
93
94
95
96
97
98
99
100
101

Cities

Countries

Tel Aviv
Detroit
Oslo
Calgary
Auckland
Beijing
Bangkok
Mexico city
Kyoto
Shanghai
Luxembourg
Lisbon
Tianjin
Moscow
Baltimore
Manchester
Buenos Aires
Seattle
Rio de Janeiro
San Diego
Nicosia
Sao Paulo
Dubai
Bratislava
New Delhi
Istanbul
Belgrade
Bucharest
Almaty
Riga
Athens
St. Petersburg
Johannesburg
Vilnius
Sofia
Budapest
Kuala Lumpur
Lima
Guangzhou
Bogota
Santiago
Manila
Kolkata
Cairo
Warsaw
Kiev
Shenzhen
Jakarta
Mumbai
Ho Chi Minh
Bangalore

Israel
USA
Norway
Canada
New Zealand
China
Thailand
Mexico
Japan
China
Luxembourg
Portugal
China
Russia
USA
U.K.
Argentina
USA
Brazil
USA
Cyprus
Brazil
U.A.E.
Slovakia
India
Turkey
Serbia
Romania
Kazakhstan
Latvia
Greece
Russia
South Africa
Lithuania
Bulgaria
Hungary
Malaysia
Peru
China
Columbia
Chile
Philippines
India
Egypt
Poland
Ukraine
China
Indonesia
India
Vietnam
India

Total
Score
356.66
354.73
354.05
352.43
351.63
351.55
350.64
348.40
348.39
348.25
347.37
343.22
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340.71
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320.08
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313.54
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GC

NC

KC

IC

CC

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<tbody>
<tr>
<td>102</td>
<td>Chongqing</td>
<td>China</td>
<td>246.70</td>
<td>61.61</td>
<td>55.89</td>
<td>28.23</td>
<td>45.00</td>
<td>55.97</td>
</tr>
<tr>
<td>103</td>
<td>Beirut</td>
<td>Lebanon</td>
<td>235.06</td>
<td>70.60</td>
<td>52.17</td>
<td>13.26</td>
<td>18.65</td>
<td>80.38</td>
</tr>
<tr>
<td>104</td>
<td>Caracas</td>
<td>Venezuela</td>
<td>234.55</td>
<td>46.17</td>
<td>58.55</td>
<td>27.95</td>
<td>46.71</td>
<td>55.19</td>
</tr>
<tr>
<td>105</td>
<td>Lagos</td>
<td>Nigeria</td>
<td>233.11</td>
<td>43.00</td>
<td>39.80</td>
<td>45.00</td>
<td>55.00</td>
<td>50.31</td>
</tr>
</tbody>
</table>

**LEGEND**

GC: Global Cities  
NC: Nice Cities  
KC: Knowledge Cities  
IC: Intelligent Cities  
CC: Creative Cities  

BOLD: Refers to the substituted average of the 105 cities to rebalance lack of scores in each category.

5 **Balanced scorecards for cities**

While we suggest that the composite score derived from our super ranking (ranking of rankings) to be a comprehensive and useful measure for the comparison of cities, we also argue that consideration of the relative scores in each of the five categories can actually prove to be of more use. In essence, this can be considered to be a city-specific version of the balanced scorecard concept introduced by Kaplan and Norton (1996). As with the balanced scorecard, a city is best assessed not by an absolute score but by its relative performance in each dimension. We propose its presentation as a spider web diagram – a technique that allows visual comparison of cities. The CITYWEB is a powerful and intuitive way to understand visually the relative strengths and weaknesses a city possess.

5.1 **CITYWEBS**

The subtotal derived from each category is plotted onto the spider web from the centre (representing the lowest value, i.e., zero) to the vertices (representing maximum possible value (i.e., 100). A single category plotted on the CITYWEB would not illustrate the relative significance of its contribution to the city; however, all five categories plotted onto the CITYWEB as a whole would provide an easy and efficient way of understanding the current position of the city.
6 Analysing the Super Index

6.1 Strengths of the Super Index

Comprehensiveness of data: One of the greatest strengths of the Super Index is the variety and comprehensiveness of the data used to create it. Our data comes from all sources: governments, private corporations, and public institutions. As previously outlined, traditional indices are limited by an institution’s finite resources. In the case of our Super Index, these resources are multiplied by the number of different institutions included in our index. Rather than competing with other indices, the Super Index uses other leading frameworks as building blocks (see Exhibit 4). The result is a more comprehensive and accurate ranking system.
Exhibit 4. Building blocks of the Super Index

Number of indicators per category: This strength is closely related to the comprehensiveness of data. While traditional indices tend to focus on very few indicators to create an overall ranking, the Super Index uses all of the indicators within an index for each of the indices involved. For example, the MasterCard WorldWide Centers of Commerce Index: Liveability Index (2008) uses four categories to rank the overall niceness of a city. This can be contrasted with the ten indicators the Economist Intelligence Unit: Liveability Study (2008).

Reduction of bias: Another strength of the Super Index is its ability to reduce the overall bias of a ranking system. As previously discussed, different indices are produced by different institutions for different target audiences. By using results from all kinds of institutions for all kinds of target audiences, any bias that may exist can be reduced. Extreme results from within an index will be dampened by the more conservative results of another index. The result is a more fair and balanced ranking system. This concept can be likened to James Surowiecki’s “wisdom of crowds” concept (Surowiecki, 2004). Although each index is produced by experts, the collective wisdom and diversity of groups will result in different conclusions from similar datasets. However, because each of these conclusions used together to produce one final result, their differences are minimized and a more reliable and accurate conclusion will be produced.

General Audience: The Super Index was created with no specific audience in mind. It is equally useful to individuals, businesses, academics and governments. Because the Super Index is an aggregation of information from many different indices and is produced for a general audience, there are no political motivations or monetary incentives to skew results. Rather than focusing on very specific factors, the Super Index provides a score for each city in five different categories. Adding these scores up allow anyone to see how a city ranks compared to others in the world. Alternately, individual category scores can be used to highlight specific areas where a city can improve.

Mix of subjective and objective factors: In order for a ranking system to be as accurate as possible, there sometimes needs to be a mix of both objective scores and subjective scores. The Super Index combines scores from objectively measured indices, subjectively measured indices, and indices that use both. This allows our index to rank cities based on an overall score that includes both measurable and non-measurable factors. The result is a fair and balanced ranking system that takes into account all aspects.
6.2 Limitations of the Super Index

Weighting system: One limitation of the Super Index is the way index scores are individually weighted. Each city receives a score out of 100 in five different categories: global, nice, knowledge, intelligent and creative. These scores are then added up to give a final score out of 500. The scores within each category are the average scores of the indices for that category for each city. Because each category is given a score out of 100, there is an equal weighting to each for the final score. However, since there are a different number of indices in each category, each individual index has a different weighting towards the category score and final score. For example, in the nice category there are 5 indices. So, each index makes up 20 percent of the nice category score and 4 percent of the final score. In the creative category however, there are only three indices. Consequently, each index makes up 33.33 percent of the creative city score and 6.66 percent of the final score. This uneven weighting system gives more value to indices that are in categories with very few other indices and less value to ones with many within their category.

Number of indices per category: The number of indices per category range from six in the knowledge city category to three in the creative city category for a total of 21 indices across five categories. As previously mentioned, this has caused a problem with the weighting of each index. This limitation has also caused a problem with the comprehensiveness of our data within each category. The creative and intelligent categories each have only three indices in them. This limits the comprehensiveness of these categories as well decreases the accuracy of both the category scores and the final scores. Ideally, we would like to include as many applicable indices as possible per category.

Overlap of indicators: Because each index was independently created by different companies there is an overlap of indicators within each category. For example, in the nice city category five out of five indices specifically mentioned availability of health care as a key indicator in their ranking system. However, only Anholt City Brands Index (2007) mentioned pulse (how exciting the city is perceived to be) as one of their indicators. Another problem occurs when there is overlap of indicators between the categories. Not all indices in our Super Index fit perfectly within their category. We tried to make decisions based on where they fit best overall, but even though they may fit better in one category overall, some indicators within their study may be best suited in another category. An example of this can be found in The Economist Intelligence Unit: Liveability Study (2008). Overall, this index measures the quality of living in a city. However, one of the indicators is quality of telecommunications which would be more suitable for the intelligent category.

Relying on other’s data: The accuracy of the Super Index ranking is entirely dependent on the accuracy of the individual indices. If the indicators within each individual ranking are accurately measured and recorded, the result is a very accurate and cohesive Super Index. However, if individual indices are inaccurate, it will negatively impact the accuracy of our Super Index. This is especially true in the case of highly weighted indices in underrepresented categories.

Availability of data for all cities: Another issue that had to be dealt with was the availability of data for each city. While the nice city category represented a great number of cities, both the creative and intelligent category were very limited in the number of cities represented. For example, in the creative category, because of lack of data for
cities, we included The Travel & Tourism Competitiveness Report: Human, Culture, and Natural Resources (2009) which ranks countries rather than cities. In categories where no score exists, an average score is substituted to avoid penalizing cities that were not represented in a category. However, the problem with this method is the likelihood that missing cities were excluded from individual indices for a reason. If the cities are not important enough to be included within their individual category, then they probably do not deserve an average score.

7 The discourse on the role of “niceness”

7.1 Quality of life

Amongst researchers, there is a general consensus that a meaningful definition on the role of “quality of life” can be described by the linkage between two dimensions: psychological and environmental (McCall, 1975; Myers, 1987; Davidson and Cotter, 1991; O’Brien and Ayidya, 1991; Grayson and Young, 1994; Diener and Suh, 1997; and Turksever and Atalik, 2001). In section 3.2 of this paper, we examined the literatures that underpin “nice cities” as one of the five key categories of our Super Index. We defined “nice cities” as the consolidation of subjective interpretations of city brands with the traditional assessment of quality of life with respect to factors such as education, healthcare, weather, crime rates and employability. Dissart and Dellar (2000, p. 136) states that “a person’s quality of life is dependent on the exogenous [objective] facts of his or her life, and the endogenous [subjective] perceptions he or she has of these factors and of himself or herself.”

7.2 Linking economic and quality of life (well-being) indicators

Murdie et al. (1992) and Williams et al. (2001) have reviewed a number of studies that use subjective and objective indicators for a variety of spatial observational units such as census tracts, cities, regions and countries. The authors have identified that amongst these studies, there is a diverse range of social, political and environmental indicators that are seemingly disparate. However, Murdie and Williams have noted consistent references to economic indicators as a baseline to assess liveability or quality of life in their reviewed studies. Their finding suggests there is an inherent linkage between quality of life indicators and economic indicators. An example of such ranking of cities is the Globalization and World Cities (GaWC) study, which is strongly based on a city’s economic success classified by world city status using business type data (Massam, 2002).

Florida et al. (2009) has extensively explored the topic on “well-being” by understanding how psychological, social and economic factors contribute to the happiness of residents. He has identified a number of studies, for example, Diener et al. (2003), Diener and Suh (1997), Easterlin (1995), and Schyns (1998), that have found positive linear relationships between national levels of well-being and income. Using state-level economic indicators such as gross regional product (GRP) per capita, income, median housing value, Florida et al. (2009) notes “well-being was significantly related to all three of the economic indicators, most strongly with median housing value, followed by median income, and per capital GRP” (p. 13)
Exhibit 5: Top 10 Ranked Cities/Regions for 21 Indices

<table>
<thead>
<tr>
<th>City Rank</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>9th</th>
<th>10th</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Singapore, Singapore</td>
<td>Hong Kong, Hong Kong</td>
<td>London, England</td>
<td>Tokyo, Japan</td>
<td>New York, United States</td>
<td>Dublin, Ireland</td>
<td>Edinburgh, Scotland</td>
<td>Vienna, Austria</td>
<td>Montreal, Canada</td>
<td>Chicago, United States</td>
</tr>
<tr>
<td>2</td>
<td>Copenhagen, Denmark</td>
<td>Zurich, Switzerland</td>
<td>New York, United States</td>
<td>Delhi, India</td>
<td>Los Angeles, United States</td>
<td>Munich, Germany</td>
<td>Hamburg, Germany</td>
<td>London, United Kingdom</td>
<td>Brussels, Belgium</td>
<td>Tokyo, Japan</td>
</tr>
<tr>
<td>3</td>
<td>Venice, Italy</td>
<td>Sydney, Australia</td>
<td>Melbourne, Australia</td>
<td>Dubai, United Arab Emirates</td>
<td>Hong Kong, China</td>
<td>Singapore, Singapore</td>
<td>Beijing, China</td>
<td>Buenos Aires, Argentina</td>
<td>Seoul, South Korea</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>New York, United States</td>
<td>Tokyo, Japan</td>
<td>Paris, France</td>
<td>Rome, Italy</td>
<td>Copenhagen, Denmark</td>
<td>Geneva, Switzerland</td>
<td>Stockholm, Sweden</td>
<td>Manchester, United Kingdom</td>
<td>Vienna, Austria</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>London, England</td>
<td>Hong Kong, China</td>
<td>Paris, France</td>
<td>Tokyo, Japan</td>
<td>Madrid, Spain</td>
<td>Tokyo, Japan</td>
<td>Abu Dhabi, United Arab Emirates</td>
<td>Istanbul, Turkey</td>
<td>Johannesburg, South Africa</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tokyo, Japan</td>
<td>Paris, France</td>
<td>Moscow, Russia</td>
<td>New York, United States</td>
<td>Washington, DC</td>
<td>Beijing, China</td>
<td>Kuala Lumpur, Malaysia</td>
<td>Sydney, Australia</td>
<td>Mexico City, Mexico</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Singapore, Singapore</td>
<td>Munich, Germany</td>
<td>Berlin, Germany</td>
<td>Seoul, South Korea</td>
<td>Toronto, Canada</td>
<td>Madrid, Spain</td>
<td>Hong Kong, China</td>
<td>Tokyo, Japan</td>
<td>Shanghai, China</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hong Kong, China</td>
<td>Paris, France</td>
<td>Moscow, Russia</td>
<td>New York, United States</td>
<td>Tokyo, Japan</td>
<td>Beijing, China</td>
<td>Kuala Lumpur, Malaysia</td>
<td>Sydney, Australia</td>
<td>Mexico City, Mexico</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Tokyo, Japan</td>
<td>Paris, France</td>
<td>Moscow, Russia</td>
<td>New York, United States</td>
<td>Tokyo, Japan</td>
<td>Beijing, China</td>
<td>Kuala Lumpur, Malaysia</td>
<td>Sydney, Australia</td>
<td>Mexico City, Mexico</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>London, England</td>
<td>Hong Kong, China</td>
<td>Singapore, Singapore</td>
<td>Beijing, China; New York, United States</td>
<td>Tokyo, Japan</td>
<td>Beijing, China</td>
<td>Kuala Lumpur, Malaysia</td>
<td>Sydney, Australia</td>
<td>Mexico City, Mexico</td>
<td></td>
</tr>
</tbody>
</table>

In an attempt to answer the question of whether knowledge cities are merely nice cities, we have tested our hypothesis using the case of Canadian cities in our previous work on CITYCARD.
cities by nation in each category as a simple comparator, while Canada receives a tie for the highest number of references for nice cities (7 of 50), it has a much lower proportion and overall ranking in the other four categories.

The result demonstrates that, as a nation, Canada is largely perceived as a “nice” country. In addition, Canada’s major urban centres are considered to be “nice” cities with excellent provision of public healthcare, education, infrastructure and a pleasant natural environment. However, in categories of “knowledge” and “intelligent” cities, Canadian cities underperform as a whole.

### 7.4 Correlation analyses

To further our understanding on the role of “niceness” in the attraction, cultivation and development of a knowledge-based city, a correlation analysis was conducted. Using the category scores, we performed a Spearman correlation analysis and two-sided significance test with SPSS. The purpose of this test was to see if there are any strong relationships between the category scores. For example, do nice cities tend to be global cities as suggested by Florida (2010), Diener et al. (2003), Diener and Suh (1997), Easterlin (1995) and Schyns (1998)? Although we understand that correlation does not imply causation, we uncovered some very strong relationships in our dataset.

**Exhibit 6. Pearson correlation test using SPSS**

<table>
<thead>
<tr>
<th></th>
<th>Global Cities</th>
<th>Nice Cities</th>
<th>Knowledge Cities</th>
<th>Intelligent Cities</th>
<th>Creative Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>N/A</td>
<td>.700**</td>
<td>.450**</td>
<td>.262**</td>
<td>.655**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td>.000</td>
<td>.007</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>105</td>
<td>105</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td><strong>Nice Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.700**</td>
<td>N/A</td>
<td>.527**</td>
<td>.221**</td>
<td>.673**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td>.000</td>
<td>.023</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>105</td>
<td></td>
<td>105</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td><strong>Knowledge Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.450**</td>
<td>.527**</td>
<td>N/A</td>
<td>.320**</td>
<td>.456**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td></td>
<td>.001</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>105</td>
<td>105</td>
<td></td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td><strong>Intelligent Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.262**</td>
<td>.221**</td>
<td>.320**</td>
<td>N/A</td>
<td>.096</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.007</td>
<td>.023</td>
<td>.001</td>
<td></td>
<td>.331</td>
</tr>
<tr>
<td>N</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td></td>
<td>105</td>
</tr>
<tr>
<td><strong>Creative Cities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.655**</td>
<td>.673**</td>
<td>.456**</td>
<td>.096</td>
<td>N/A</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.331</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

**Correlation is significant at the 0.05 level (2-tailed).**

### 7.5 Interpreting correlation results

**Global:** Global has the highest correlation to other categories across the board. The correlation to global cities to the other categories range from .70 to .262. All four of the correlations are significant at the .01 level. The strongest among these correlations is the correlation between nice and global followed very closely by creative. These correlations indicate that global cities tend to be both nice and creative.
Nice: The nice category also has a very strong correlation to the remaining categories. All are significant at the .01 level except intelligent, which is significant at the .05 level. Nice has a strong correlation to global, knowledge and creative categories.

Knowledge: The knowledge category has the most consistent correlation among the five categories. Knowledge’s correlation ranged from .320 to .527, all of which are significant at the .01 level. This indicates that the score in knowledge is closely associated with the score in the other four categories.

Intelligent: Perhaps the most interesting category, intelligent has the lowest correlations across the board. Its correlation with global and knowledge were .262 and .320 respectively, each being significant at the 0.01 level. Intelligent correlation with nice is measured at .221 and is significant at .05. The correlation between intelligent and creative is almost nonexistent, measuring at an insignificant .096. This indicates that the score a city receives in the intelligent category has very little relation to the score they receive in another category.

Creative: The creative category has a strong correlation across the board with the exception of intelligent cities. Creative cities tend to be global, nice and knowledge cities. However, it seems that creative cities and intelligent cities have very little correlation. While it is impossible to prove through a correlation analysis why the relationship does not exist, it may be caused by a division of resources.

7.6 Knowledge-based development and “niceness”

A knowledge city, as described by Edvinsson (2003), is a city that is specifically designed to foster, retain and develop knowledge-enabled activities. Yigitcanlar (2007) and Martinez-Fernandez (2007) argue that a city that is focused on nurturing innovation, science and creativity in light of the globally connected urban economy is adopting “one of the effective paradigms for the sustainable cities of the future” (p. 63).

Academic literatures pertaining to knowledge cities have revealed there are multiple components that support knowledge-based development. Based on the work of Yigitcanlar et al. (2008) and Van Winden et al. (2007), a framework of characteristics was developed for a knowledge city. There are seven components:

1. Knowledge-Base
2. Industrial Structure
3. Quality of Life and Urban Amenities
4. Urban Diversity and Cultural Mix
5. Social Equity and Inclusion
6. Scale of a city
7. Accessibility

Five of the 7 major characteristics (i.e., quality of life and urban amenities; urban diversity and cultural mix; social equity and inclusion; industrial structure; scale of a city) in the framework as presented by Yigitcanlar and Van Winden have close resemblance to that of “nice cities” and “global cities” in our research work. Based on the results of our correlation analysis, the association between “nice cities” and “global cities” is the highest (0.700) among all other iterations as seen in Exhibit 6.

Through our review of literatures on quality of life, well-being and perceived community satisfaction from subjective and objective measures, coupled by our correlation analysis, “niceness” plays an important role in the ascendancy of global city status. A knowledge city aspires to increase their industrial base by attracting
multinational corporations to establish their headquarters in the host city (Carrillo, 2004; Kentor et al., 2003; GaWC, 2008). Meanwhile, the attraction of large corporate centres would require a city that offers high quality of living with excellent urban amenities to retain knowledge workers (Florida, 2002; Gertler et al., 2002). In order to foster knowledge creation and the attraction of knowledge workers, a city should have urban diversity and cultural mix to encourage creativity. Finally, talented individuals are attracted to places that have social equity and inclusion (Florida, 2002).

8 Conclusion

8.1 Summary

In this paper, we have underscored the pervasive influence of globalization and rapid urbanization in the 21st century. We have provided several insights for practitioners in the planning and economic development fields to recognize the need to re-examine traditional planning approaches predominately used for production-based economy in the face of a global knowledge-based economy. Cities and organizations around the world are also increasingly interested in the publication of global indices that rank countries, regions and cities. As most cities tend to specialize in their areas of competitive advantage, identifying their relative positioning amongst global ranking indices is useful when evaluating weaknesses and strengths. Given the rising awareness of a knowledge-driven economy, we have utilized global ranking indices and have reviewed their underlying measurement protocols, factors and indicators. It is through this iterative process that the categorizations of the different types of cities are conceived. This study proposed five dominant categories of cities: Creative Cities, Nice Cities, Intelligent Cities, Knowledge Cities and Global Cities. Each type of city is well represented in theory and practice amongst different countries. In order to overcome the challenges and limitations inherent in most single index, we presented the use of a comprehensive comparative framework called the “Super Index”. The Super Index consolidates 21 indices by averaging a group of indices based on their respective categories. Through this process, a global ranking of cities is developed. Based on literature reviews and a correlation analysis conducted of the Super Index, our study has identified that the role of “niceness” associates greatly to “global cities”. This finding corresponds well to the knowledge city framework as proposed by leading academics in the field. A knowledge-based city aspires to attract knowledge workers and company headquarters to a place that is socially diverse and high in quality of life, in order to generate creativity and innovation.

8.2 Research limitations

There are some issues that will limit the applicability of the current results. These limitations are identified as follow:

- While we believe that our research provides a new and useful approach to comparing cities, we also recognize that it is dependent on the scoring methods used in the original indices and the appropriateness of the combination of indices in each category. Any errors and discrepancies among the indices would affect the outcome of the Super Index.
This study took a snapshot of different time periods among 21 indices. It is likely that the economic and social context at different time periods can have impacts on merging statistical information. Hence, this research does not account for the changes (positive or negative change) that took place over time.

This research recognizes that sample size, or the number of cities examined, within each index varies from 20 to 215 cities. A high degree of fluctuation among the number of cities examined per index can impact the correlation of each index on the total score. This variation is not accounted for in the study.

Due to lack of select surveys, the use of country-level or regional level data in place of city data reduces the accuracy involved with the study (i.e., creative cities category). The problem with assigning an aggregate value to its individual component is considered an ecological fallacy.

We recognize that the statistical data collected from each index have overlapping underlying factors. Albeit the CITYWEB is built upon five distinct categories, each type of city is not mutually exclusive as there are soft boundaries among the five categories.

Sharma et al. (2008) explains that “knowledge cities are not measurable constructs which may be quantitatively described and benchmarked with weighted summations of scores along prescribed dimensions”. Our research has drawn on as many indices as possible, utilizing as many value dimensions and underlying assessment factor as possible to create the Super Ranking Framework. However, it is not a sole indicator or measure of successful cities.

### 8.3 Future research and publications

In the next stage in our study, we will further explore the underlying factors for each category in order to perform regression analysis of independent and dependent variables. As always, we will continue to review and refine the indices and weighting factors used in our index of indices to determine the relative impact of the different categories.

### References


Yigitcanlar, T., Velibeyoglu, K. and Baum, S. (Eds.) (2007a), Knowledge-based urban development: planning and applications in the information era, Hershey, PA: IGI Global.


Mysore: a framework and an audit of a knowledge city

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Structured Abstract

Purpose – The purpose of this paper is to present the preliminary findings of a larger project to study the concept of knowledge city, develop frameworks for a knowledge city, and examine Mysore as a knowledge city. The objective of this project is to collect and analyse the data relating to Mysore, identify specific indicators of a knowledge city, and benchmark the status of Mysore in terms of these aspects.

Design/methodology/approach - This paper presents a framework developed as part of our study to analyse the position of Mysore as a knowledge city. The study involved literature reviews on the concept of knowledge cities, and diverse aspects of metrics, indicators, and data of knowledge/intellectual capital—both historical and current, of the city of Mysore. The presented framework identifies indicators of a knowledge city, which include: education indicators; innovation and research indicators; network infrastructure indicators; culture, heritage and tradition indicators; tourism indicators; business and commerce indicators; and, civic administration & infrastructure indicators. Further, the study involved analysis of a few identified knowledge city/metropolis regions in the world and Indian cities, which are focusing on knowledge based development. With the categorised data, Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was performed, which gave valuable insight into the key areas that need to be addressed in order to position Mysore as a knowledge city.

Originality/value – The novelty of this study lies in the holistic approach adopted in the development of the framework, which considers the entire city, including all its constituents, as its subject. This is the first attempt that has dealt with a systematic approach towards analysing the scope for knowledge based development in Mysore city.

Practical implications – Based on the preliminary findings, this study concludes that Mysore has inherent and demonstrated potential of being positioned as a knowledge city and by focusing on the appropriate areas, it can transit towards a knowledge based economy, which not only fosters socio-economic development, but also retains its rich cultural heritage. The study will be a vantage point for the civic administration to identify the key areas to be addressed in order to achieve sustained development of Mysore as a knowledge city.

Keywords – India, intellectual capital of cities, knowledge city, sustained urban development, knowledge city framework

Paper type – Academic Research Paper

1 Introduction

Nations around the world are focusing more on establishing themselves as information societies or knowledge economies, and the primary objective is transforming the cities that constitute these nations into centres with an economy based on knowledge.
An economy of knowledge refers to an economy that focuses on production and management of knowledge for economic benefits (Knowledge Economy, 2010). More specifically, Carrillo (“The MAKCi Awards,” 2010), defines a knowledge city as — “a city in which the citizenship undertakes a deliberate, systematic attempt to identify and develop its capital system, with a balanced and sustainable approach”. This means that the citizens become actively involved in the development of the city.

Mysore, a city in Southern India, which was the erstwhile capital of the Kingdom of Mysore ruled by Wodeyars, has always been known for its quaint charm, rich heritage, magnificent palaces, beautifully laid-out gardens, imposing buildings, broad shady avenues and sacred temples. Mysore is the second largest city of the state of Karnataka. It is known the world over for its exotic sandalwood and rich silk. Its grand and imposing palaces, majestic temples, gardens leave an ever-lasting impression on the visitor. The word Mysore is derived from Mahishuru or Mahishasurana Ooru, meaning the town of Mahishasura, the demon king who is believed to have lived here, and the majestic Chamundi hills signifies the victory of Goddess Chamundeshwari over him.

This paper presents the analysis and findings of a larger project that aims to blend the invaluable identity capital of Mysore with its social intellect to position Mysore as a Knowledge City. The objective of the project is to enable the Royal City, with its mystifying history and rich cultural heritage, to take its rightful place among the elite cities in the world.

The preliminary tasks of this project involved identifying parameters that define a knowledge city. The key ingredients that increase the knowledge value of a city were identified and structured by including them in the proposed framework. The following sections of this paper present the framework used for this study, tabulate the findings of the research and discuss the findings, and in process, attempt to evaluate the position of Mysore as a knowledge city.

2 Background

This study focuses on understanding the manifestations of knowledge within a vast region of human inhabitation, largely intercepted by modern technology, and grossly motivated by human kind’s desire for sophistication. The United Nations, in the report “Understanding Knowledge Societies” (United Nations, 2005) submitted by the Department of Economic and Social Affairs, identify two forms of knowledge – Explicit and Tacit. Explicit knowledge can be represented systematically by a language, combined, stored, retrieved, and transmitted through various ICT devices, while Tacit knowledge is an intangible element that is derived from experience, expertise, insights, intuitions, perceptions and individual judgment. Tacit knowledge is hard to formalize and is highly personal and dynamic in nature. The process of knowledge development thrives on “information”, which triggers creative reflection and “people”, who are the carriers of tacit knowledge able to provide new meaning to the existing information. The two assets act as the impetus to each other in the process of mass production of knowledge (United Nations, 2005).

A society which develops in parallel with knowledge development is termed a “Knowledge Society”. The by products of knowledge development, that go through the stages of knowledge creation, dissemination and utilization form the core of “Knowledge Economy”. A knowledge city therefore, becomes a geographical area with an expanding knowledge society, and with knowledge as a strong pillar of its economy.
A Knowledge City may be defined as a city that nurtures knowledge, possesses an economy that is knowledge based, provides an environment that fosters knowledge creation and dissemination. The creation of a knowledge economy starts with reconstruction of cities and urban settlements which can act as knowledge hubs. This requires major revamping and strengthening of key constituents that make a knowledge city. A knowledge city instills a sense of ownership and attachment in the minds of people as it actively involves them in the developmental activities and allows for public articulation of thoughts and criticisms. In other words, the citizens of the city become active stakeholders in its development.

Carrillo (Carrillo, 2006) further indicates that there are sixty-five such urban development initiatives in progress around the world. One of the well known knowledge city endeavours is that of Barcelona, which was awarded the Most Admired Knowledge Metropolis Region in 2009 (The Most Admired Knowledge City: Report, 2009). Believing that culture and development are intertwined, the administration of the city of Barcelona set out to establish Barcelona as a knowledge city preserving the culture that exists and focusing on further development. The administration thus, focused on the following elements to establish a Knowledge City (Amidon & David, 2004):

- Instruments that make knowledge accessible to citizens
- A network of public libraries
- Access to new communication technologies for all citizens
- Cultural facilities and services that have a central educational strategy
- A level of literacy that is in line with the average European level
- A network of schools connected with artistic instruction
- Respect for the diversity of cultural practices of its citizens
- Civic centres that are open to diversity and that foster face-to-face relations
- Availability of the tools required for citizens from all territories to express themselves
- Instruments to make knowledge accessible

Other popular knowledge cities, which have shown tremendous progress in terms of urban, economic, and social development include Dublin, Manchester, and Melbourne. In the case of Melbourne, emphasis is given on creating a critical mass able to manage a strong innovation culture. The city wants to offer high standards of living to retain knowledge workers, with an aim of establishing itself as a learning and a knowledge creating centre (Knowledge Melbourne, 2007).

While Dublin is pursuing a ten point plan, which aims at accelerating the growth of infrastructural, educational, innovational, and entrepreneurial capitals (“Developing a Knowledge City,” 2008), the Manchester Knowledge Capital team is developing the strategic intelligence of the city, by positioning private and public sectors to be mutually beneficial for maintaining a robust economy able to weather global challenges (Leading Change, n.d.).

The concept of Knowledge City though being a familiar term in Western countries is merely interpreted in the Indian society as a geographical concentration of Special Economic Zones (SEZ’s) and I.T. Companies. This has led to the development of various “Knowledge City” areas, which merely consist of various knowledge based and knowledge intensive industries. However, what one needs to realize is that the SEZ’s, I.T. companies and the other industries, are an integral part of the city of knowledge, and by themselves do not constitute a Knowledge City.
Mysore, being a cradle of education, music, dance, art, and literature, has resplendent cultural and intellectual heritage and is home for eminent personalities from diverse fields. Over centuries of kingly rule and decades of Government rule, Mysore has achieved many firsts in various fields. The City Improvement Trust Board (CITB) established by His Highness Maharaja Nalvadi Krishnaraja Wodeyar in 1903 was one of the first of its kind, whose hallmark was combining innovative planning with a humanitarian approach. The University of Mysore became the first University outside the domain of the British Administration in India, the sixth in India as a whole and the first ever in the state of Karnataka. The Central Food Technological Research Institute (CFTRI) stands out among the largest and one of the most diversified technology laboratories in the world. Mysore also has the distinction of having spawned many schools of thought/styles in different domains such as of Mysore Yoga, Mysore painting and others.

Mysore holds a unique brand value that is recognized by people all over the world. If the city incorporates a systematic approach towards creating a knowledge driven economy, it has the potential to become a model knowledge city.

3 The study

This section of the paper defines the research questions of this study and describes the methodology of this study, presenting two frameworks that highlight the various parameters of a city essential for its growth as a knowledge city, before presenting a framework developed as part of this study to analyse the position of Mysore as a knowledge city. The research questions of this study are:

R1. What are the indicators of a knowledge city?

R2. Where does Mysore city stand in terms of such indicators? Does Mysore city have the potential to be positioned as a knowledge city?

In an attempt to realize the objectives of this study, the preliminary task performed was the study of popular knowledge city frameworks, which are widely used to analyse the performance of a city in terms of knowledge based developmental activities. Ovalle et. al. (2004) describe a comprehensive set of “value-dimensions” used to examine various cities, which have been identified as regions focusing on knowledge based development. They identify critical parameters encompassing all the areas of a city that need to be focused on, in order to create value and to achieve sustained improvement in its socio-economic and cultural aspects.

Most of the parameters identified by Ovalle et. al. (2004), also form a part of the widely accepted Most Admired Knowledge City (MAKCi) framework (The Most Admired Knowledge City: Report, 2009), which has been developed by the World Capital Institute and Teleos, to categorise a city’s assets into eight categories, facilitating the analysis of its position among other knowledge cities. Table 3.1 shows the major capital categories identified by the MAKCi framework.

The framework developed as part of this study is called the “Knowledge City Index (KCI)” framework, and presents the indicators, which are critical to the existence and sustenance of a city’s overall growth. The project this study is a part of, aims at continuously improvising the framework to include appropriate parameters, which benchmark a city’s position as a knowledge city, and aims to rank such cities based on the KCI. The KCI framework and the associated indicators are presented below.
3.1 Education indicators
Sub-parameters: Literacy rate, formal education, traditional cultural education, academic events

Educational institutes like schools, pre-university colleges, under-graduate / post-graduate colleges and the university, are the formal educational institutes, since they play a major role in enabling nurturing and dissemination of knowledge to citizens so as to create generations of informed citizens of the city. Apart from formal schooling, developing a citizen’s cultural and traditional knowledge base is equally important to a knowledge city. The institutes and establishments that focus on providing education in the domains of art and culture, including Sanskrit, yoga, music, dance and other cultural domains, form the traditional cultural educational institutes. This indicator can be mapped on to the instrumental-intangible capital and the intellectual aspect in the human-individual capital of the MAKCi framework.

3.2 Innovation and research indicators
Sub-parameters: Centres of innovation and research, city’s contribution to knowledge

Innovation leads to creation of new knowledge and in turn, forms one of the driving forces of a Knowledge City. Thus, centres focusing on creation of new knowledge are categorised as innovation and research indicators. This indicator can be mapped on to the human-collective capital of the MAKCi framework.

3.3 Network infrastructure indicators
Sub-parameters: Internet, mobile telephony, traditional telephony

The internet enables a knowledge city to be aware of the happenings of the outside world and hence, forms a critical factor in the city’s development. When speaking of internet, one will also have to consider statistics of how much data about a particular city is available on the internet, since this presents a platform to showcase the city to the rest of the world. However, existence of an informed population in the rest of the world makes no sense if there is a lack of an informed citizenry within the city. The telephone and the mobile phone network of the city address this need. Thus, internet and telephony are classified under the network infrastructure indicators. This indicator can be mapped on to the instrumental-material capital of the MAKCi framework.

3.4 Culture, heritage and tradition indicators
Sub-parameters: Geographical Indications (G.Is), cultural practices/traditions, religions, festivals, cultural organizations and their activities

The true growth of a city can only be ascertained by the balance in both its cultural/traditional preservation as well as technological advancement. Hence, the various cultural practices, as well as the activities by organizations, which focus towards preservation of traditional beliefs and cultural practices, are classified under this indicator. This indicator can be mapped on to the identity capital, the intellectual aspect of the human-collective capital of the MAKCi framework.

3.5 Tourism indicators
Sub-parameters: Global prominence of the city as a tourism destination, tourist statistics
A favoured tourist destination is usually a city that possesses unique characteristics or unique cultural practices or landmarks, attracting people from around the world, which often paves the way for a business investment in that region or the city itself. Thus, tourism assumes the role of a critical agent, which performs the functions of showcasing the city to the world as well as contributing to improving its economy. This indicator can be mapped on to the relational capital of the MAKCi framework.

3.6 Business and commerce indicators
Sub-parameters: Economy of the city, industries (traditional and contemporary), current trends, entrepreneur/entrepreneurship culture

Establishment of any successful city depends on a stable economical foundation, and the economic aspects of the city are classified under the business and commerce parameter. This indicator can be mapped on to the human-collective capital of the MAKCi framework. This indicator can be mapped on to the financial capital and the entrepreneurial aspect of the human-collective capital of the MAKCi framework.

3.7 Civic administration & infrastructure indicators
Sub-parameters: Government bodies, Non-governmental organizations, development plans/policies/frameworks, developmental activities, Transportation, sanitation, health, roads, other facilities

This indicator covers the analysis of work done by representatives of the citizens in the city, in other words, the government bodies. However, to ensure that the government treads the appropriate path, and that equal focus is rendered by these government bodies to all areas of concern in a city, the Non-Governmental Organizations (NGOs) play a very significant role. Hence, the civic administration parameter focuses on analysing a city’s government and non-government bodies. Urban infrastructure and transportation, which form the basic necessities of any city and present its citizens with the city they know and live in, are classified under the civic infrastructure indicator. This indicator can be mapped on to the instrumental-intangible capital, instrumental-material capital, the organic aspect of the human-collective capital and the intelligence capital of the MAKCi framework.

With the parameters of the KCI framework now defined, this paper endeavours to showcase the findings of this study and attempts to analyse Mysore city based on these parameters. Further, a comparative study has been done on Mysore, Bangalore and Pune, based on a specific set of parameters.

4 Findings

As part of this study, data pertaining to the indicators was obtained from both primary and secondary sources. This section of the paper presents the data collected from such sources, before proceeding to present a comparative study between Mysore and the other Indian cities of Bangalore and Pune for a specific set of parameters.

4.1 Data collected from secondary sources about the indicators of the KCI framework
4.1.1 Education indicators.
(a) Literacy rate:
- Mysore city literacy rate: 82.8% as per 2001 census (Mysore, 2010)
- Indian average: 64.8% (Number of Literates & Literacy Rate, n.d.)
- Karnataka average: 67.04% (“Current Status of Primary Education,” n.d.)

(b) Formal education
The key statistics pertaining to formal education in Mysore city are as follows:
- Educational institutes (Education, 2009):
  - Primary schools: 671
  - High schools: 272
  - Pre-University colleges: 82
  - Polytechnic colleges: 9
  - Engineering colleges: 7
  - Medical, Dental, Indian system of medicine colleges: 6
- Student attendance in schools (Attendance Information, 2009):
  - Attendance in government schools: 98%
  - Average attendance in schools: 99%
- High-school enrolment (percentage of primary school students who enrol for high school) (Enrolment Information, 2009):
  - Government schools: 50%
  - Government aided / un-aided private schools: 90%
- Universities:
  - University of Mysore: This is the sixth oldest university in India and was the first university in a princely state. This is the only university in Karnataka to have been awarded the A+ grade by the National Accreditation and Assessment Council (NAAC). 31 degree colleges in Mysore are affiliated to the University of Mysore (Education, 2009).
  - Karnataka State Open University (KSOU): Established in 1996, KSOU offers both undergraduate and post-graduate programmes via distance education.
- Libraries:
  - Number of libraries: 27 (Education, 2009)

(c) Traditional cultural education
Mysore is known as the “Cultural Capital” of the state of Karnataka (Culture of Mysore, 2010). Presented below are details about institutes, which propagate Mysore’s traditional and cultural education.
- Maharaja’s Sanskrit College: Established in 1879 during the reign of Maharaja Krishnaraja Wodeyar III of the Kingdom of Mysore, is one of the oldest institutes offering courses in Veda, Agama, and Sastra in the traditional methods (Oriental Studies in Mysore, n.d.).
- Government Ayurveda Medical College: It was a part of Maharaja Sanskrit College and became a separate entity in 1907. It has been responsible in imparting education about the concept of Ayurveda, the traditional practices of medicine and well being (Oriental Studies in Mysore, n.d.).
- Meditation, yoga, and spirituality have been an integral part of Mysore’s heritage, and go hand-in-hand with Ayurveda and Vedas. Internationally renowned yoga experts, such as Sri Pattabhi Jois and many others have been a product of Mysore, and presently there are numerous institutes propagating yoga to Indian, and international students alike. (Yoga Institutions in Mysore, n.d.).
- For a culturally rich city, institutes that impart music, dance, drama and artwork, which find their origins in the Mysore region, are equally important for preserving its culture. Mysore is home to many such institutes (Music/Dance Institutions in Mysore, n.d.). Institutes such as Rangayana have been established for creation and preservation of theatrical talent by offering courses in stage craft, and plays in Kannada, and regularly conducting programmes to showcase the talent.
Chamarajendra Academy of Visual Arts (CAVA): This is affiliated to the University of Mysore, and was originally started by the Maharaja Krishnaraja Wodeyar IV as the Chamarajendra Technical Institute in 1906. CAVA offers courses in drawing, painting, sculpture, graphics, applied arts, photography, photo-journalism and art history (Chamarajendra Academy of Visual Arts, 2010).

4.1.2 Innovation and research indicators.

Innovation leads to creation of knowledge and in turn, forms one of the driving forces of a Knowledge City. Mysore has prestigious research institutions in India, which have contributed immensely to the creation of new knowledge. Table 4.1 lists the important research institutes in Mysore city, along with their highlights. It is worthy to note that Mysore has the distinction of housing both the laboratories related to Food Technology in India — CFTRI and DFRL. Besides these prestigious research institutes, several departments under the University of Mysore are involved in research in a variety of domains, thereby adding to the knowledge creation.

4.1.3 Network Infrastructure indicators.

Communication and connectivity amongst the citizens of the city plays an important role in creating an informed citizenry. Presented below are some of the highlights of this indicator.

- Mysore holds the distinction for being the first city in India and the second city in the world after Jerusalem with citywide WiFi. In 2004, citywide WiFi was first launched by WiFiyNet in Mysore City (Mysore, India offers commercial WiFi, 2005).
- An experiment was performed to determine the amount of relevant content about Mysore that is available on the internet, and this experiment in explained in detail in section 4.2.1.
- Wired and cellular/wireless telephone scenario in Mysore city (BSNL Staff, Personal Communication, 2009; Airtel India Ltd. Staff, Personal Communication, 2009):
  - Wired telephone subscribers: 2,00,000 (about 18% of current estimated population of 1.1 million)
  - Cellular phone subscribers: 6,50,000 (about 59% of current estimated population of 1.1 million)
  - Trend observed: Increasing number of people are discontinuing their wired telephone subscriptions and switching to cellular phones.

4.1.4 Culture, heritage and tradition indicators.

(a) Geographical Indications (G.Is)

With the rich cultural heritage, Mysore has the distinction of having maximum number of G.Is in the state of Karnataka, and these are listed in table 4.2.

(b) Festivals and cultural practices

Mysore festivals:

- Dasara: Generally celebrated according to the auspicious days of the Hindu calendar, in the months of September – October every year. The festival is observed for ten days, culminating with the renowned Jambu Savari (Elephant ride) on the tenth day (also known as “Vijaya Dashami” or victorious tenth day) (Culture of Mysore, 2010).
- Yugadi, or the New Year day for the Kannada speaking locals: Another sacred festival to Mysore locals. Falls either in the latter half of March or early April of every year.
Apart from the two festivals that are very close to the city, the citizens also harmoniously celebrate other festivals of all religions and faiths of which many citizens are a part (Mysore – Festivals, n.d.).

Culture and traditions:
The cultural heritage of a region would remain incomplete if one did not consider music, dance, drama and artwork of that region, which is the focus of this section. (Culture of Mysore, 2010; (Music/Dance Institutions in Mysore, n.d.).

- Being the erstwhile capital of the Kingdom of Mysore, where many of the Kings were renowned scholars and poets, Mysore has a rich heritage of music, dance and drama/theatre.
- Music and dance academies organize regular programmes around the city and enable keeping the cultural heritage alive.
- The theatre group in Rangayana, Mysore, is also very well known in India. It regularly conducts programmes to showcase the talent.
- **Mysore School of Paintings**: Mysore School of Paintings are known for their elegance, muted colours, and attention to detail. Most of these paintings have Hindu Gods / Goddesses and Hindu mythological scenes as their themes. They find their origins at the Vijayanagara Empire at the fall of which, the painters of the Vijayanagara School of Painting were rehabilitated by Maharaja Raja Wodeyar, and their creation under the Kingdom of Mysore became known as the Mysore School of Paintings. Traditional Mysore Paintings were done on paper pasted on either cloth or wood and has a thin layer of 24 karat gold that is used in select regions on them.
- **Ganjeefa**, a popular card game that was played in India extensively during the Mughal period, is now known more as an art form, and Mr. Raghupathi Bhatta of Mysore has played an important role in preserving and promoting it by setting up an International Ganjeefa Research Centre at Mysore.
- Mysore has also been known for **Rosewood inlay work**, involving creation of patterns on rosewood and embedding motifs created in ivory (more recently, plastic) in select regions of the created patterns on wood. Nearly 4000 people in Mysore are involved in rosewood inlay work in the present day.
- Besides the institutes that impart cultural knowledge, preservation and promotion of the artwork also depends on museums and art galleries. Some of the renowned museums and art galleries include the Private Residential Museum of the Maharaja of Mysore at Mysore Palace, Jayachamarajendra Art Gallery at Jaganmohana Palace, and Jayalakshmi Vilas Palace museum.

(c) Organizations focusing on preserving cultural practices — The religious institutions

From ancient times, each religion or faith has in many ways contributed to the propagation of regional cultures and traditions. Mysore has its share of various religious communities (Religion in Mysore, n.d.), which strive hard to propagate its cultural heritage and also messages of peaceful coexistence. A large percentage of these religious institutions have also taken up social service activities by constructing educational institutions and hospitals for all citizens of Mysore, and thereby further promote the cause of social welfare and communal harmony.

4.1.5 **Tourism indicators.**

The popularity of Mysore as a desired tourism destination has increased since the final decade of the 20th Century. Much of this has to be owed to the Mysore Dasara festivities, and to Mysore’s culture, history, spirituality, Ayurveda and Yoga. This was clearly evident in 2006, when according to the Archaeological Survey of India (cited in “Mysore Palace beats Taj Mahal in popularity,” 2007), more visitors were recorded at the Mysore Palace than the most visited tourist destination in India, the Taj Mahal.
Mysore’s tourism potential is boosted with the presence of a variety of tourist attractions both in and around Mysore city. Within Mysore city, the most popular destination for visitors is the Mysore Palace, however, with a large number of devotees from various parts of India visiting the Chamundeshwari Temple atop Chamundi Hills, statistically, the most popular tourist destination in Mysore city is the Chamundi Hills, and these are closely followed by the Chamarajendra Zoological Gardens (popularly known as the “Mysore Zoo”) as the next preferred tourism destination. (Joint Director, Department of Tourism, Mysore, Personal Communication, November 2009).

4.1.6 Business and commerce indicators.

Establishment of any successful city depends on a stable economical foundation, and this section presents the highlights of Mysore’s business and commerce.

- **Mysore Economic Conference** held in 1911, under Maharaja Krishnaraja Wodeyar IV
- Establishment of the Mysore Sandalwood Factory in 1917
- Establishment of Sri Krishnarajendra Mills (K.R. Mills) in 1920
- Establishment of Ideal Jawa (India), in association with the Czechoslovakian Jawa motorcycle company, in 1960
- Mysore district projected by Government of Karnataka as the next industrial hub after Bangalore (2008 and beyond)
- Karnataka Industrial Areas Development Board (KIADB) has established four industrial areas in and around Mysore, located at Belagola, Belawadi, Hebbal, and Hootagalli.
- Close proximity to Bangalore (140 kilometers), increasing congestion in Bangalore have caused a “push-effect”, which is causing Information Technology (I.T) and I.T enabled services (ITeS) companies to look for nearby districts (Mysore in particular) as the next choice for establishing their companies.
- Creates employment opportunity for all members of the society alike.
- According to the District Industries Centre (DIC, 2009), there are more than 60 medium and large scale industries in Mysore district, with a workforce of approximately 23,000. The industries have invested approximately USD 720 million in Mysore.
- Major industries, who have set up their manufacturing plants here include: tyre manufacturing (Vikrant Tyres, Falcon Tyres, J.K. Tyres); textiles (K.R. Mills, now Atlantic Mills); electronic systems (L&T); Bharath Earth Movers Limited (BEML); vehicle manufacturing (TVS, Ideal Jawa); and Information Technology (Infosys, Wipro, Software Paradigms India Ltd. etc.). Infosys has established one of the largest technical training centres in the world and Wipro has established its Global Service Management Center (GSMC) at Mysore.
- Tourism is a major economic pillar of Mysore, as close to 2.5 million tourists visit Mysore every year.

Lowlights:
- The manufacturing industry in Mysore suffered when K.R. Mills and Ideal Jawa factories closed-down, and many people were rendered unemployed.

Encouraging factors:
- Development projects, such as the doubling of railway tracks between Mysore and Bangalore, creation of the Bangalore-Mysore expressway, the upgrading of Mysore Airport
- A survey by Business Today in 2001, in which Mysore was ranked as the 5th best city in India to conduct business (Source).

Entrepreneurship, Small scale and traditional industries:
Entrepreneurship: Incubation facilities such as Science & Technology Entrepreneurship Park (STEP) (in Sri Jayachamarajendra College of Engineering) and training centres such as Entrepreneurship Development Cell (EDC) (in The National Institute of Engineering) encourage entrepreneurship among Mysore residents, particularly the youth.

Small scale industries: District Industries centre (DIC, 2010) reports that an average of more than 300 new companies register in Mysore every year. The actual number of new companies registered per year for the period ranging from 1991-92 till 2009-10 is illustrated in figure 4.2.

Traditional industries: Since centuries, Mysore has been a haven to traditional industries such as Silk, sandal wood, incense sticks, and handicrafts industries, and in the present day, tourism is one of the main contributors to the existence and growth of such industries.


- Karnataka contributes to nearly 34% of the total software exports from India. Mysore contributes to about 2% of Karnataka’s total software exports.
- Mysore exports more software than total exports of 11 Indian states considered individually.
- Mysore’s software exports for 2008-09: Approximately USD 292 million (37% increase from 2007-08)

4.1.7 Mysore is the best performing tier II city in Karnataka in terms of software exports, followed by Mangalore (with exports worth USD 183 million) and Hubli (with exports worth USD 5.3 million).

4.1.8 Civic administration & infrastructure indicators.

(a) Government bodies, policies/frameworks, and development activities

- Mysore City Corporation (MCC) (http://www.mysorecity.gov.in/):
  - The civic administration of the city is managed by the Mysore City Corporation (MCC), which was earlier established as a municipality in 1888 and converted into a corporation in 1977.
  - It looks after the engineering works, health and sanitation, water supply, administration and taxation in the city.
  - Mysore city is divided into 65 wards and the council members (also known as Corporators) are elected by the citizens of Mysore in elections held in these wards once every five years. The council members in turn elect the mayor of the city.

- Mysore Urban Development Authority (MUDA) (http://www.mudamysore.org)
  - City Improvement Trust Board (CITB) was established in 1903 to undertake planned development.
  - Under the Karnataka Urban Development Authorities Act 1987, the CITB was amalgamated with the Local Planning Authority of Mysore, and the Mysore Urban Development Authority (MUDA) was constituted.
  - The growth and expansion of the city is managed by the MUDA, which is headed by a commissioner and its activities include developing new layouts and roads, town planning and land acquisition.

- The citizens of Mysore elect four representatives to the Legislative assembly of Karnataka through the constituencies of Chamaraja, Krishnaraja, Narasimharaja and Chamundeshwari.

- Mysore city, being a part of the larger Mysore Lok Sabha constituency, also elects one member of the Lok Sabha.
Urban Development—JNNURM (http://jnnurmmysore.in/):
- The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005 by the Government of India for the creation of financially sustainable inclusive cities.
- As part of this project, planned development programme for Mysore began with a timeline of 20-25 years, with 5-year intermediate milestones.
- JNNURM focuses on the redevelopment of the inner areas of the city, and on other areas such as infrastructure development.

Mysore Vision 2025 (MCC Staff, Personal Interview, February 2010):
- Aiming to promote model growth of Mysore city, while retaining its value as the heritage and cultural capital, the MCC has envisaged a vision to develop Mysore on European Model.
- This vision focuses on heritage conservation, providing basic services for the urban poor, development of infrastructural development (such as drinking water, sanitation, etc.), providing community facilities (such as social security, education, etc.), and improving facilities at tourist destinations in the city.

(b) Non-governmental organizations (NGOs) (Mysore – Non Government Organizations, n.d.)
Ensuring able governance is a task that has been taken up by Non-Government Organizations or NGOs.
- There are close to 40 NGOs in Mysore and the most prominent among these are the Mysore Grahakara Parishad (MGP) and the Association of Concerned and Informed Citizens of Mysore (ACICM).
- The Government of Karnataka had started a task force called Mysore Agenda Task Force (MATF), whose main objective was to maintain the welfare of Mysore, and encourage private sector participation in the empowerment of the citizens. The MATF team comprised of a team of experts from various fields across all sectors and were appointed by the Government of Karnataka.
- MATF was disbanded by the Government in 2005, and the ACICM has come up in its place.
- The other NGOs focus on variety of domains such as rural development, welfare of the old and needy, welfare of children, caring for the physically and mentally disabled, focusing on environment, and focusing on the overall development of the city.

(c) Civic infrastructure — Transportation
- A major role in connecting various regions within Mysore and connecting Mysore with other regions of India is played by buses of the Karnataka State Road Transport Corporation (KSRTC).
- Mysore has been chosen for the implementation of innovative technologies in transportation, such as:
  - Intelligent Transport System project, which is based on GPS and plans to cover 500 buses, 80 bus-stops and 2 bus terminals (“Intelligent Transport System,” 2008).
  - Innovative Environment Project, where ethanol mixed diesel is used to run buses to reduce pollution levels (“Innovative Environment Project,” 2008).
- Besides bus transportation, other means of transport such as auto-rickshaws and taxis are prominent.
- One of the oldest means of transportation, though being very rare in the present days, is the Tonga or horse-drawn carriage.
- South-Western Railways connects Mysore to Bangalore, Hassan, and Chamarajanagar districts.
• Air connectivity to Mysore: The newly renovated Mysore Airport has been inaugurated, and is expecting approval by Airports Authority of India (AAI) and by the state government to begin operations.

4.2  Data collected from primary sources about a few indicators of the KCI framework

As part of this study, an experiment to determine the amount of relevant content about Mysore is available on the internet, a survey about the loyalty of the residents of Mysore towards the city, and a study on the events that are organized in Mysore city during a particular month were performed. This section describes the above exercises in detail and presents their findings.

4.2.1  Experiment to determine the amount of relevant content about Mysore available on the internet.

Methodology:
An experiment was performed to determine how much of information about Mysore is available on the internet. Thirty-six topics related to Mysore were chosen and advanced searches were performed using the Google search engine. The keywords for the searches were of the format — “mysore” AND “topic”, where topic was one of the thirty-six chosen. For each of these topics, the total number of search results was noted and the number of search results relevant to the topic searched was determined for the first 20 results by inspecting the links obtained as search results. On an average, 81.53% of content relevance was observed in the first 20 search results, indicating that most of the categories had a high percentage of relevant results in the first 20 results.

Table 4.3 gives the list of topics that were chosen, the searched phrase, total number of search results returned, the number of relevant search results per the first 20 results. Figure 4.1 illustrates the search relevance for the first 20 results for each chosen topic.

4.2.2  Survey on loyalty of Mysore residents towards the city.

Methodology:
A survey was performed, with the respondents being residents of Mysore, including both the natives of the city as well as the immigrants, in the age group of 17 to 30 years. The total number of respondents were 61, who were randomly chosen from various Graduate educational institutes in the city, and were asked three questions. The questions were:

1. Where are you from?
2. Do you like Mysore?
3. If given a choice between Mysore and any other city in India, where would you rather settle down?

The results of the survey are shown in table 4.4. It was observed that 49% of the respondents were native citizens of Mysore, while the rest were from other cities in India. Among the natives, three respondents did not like the city of Mysore in general, while the same belief was exhibited by five respondents who were non-natives. When asked about their choice between Mysore and any other city in India for settling down, 85% of Mysore natives (i.e. 26 respondents) chose Mysore, while only 19% of non-native Mysorean respondents (i.e. 6 respondents) chose Mysore over any other city in India.

4.2.3  Study on the events that are organized during a particular month in Mysore

Methodology:
The Mysore city edition of a popular daily newspaper namely, Deccan Herald, was chosen for this exercise. Newspapers for the entire month of May 2010 were selected and the pages with news about Mysore city, i.e. page 2, 3 for general news and events, and pages 16, 17, 18 for sports news and events, were scanned for news about events. The events were classified as shown in table 4.5. The results of this exercise were obtained as follows:

- Academic events: 59
- Conferences: 61
- Art & cultural events: 149
- Sports events: 16
- Health related events: 33

4.3 Comparative study of the cities of Mysore, Bangalore and Pune

An internet search exercise was performed to determine common parameters of the cities of Bangalore, Mysore and Pune, which are available in the public domain. As a result, six parameters were identified, and they are listed in table 4.6. The reason as to why Bangalore has been chosen for this exercise is that being a metropolitan city at close proximity to Mysore, the congestion and expensive living conditions prevalent there has been identified as one of the prime reasons for Mysore’s increasing popularity as a preferred business destination, while Pune was chosen because it is one of the cities of India, which is growing at a rapid pace.

Methodology:

An internet search exercise was performed for various types of data about the cities that are available in the public domain, and once the common parameters were identified, the rankings or the scores of each of the three cities were noted. This was followed by normalization, where the results of each city was normalized with respect to the best performing city in that category, i.e. the best performing city was given 100% and the rest formed a portion of this score. Next, a score ($S_1$) was assigned to each city, based on the percentage obtained, as shown in table 4.7, and the scores obtained by each city, along with the original score, is shown in table 4.8. Following this exercise, a graph as illustrated by figure 4.3 was plotted, which clearly illustrates each city’s standing in terms of these parameters.

5 Discussion

With the findings of this study listed in the previous section, this section of the paper focuses on the analysis of Mysore city based on the parameters of the KCI framework, in an attempt to answer the research questions of this study, and presents a strengths, weaknesses, opportunities and threats (SWOT) analysis of Mysore city.

The data obtained from various secondary sources indicate that Mysore exhibits strong orientation towards cultural and traditional activities, which is supported by the presence of numerous cultural organizations, cultural practices and the inherited “cultural capital” tag for the city. This was further justified by means of the study of newspaper events, which identified 149 art & cultural events during one particular month. However, the way ahead to establish Mysore as a knowledge city should include special focus on innovation and creation of knowledge.

Even though many renowned research institutes have been identified, and various research projects have been taken up by the University of Mysore, the contribution of the
city as a whole towards creation of new knowledge is relatively low when compared to other knowledge cities. A remedial measure for this requires the creation of a conducive environment to attract and retain knowledge workers.

The “Loyalty towards Mysore” survey shown that citizens of Mysore exhibit a larger degree of loyalty towards the city, when compared with the outsiders, who seem to “like” the city and its ambience, but would not prefer to settle down here. A possible reason for the outsiders’ opinion could be the fact that the employment opportunities provided by other cities are significantly higher, and due to the fact that Mysore is still in a growing phase and not many industries have been established.

When analysing citizen’s loyalty towards the city, one cannot afford to exclude active participation of residents of the city in public gatherings and discussions related to the city’s development, and the newspaper events study highlights 61 conferences in one month, which include public discussions and discussions organized by the NGOs with the agenda of city development. Thus, one can say that public participation and sense of ownership in the various aspects of the city is increasing, albeit at a slow pace.

From the comparative study of Mysore, Bangalore and Pune, one can understand that Mysore performs better in four parameters, namely, percentage of slums, registered G.I’s, pollution, and literacy rate, while being outperformed by Bangalore and Pune in the OCC (Offshore City Competitiveness) index and Liveability index. Bangalore and Pune have both performed very well in the OCC index, which justifies them being the choice of several multinational companies to set up their research/services centres. Nevertheless, even though Mysore ranks 10th in the OCC index, this index suggests that it is the 10th best city in India to set up an offshore development / service centre. Similarly, even though ranked 17th in the Liveability index, its position is with respect to 36 other cities of India that were ranked on the basis of various parameters including education, health, economy, etc. is to be appreciated.

After having considered data obtained from various sources, related to the aspects of a knowledge city identified by the KCI framework, this paper now presents the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of Mysore city as a whole, where its positioning as a knowledge city involves resolving trade-offs between the various integral parameters of the city.

**Strengths**

- Mysore attracts close to 2.5 million tourists every year and a large percentage of foreign visitors, thereby indicating a strong brand value (Joint Director, Department of Tourism, Mysore, Personal Communication, November 2009).
- Tourism is indirectly responsible for increased revenues in all commercial sectors, such as traditional industries, transportation, and hospitality.
- University of Mysore has been accredited with the A+ Grade by National Assessment and Accreditation Council (NAAC) and has been attracting students from several countries (Institutions Accredited by NAAC with validity — Southern Region, 2010).
- An upward trend observed in setting up of small scale industries since 2006-07.

**Weaknesses**

- Delay in making the newly upgraded Airport operational will continue to hit the growth of industries significantly.
- Failure to attract knowledge creating industries (such as R&D units).
- Mysore has been blacklisted in JNNURM development activities for delayed implementation of sanctioned infrastructure development projects.

**Opportunities**
The fact that the Government of Karnataka is projecting Mysore as the next IT and ITeS hub can beckon knowledge-based and knowledge-intensive industries in the near future.

The Push-effect, resulting because of increasing congestion in Bangalore city and its improved connectivity with Mysore further encourages the growth of business sector.

Completion of the Railway Double Track between Mysore and Bangalore, and start of operations from Mysore airport will be added advantages to attract more business establishments to Mysore.

Mysore, being a tier-II city and being very much smaller when compared to Bangalore, makes it easy for the civic administration to plan and achieve sustainable development of the area within the city, as well as around it.

Threats

- Mushrooming commercial establishments pose a threat to the heritage value of the city.
- JNNSURM development works are delayed unnecessarily, which may result in industries shying away from investment.
- Political instability that has been observed during the last five years in the state of Karnataka may prove to be a bane, and may cause industries to hold back investing in Mysore.

The SWOT analysis presented above highlights the key factors that are going to determine the future of Mysore city, since there is an ineluctable interrelationship among these factors. Section 3 of this paper, attempts to answer the research question R1 by emphasizing the parameters, which are absolutely essential to transform a city into a knowledge city. The section also presents the parameters that are emphasized in the study by Ovalle et. al. (2004) and those that are highlighted by the world capital institute as being the “capitals” or assets that a city’s development has to be based on, in order for it to be considered as a knowledge city (The Most Admired Knowledge City: Report, 2009).

With the essential parameters identified, this section now proceeds to answer research question R2, which involves rating Mysore City based on the parameters identified by the KCI framework. This rating exercise was performed by the volunteers involved in this project by inspecting the data collected as part of this study. Mysore’s performance in each indicator was rated, on a scale of 1 to 10, with 1 representing “inferior performance” and 10 representing “superior performance”, based on the thorough examination of present state of development activities in the city, development plans proposed by the civic administration, and the facts presented in this paper. An average of the score obtained was determined and this is called the knowledge city index (KCI) for Mysore City. Mysore city’s score for each of the parameters of the KCI framework are as given below:

1. Education: 7
2. Innovation and research: 5
3. Network infrastructure: 7
4. Culture, heritage and traditions: 8
5. Tourism: 9
6. Business and commerce: 7
7. Civic administration & civic infrastructure: 5

KCI for Mysore City: 6.857

With a knowledge city index of 6.857, it can be said that Mysore has the essential ingredients of a knowledge city and needs focused development in specific areas to achieve this objective.
Even though indicators of the KCI framework map on to the capitals of the MAKCi framework, many intricate aspects have not been considered in this study. The “knowledge” aspect of a knowledge city/region is reflected by some but not all indicators presented in the KCI framework, however, with this evolutionary KCI framework being in its nascency, this study has accorded equal importance to each indicator. This forms a major limitation of this study. Another limitation is that the rating exercise was carried out only by the volunteers of this study, and collective public/expert opinions did not form a part of this exercise.

6 Concluding remarks

By designing the framework using broader indicators, this study has been able to partially answer the research question R1, which obviates the need for evolutionary refinement to arrive at a comprehensive model.

The KCI score for Mysore deduced while addressing the research question R2 leads one to infer that Mysore has the essential ingredients of a knowledge city, however, it can also be observed that the score is mainly boosted by the city’s exceptional performance in culture and tourism. What has to be understood is the fact that despite the presence of numerous research institutions in Mysore, the amount of knowledge created, which is a vital parameter of a knowledge city, is far from being considered significant. The encouraging factor, though, is the consistent development of its business and commerce sector, which is reflected by the growing number of new industries and software exports.

A casual examination of Mysore with respect to the MAKCi framework reveals that the city is in moderate conformance with the parameters of the framework. The MAKCi framework, which was used to analyse mostly cities from the developed countries, can’t be directly employed to analyse Mysore city in its current state since it lags behind in terms of basic infrastructure. Therefore, the way ahead for the city administration is to focus on strengthening the physical infrastructure, keeping in mind the larger goal of attaining the status of a knowledge city.

The future course of action should also include the administration introducing a city level Information Communication Technology (ICT) policy, which emphasizes digital literacy of citizens thereby enhancing their level of information access. A better informed citizenry is the first step towards creating a fleet of knowledge workers, who would become the building blocks of a knowledge city.

The future work of the project that this study is a part of, includes arriving at highly granular indicators, by identifying a near-exhaustive set of parameters that contribute to a more precise definition of these indicators. The way ahead for this project also rests on the active participation of Mysore city administration in involving the citizens as the city’s stakeholders, and devising a comprehensive development plan to position Mysore as a knowledge city.

In conclusion, it can be said that though culture and traditions are inherited, the other pillars of a knowledge city have to be established and sustained. So, the onus now, is on the civic administration to plan for the overall development of the city and implement such plans appropriately. It has to be understood that the transition of Mysore into a knowledge city is best possible on the foundation of its culture and tradition, and not at their cost.
Acknowledgements

We wish to thank Prof. Shalini R. Urs, the Executive Director of International School of Information Management, University of Mysore, and Prof. Waltraut Ritter, Knowledge Dialogues and University of Hong Kong, Hong Kong, for being the source of inspiration for this project, and for their timely support and guidance. We also wish to thank the Mysore Chamber of Commerce and Industries (MCCI), District Industries Centre, Mysore, Director of the Tourism Department, Mysore, Deputy Director of Public Instruction (DDPI), Mysore, and various schools and colleges in Mysore city for their magnanimity in providing us with the required information during the course of this project.

Tables and Figures

<table>
<thead>
<tr>
<th>Table 3.1. Major categories presented in the MAKCi framework</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Identity capital</td>
</tr>
<tr>
<td>Intelligence capital</td>
</tr>
<tr>
<td>Relational capital</td>
</tr>
<tr>
<td>Financial capital</td>
</tr>
<tr>
<td>Human Individual capital</td>
</tr>
<tr>
<td>Human Collective capital</td>
</tr>
<tr>
<td>Instrumental-material capital</td>
</tr>
<tr>
<td>Instrumental-knowledge capital</td>
</tr>
</tbody>
</table>

(The Most Admired Knowledge City: Report, 2009)
<table>
<thead>
<tr>
<th>Research Institute</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oriental Research Institute</strong>&lt;br&gt;(Manuscript Resource Centres, n.d.)</td>
<td>• Established in 1891 as the <em>Oriental Library</em> by Maharaja Chamaraja Wodeyar&lt;br&gt;• It has a rare collection of 35,000 palm leaf bundles and paper manuscripts, which are considered equivalent to 75,000-80,000 Sanskrit works.&lt;br&gt;• Kautilya’s <em>Arthashastra</em>, written in 4th Century B.C, was discovered, edited and published in this institute and <em>Sritattvanidi</em>, a nine volume encyclopaedia in Sanskrit compiled by Maharaja Krishnaraja Wodeyar III, is among its prized possessions.&lt;br&gt;• A <em>National Centre for History of Science</em> has been set up in the Oriental Research Institute with a grant from the University Grants Commission (UGC).</td>
</tr>
<tr>
<td><strong>Central Food Technological Research Institute (CFTRI)</strong>&lt;br&gt;(About CFTRI, n.d.)</td>
<td>• One of the largest and most diversified food technology laboratories in the world.&lt;br&gt;• Edible products produced here are patented.&lt;br&gt;• Patents: 1006 (nearly 100 patents every year)</td>
</tr>
<tr>
<td><strong>Defence Food Research Laboratory (DFRL)</strong>&lt;br&gt;(Defence Food Research Laboratory, n.d.)</td>
<td>• Set up by Defence Research &amp; Development Organization (DRDO) of Government of India&lt;br&gt;• Conducts R&amp;D in the area of Food Science &amp; Technology, to cater to the varied food challenges for the Indian Armed Forces.&lt;br&gt;• Patents: 12 granted and 70 filed</td>
</tr>
<tr>
<td><strong>Anthropological Survey of India (ASI)</strong>&lt;br&gt;(“Visit to the ASI,” 2007)</td>
<td>• ASI’s Mysore office is the Southern Regional Office and was founded in 1960.&lt;br&gt;• Focuses on the various communities in India from a biological and cultural point of view.</td>
</tr>
<tr>
<td><strong>Central Institute of Indian Languages (CIIL)</strong>&lt;br&gt;(About Us, n.d.)</td>
<td>• Established to coordinate the development of Indian Languages.&lt;br&gt;• It promotes inter-disciplinary research, contributes to the mutual enrichment of languages, and thus, contributes to the emotional integration of the people of India.</td>
</tr>
<tr>
<td><strong>All India Institute of Speech and Hearing (AIISH)</strong>&lt;br&gt;(All India Institute of Speech and Hearing, 2010)</td>
<td>• Imparts professional training, renders clinical services, conducts research and educates the public on issues related to communication disorders such as hearing impairment, mental retardation, voice, fluency and phonological, and language disorders.&lt;br&gt;• AIISH has been recognized as:&lt;br&gt;  ❖ Centre of Excellence in the area of deafness by World Health Organization (WHO)&lt;br&gt;  ❖ Centre for Advance Research by the University Grants Commission (UGC)&lt;br&gt;  ❖ Science and Technology Institute by the Department of Science and Technology (DST), Government of India&lt;br&gt;  ❖ It has also been recognized as the Nodal Centre for the implementation of National Programme for Prevention and Control of Deafness by the Ministry of Health and Family Welfare, Government of India.</td>
</tr>
<tr>
<td><strong>Regional Institute of Education (RIE)</strong></td>
<td>• Established in 1963 by the National Council of...</td>
</tr>
<tr>
<td>Research Institute</td>
<td>Highlights</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Research Institute (<a href="http://www.riemysore.ac.in/">http://www.riemysore.ac.in/</a>)</td>
<td>Education, Research and Training (NCERT). Offers innovative pre-service and in-service teacher training programmes, and the relevant R&amp;D activities, for improving school education.</td>
</tr>
<tr>
<td>Central Sericulture Research &amp; Training Institute (CSRTI)</td>
<td>One of the leading research institutes in the domain of sericulture. Conducts scientific, technical and social research in the field of silk production. Patents: 1 international and 34 national patents.</td>
</tr>
<tr>
<td>Rare Materials Project (RMP)</td>
<td>This is a project by the Department of Atomic Energy of the Government of India and the Baba Atomic Research Centre (BARC), for researching in the area of atomic and nuclear fuels. The exact details of research at RMP are deemed classified.</td>
</tr>
<tr>
<td>Mysore Paints and Varnish Limited (MPVL)</td>
<td>Established in 1937, and was converted into a public sector undertaking in 1947. MPVL specializes in the manufacture and supply of indelible ink (voter’s ink) that is used in elections – used by Election Commission of India for all Indian elections (since 1962), and other countries like South Africa, Nepal, Turkey, Cambodia, Nigeria, Ghana. Patents: Indelible ink</td>
</tr>
</tbody>
</table>

**Table 4.2** Geographical Indications of Mysore

<table>
<thead>
<tr>
<th>No.</th>
<th>Geographical Indications</th>
<th>Goods / Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mysore Silk</td>
<td>Handicraft</td>
</tr>
<tr>
<td>2</td>
<td>Mysore Agarbathi</td>
<td>Manufacture</td>
</tr>
<tr>
<td>3</td>
<td>Mysore Rosewood Inlay</td>
<td>Handicraft</td>
</tr>
<tr>
<td>4</td>
<td>Mysore Sandalwood Oil</td>
<td>Manufacture</td>
</tr>
<tr>
<td>5</td>
<td>Mysore Sandal Soap</td>
<td>Manufacture</td>
</tr>
<tr>
<td>6</td>
<td>Mysore Traditional Paintings</td>
<td>Handicraft</td>
</tr>
<tr>
<td>7</td>
<td>Mysore Betel Leaf</td>
<td>Agriculture</td>
</tr>
<tr>
<td>8</td>
<td>Mysore Jasmine</td>
<td>Agriculture</td>
</tr>
<tr>
<td>9</td>
<td>Ganjifa Cards of Mysore</td>
<td>Handicraft</td>
</tr>
</tbody>
</table>

(Geographical Indications of Goods, 2008)

**Table 4.3** List of topics that were chosen, the searched phrase, total number of search results returned, the number of relevant search results per the first 20 results

<table>
<thead>
<tr>
<th>Topic</th>
<th>Search Phrase</th>
<th>Total number of results</th>
<th>Number of relevant search results per first 20 results</th>
<th>Percentage of relevant search results per first 20 results (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Mills</td>
<td>“Mysore” AND “Paper Mills”</td>
<td>248000</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>University of Mysore</td>
<td>“University of Mysore”</td>
<td>190000</td>
<td>17</td>
<td>85</td>
</tr>
</tbody>
</table>

243
<table>
<thead>
<tr>
<th>Topic</th>
<th>Search Phrase</th>
<th>Total number of results</th>
<th>Number of relevant search results per first 20 results</th>
<th>Percentage of relevant search results per first 20 results (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dasara</td>
<td>“Mysore” AND “Dasara”</td>
<td>130000</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Sandalwood</td>
<td>“Mysore” AND “Sandalwood”</td>
<td>124000</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>Palace</td>
<td>“Mysore” AND “Palace”</td>
<td>60400</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>LT</td>
<td>“Mysore” AND “LT”</td>
<td>55600</td>
<td>5</td>
<td>25</td>
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<tr>
<td>Hotels</td>
<td>“Mysore” AND “Hotels”</td>
<td>43600</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Airport</td>
<td>“Mysore” AND “Airport”</td>
<td>40800</td>
<td>18</td>
<td>90</td>
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<tr>
<td>Yoga</td>
<td>“Mysore” AND “Yoga”</td>
<td>29700</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Silks</td>
<td>“Mysore” AND “Silks”</td>
<td>25600</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>Natural Beauty of Mysore</td>
<td>“Natural Beauty”, “Mysore”</td>
<td>24700</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>Tourism</td>
<td>“Mysore” AND “Tourism”</td>
<td>23300</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Music</td>
<td>“Mysore” AND “Music”</td>
<td>17600</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>World Records in Mysore</td>
<td>“World Records”, “Mysore”</td>
<td>11100</td>
<td>10</td>
<td>50</td>
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<tr>
<td>Infosys</td>
<td>“Mysore” AND “Infosys”</td>
<td>8450</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>History</td>
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<td>6050</td>
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<td>85</td>
</tr>
<tr>
<td>theatre</td>
<td>“Mysore” AND “Theatre”</td>
<td>5820</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>Internet</td>
<td>“Mysore” AND “Internet”</td>
<td>5300</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>Art</td>
<td>“Mysore” AND “Art”</td>
<td>4750</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Business &amp; Economy</td>
<td>“Mysore” AND “Business &amp; Economy”</td>
<td>4200</td>
<td>16</td>
<td>80</td>
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<tr>
<td>Heritage</td>
<td>“Mysore” AND “Heritage”</td>
<td>3780</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>WiFi</td>
<td>“Mysore” AND “WiFi”</td>
<td>3530</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>Hospitals</td>
<td>“Mysore” AND “Hospitals”</td>
<td>2270</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Temples</td>
<td>“Mysore” AND “Temples”</td>
<td>2050</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Population</td>
<td>“Mysore” AND “Population”</td>
<td>1970</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Railways</td>
<td>“Mysore” AND “Railways”</td>
<td>875</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Wildlife</td>
<td>“Mysore” AND “Wildlife”</td>
<td>643</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Education Institutions</td>
<td>“Mysore” AND “Education Institutions”</td>
<td>632</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>Chinese Products in Mysore</td>
<td>“Chinese Products”, “Mysore”</td>
<td>588</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Architecture</td>
<td>“Mysore” AND “Architecture”</td>
<td>371</td>
<td>16</td>
<td>80</td>
</tr>
<tr>
<td>Topic</td>
<td>Search Phrase</td>
<td>Total number of results</td>
<td>Number of relevant search results per first 20 results</td>
<td>Percentage of relevant search results per first 20 results (%)</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------</td>
<td>-------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>Transportation</td>
<td>“Mysore” AND “Transportation”</td>
<td>331</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Cinema Halls</td>
<td>“Mysore” AND “Cinema Halls”</td>
<td>318</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>Literature</td>
<td>“Mysore” AND “Literature”</td>
<td>126</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Libraries</td>
<td>“Mysore” AND “Libraries”</td>
<td>126</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Drama</td>
<td>“Mysore” AND “Drama”</td>
<td>79</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>International Students in Mysore</td>
<td>“International Students in Mysore”</td>
<td>9</td>
<td>9</td>
<td>100*</td>
</tr>
</tbody>
</table>

(* The total number of results obtained and the number of relevant results for this topic are both 9, hence, percentage is counted as 100)

**Table 4.4** Results of the “Loyalty towards Mysore” survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Mysorean</th>
<th>Non-Mysorean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where are you from?</td>
<td>From Mysore: 30 (49%)</td>
<td>From other places: 31 (51%)</td>
</tr>
<tr>
<td>Do you like Mysore?</td>
<td>Like: 27</td>
<td>Like: 26</td>
</tr>
<tr>
<td></td>
<td>Dislike: 3</td>
<td>Dislike: 5</td>
</tr>
<tr>
<td>If given a choice between Mysore and any other city in India, where would you rather settle down?</td>
<td>Mysore: 26</td>
<td>Mysore: 6</td>
</tr>
<tr>
<td></td>
<td>Any other city: 4</td>
<td>Any other city: 25</td>
</tr>
</tbody>
</table>

**Table 4.5** Event categories identified for the “newspaper events” exercise

<table>
<thead>
<tr>
<th>Event category</th>
<th>Constituent Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic events</td>
<td>Workshops, seminars, training programs, Medical CME programmes*</td>
</tr>
<tr>
<td>Conferences</td>
<td>General public gathering, conferences on cultural themes, convocations</td>
</tr>
<tr>
<td>Art &amp; Cultural events</td>
<td>Events related to music, dance, festivals, yoga, drama, religious discourses, books/CD releases, exhibitions</td>
</tr>
<tr>
<td>Sports events</td>
<td>Any sport events being held in Mysore city, covered by the newspaper</td>
</tr>
<tr>
<td>Health related events</td>
<td>Health camps, blood donation camps</td>
</tr>
</tbody>
</table>

*Note that even though Medical CME programs are on Health themes, they were categorised into Academic events, since they aim at teaching the audience about the particular subject.
Table 4.6  Common parameters of Bangalore, Mysore and Pune that are available in the public domain

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slum percentage</td>
<td>Percentage of slums in the area of the city (Mysore, 2010)</td>
</tr>
<tr>
<td>Registered Geographical Indications (G.I)</td>
<td>The number of geographical indications of the city, which are registered with the Geographical Indications Registry at the Intellectual Property Office of the Government of India (Geographical Indications of Goods, (2008))</td>
</tr>
<tr>
<td>Literacy rate (percentage)</td>
<td>Percentage of population of the city that is literate, according to census data from 2001 (Mysore, 2010; Bangalore, 2010; Pune, 2010)</td>
</tr>
<tr>
<td>Pollution levels</td>
<td>Carbon-di-oxide (CO₂) emissions in the city, measured in tonnes per capita per year. (12 Indian Cities: Transport Indicators, 2009)</td>
</tr>
<tr>
<td>Offshore City Competitiveness (OCC) Index</td>
<td>A measure of how attractive the city is to ITO and BPO industry (India: Comparison of Locations, 2004)</td>
</tr>
<tr>
<td>Liveability Index 2010</td>
<td>A measure of the quality of life offered by Indian cities (Confederation of Indian Industries, 2010)</td>
</tr>
</tbody>
</table>

Table 4.7  Strategy to assign each city with a score (S1), to enable comparison

<table>
<thead>
<tr>
<th>Percentage range</th>
<th>Score (S1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 — 91</td>
<td>10</td>
</tr>
<tr>
<td>90 — 81</td>
<td>9</td>
</tr>
<tr>
<td>80 — 71</td>
<td>8</td>
</tr>
<tr>
<td>70 — 61</td>
<td>7</td>
</tr>
<tr>
<td>60 — 51</td>
<td>6</td>
</tr>
<tr>
<td>50 — 41</td>
<td>5</td>
</tr>
<tr>
<td>≥ 40</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4.8  City’s performance in terms of identified common parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mysore Score (S1)</th>
<th>Bangalore Score (S1)</th>
<th>Pune Score (S1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slums (%)</td>
<td>8.95   8</td>
<td>10 8 38.9 2</td>
<td></td>
</tr>
<tr>
<td>Registered G.I</td>
<td>9      10</td>
<td>0 2 1 2</td>
<td></td>
</tr>
<tr>
<td>Literacy Rate (%)</td>
<td>82.8   10</td>
<td>83 10 81.5 10</td>
<td></td>
</tr>
<tr>
<td>Pollution level</td>
<td>0.01   10</td>
<td>0.11 2 0.06 5</td>
<td></td>
</tr>
<tr>
<td>OCC Index 2004</td>
<td>10     2</td>
<td>2 8 3 7</td>
<td></td>
</tr>
<tr>
<td>Liveability Index 2010</td>
<td>17     2</td>
<td>4 8 8 6</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.1 Search relevance for the first 20 results for each chosen topic

Figure 4.2 Number of new small scale industries registered in Mysore, between 1991-92 and 2009-10.
Figure 4.3 Graph illustrating performance of each city in terms of identified common parameters

References


Details of Medium and Large Scale Industries. (2009). District Industries Centre, Mysore.


Knowledge citizens’ competences: how citizens can improve their cities’ evaluation as knowledge cities

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Structured Abstract

Purpose
The objective is to determine a taxonomy of knowledge citizen’s competences and the way that they can be evaluated and developed. The competences should establish a direct relation between the citizens’ actions and the city’s value elements that are affected, according to the MAKCi framework.

Design/methodology/approach
A review of taxonomies, the MAKCi framework and proposals of citizen’s action and their effects was done. The review of taxonomies was done to find similar exercises. The MAKCi framework was reviewed to notice the indicators of each capital. The review of proposals of citizen’s actions helped to answer how citizens can improve their cities’ evaluation as knowledge cities. The information...
allowed designing the taxonomy of citizen’s competences and a proposal to evaluate and develop them.

**Originality/value** – The competences proposed in this paper, are different from others, because they are designed from the study of authors specialized in other areas distinct from knowledge management. Those authors have concluded, from their specific area of study, citizens’ actions and behaviours that can solve problems studied by the knowledge-based development and evaluated by the MAKCi framework.

**Practical implications** – The results propose citizen’s actions that can improve the value elements of a city. The tool designed explains how to evaluate and develop the competences in order to repeat successful actions. This research can be used to design citizens’ programs, by group or individual, so that a city can improve its human capital to leverage the rest of its value elements.

**Keywords** – citizens, MAKCi, competences, cities

**Paper type** – Practical Paper

1 Introduction

Ergazakis et al. (2006) explain that although knowledge has been the critical source of progress since the origins of the human kind on earth, what is new and rapidly evolving nowadays, is the explicit and purposeful management of knowledge as a strategic resource. The necessities of a sustainable development, and the creation of value in all the areas of a city, have been the principal reasons to look at the concepts of knowledge, and knowledge-based development, as factors of balance and sustainable high quality of living. For Chatzkel (2004) the knowledge factor differentiates a region. He suggests that physical and financial resources still are important, but knowledge and actionable knowledge specifically, is the most powerful factor of production.

The Knowledge Cities official website (“Knowledge Cities”, 2010) suggests that a Knowledge City (KC) is one that searches for the creation of value in all its areas. That means that the economic benefit or the increase in production is not the principal goal of this kind of city but the appreciation and capitalization of the total value produced by human activity. Carrillo (2010) suggests that the total value produced by human activity includes forms of knowledge capital such as those related to education, technology and innovation as well as identity, intelligence, cohesion, attractiveness, and so on.

As long as a knowledge city search for the capitalization of the total value produced by human activity, a knowledge city is as value as its human capital. Goldberg et al. (2006) suggests the importance of citizens in knowledge cities. Propose that they are the key to call a city as knowledge city. Particularly, express that citizens can learn by themselves but it is not useful for a city if there is not communication and feedback of the knowledge between the citizens.

This research tries to identify the citizen’s competences that allow a citizen leverages the knowledge value of his/her city. The MAKCi framework will be used to explain how the citizens can affect the city’s total value. This framework was chosen because it is widely known and the entire city’s value elements can be classified into it.

2 Methodology

This research was developed in three stages. In the first stage, a review of taxonomies was done. The review allowed identifying different kinds of taxonomies and the way they are implemented.
Once the review of taxonomies was concluded, the MAKCi framework was studied. The goal of the analysis of this framework was to choose indicators that demonstrated a direct relation between the citizens’ actions and the increase or decrease of those indicators. After that the MAKCi’s indicators were chosen, problems produced by a low performance in those indicators were arisen. To solve those problems a review was done to find authors of different areas that had proposed citizen’s actions that allow solving the problems arisen previously.

In the second stage, by using functional analysis, the taxonomy of 30 citizen competences was developed. This taxonomy’s design was based on the theory found in the first stage and focused on promoting active participation of each citizen. The organization of competences is according to the capital they are leveraging, the area inside the capital, the competences in each area and the indicators that will demonstrate that the citizen has developed those competences.

In the third stage the principal goal was to find the best way to evaluate and develop the competences. This was achieved by comparing mechanisms to implement the taxonomies reviewed in stage 1. Figure 1 describes the method.

### 3 Development

#### 3.1 Taxonomies’ Review

Taxonomy is a classification system. The objective of taxonomy is to group objects based on a similar characteristic (structure, colour, behaviour, etc.). The taxonomies found in the taxonomies’ review are described briefly in the next sections.

<table>
<thead>
<tr>
<th>Table 1. Becta</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong> Becta</td>
</tr>
<tr>
<td><strong>Reference:</strong> <a href="http://about.becta.org.uk/">http://about.becta.org.uk/</a> (&quot;Becta&quot;, 2010)</td>
</tr>
<tr>
<td><strong>Purpose:</strong> Becta leads the national drive to inspire and lead the effective and innovative use of technology throughout learning.</td>
</tr>
<tr>
<td><strong>Target:</strong> Teachers and students.</td>
</tr>
<tr>
<td><strong>Instrument:</strong> It uses Information and Communication Technology, basically web tools.</td>
</tr>
</tbody>
</table>
Table 2. Citizen’s briefcase

<table>
<thead>
<tr>
<th>Name: Citizen’s briefcase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: It is a site that allows a citizen to know the essential civic competences and their strengths and weaknesses like a citizen, and suggests a guideline to increase the knowledge, skills, attitudes and civil values.</td>
</tr>
<tr>
<td>Target: Citizens</td>
</tr>
<tr>
<td>Instrument: A dynamic web site in a permanent construction.</td>
</tr>
</tbody>
</table>

Table 3. Glow

<table>
<thead>
<tr>
<th>Name: Glow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: To enhance the quality of learning and teaching in the classroom by fully supporting the delivery of curriculum for excellence. The purpose of curriculum for excellence is encapsulated in the four capacities – to enable each child or young person to be a successful learner, a confident individual, a responsible citizen and an effective contributor.</td>
</tr>
<tr>
<td>Target: Teachers, students, parents, school managers, school administrators and local authorities.</td>
</tr>
<tr>
<td>Instrument: A nacional directory, forums, video, audio, mail, messenger and chat.</td>
</tr>
</tbody>
</table>

Table 4. Instructor Competences Assessment Instrument

<table>
<thead>
<tr>
<th>Name: Instructor Competences Assessment Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: It is designed to help programs to verify and validate competences with their staff and use the information for program improvement and professional development planning.</td>
</tr>
<tr>
<td>Target: Adult educators.</td>
</tr>
<tr>
<td>Instrumentación: Interviews, Questionnaires, Observations, Portfolios, Journals and Lesson Plans</td>
</tr>
</tbody>
</table>

Table 5. Management Competencies Assessment Instrument

<table>
<thead>
<tr>
<th>Name: Management Competencies Assessment Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: To identify and increase the competences that all managers should poses to be effective in his professional development.</td>
</tr>
<tr>
<td>Target: Managers</td>
</tr>
<tr>
<td>Instrument: Performance evaluations, administrative reports and administrative portfolios.</td>
</tr>
</tbody>
</table>

Table 6. Personal Competence Manager

<table>
<thead>
<tr>
<th>Name: TEN Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: Support individuals, groups and organizations in Europe in the life-long development of their abilities by developing and promoting the most suitable technical and organizational infrastructure, making use of open-source, standards-based sustainable and innovative technologies.</td>
</tr>
<tr>
<td>Target: Individuals, groups and organizations.</td>
</tr>
<tr>
<td>Instrument: The PCM (Personal Competence Manager) is a website where the user has access to tools to organize the participation and creation of programs to the development of competences, in the context of social networks focuses on that objective.</td>
</tr>
</tbody>
</table>
Table 7. The National Education Network

<table>
<thead>
<tr>
<th>Name: The National Education Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose: The National Educational Network is a dedicated, educationally focused resource for teaching and learning without constraints of time or location. Harnessing our unique expertise, we enable a safe, secure, collaborative and creative learning experience for pupils, teachers and parents. It harnesses the power of broadband technology to deliver unique content and services, enabling users to share learning resources at every level, to deliver a personalized learning experience.</td>
</tr>
<tr>
<td>Target: Students, teachers and parents.</td>
</tr>
<tr>
<td>Instrument: Web site with didactic resources like games, animations and videos.</td>
</tr>
</tbody>
</table>

3.2 **MAKCi Framework**

Garcia (2008) explain that the MAKCi Framework is basically a knowledge-economy model which involves an assessment of the value base on which the future development of a city is made possible through a recombination or trading of actually existing capitals, both traditional and knowledge-based. García (op. cit.) continues explaining that the MAKCi Framework includes eight knowledge capital dimensions to stand as indicators for the whole exercise as the visible drivers of collective capital creation in knowledge-based development city-regions:

1. Identity capital;
2. Intelligence capital;
3. Financial capital;
4. Relational capital;
5. Human individual capital;
6. Human collective capital;
7. Instrumental-material capital; and
8. Instrumental-knowledge capital.

Each of the city’s value elements can be classified in one of those categories. The specifications and goals of each capital are explained in section 3.3, in order to be easier to understand the relevance of the competences proposed to leverage each capital.

3.3 **Proposals and taxonomy**

The taxonomy suggested should be read through four levels. The first level called ‘capital’ is the MAKCi framework’s capital to be leveraged. The second level called ‘area’ indicates the aspect to be competent. The third level is the ‘competence’ to develop and the fourth level points out the indicators that will demonstrate that the citizen has developed those competences. (see Fig. 2) The logic for the functional analysis is the one proposed by the MINEDUC-DIVESUP (2003).
According to García (2007) the “Identity [is] the capability to create and evolve a distinctive and well-positioned urban personality”. The city’s reputation represents how well-positioned urban personality is, so, if the reputation is improved, the identity will increase.

One way to improve the city’s reputation is to organize festivals and events. Bu (2009), notices that sports events are tools for elevating the image and appeal of a city, especially of a region. This author exemplifies that with the cases of Barcelona, Rotterdam, Turin and China. Sport events are not the only events important to increase the city’s promotion. Kavaratzis & Ashworth (2007) explain that cultural events and festivals play a very important role in marketing because they are “big moments of visibility”, where the city can attract significant international attention at one time. Another form to leverage the Identity is to maintain the city’s traditions. Palmie (2009) suggests that culinary objects, has the power to explain significant aspects of the collective identities of their original creators and consumers.

According to those authors, if a particular citizen wants to improve the city’s identity, one step is to develop competences in two areas: “Active participation in festivals and events” and "Culinary tradition".
Table 8. Identity

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td>Active participation in festivals and events</td>
<td>Values the regional’s festivals and events</td>
<td>The citizen proves that identifies the regional’s most important events</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen specifies all the implications for the city of the regional festivals and events</td>
</tr>
<tr>
<td>Culinary tradition</td>
<td>Knows the importance of the city’s culinary traditions</td>
<td></td>
<td>The citizen identifies the benefits of maintaining city’s culinary traditions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learns and promotes the city’s culinary traditions</td>
<td>The citizen can prepare the city’s culinary traditions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen has recommended or have being part of the staff in a regional festival or event</td>
</tr>
</tbody>
</table>

3.3.2 Intelligence

According to García (2007) the “Intelligence [is the] capability to identify/ foresee and adequately respond to significant agents and events”. In order that a city can identify/ foresee an opportunity or a threat, should be able to read the context, the environment and understand clearly the consequences of its acts. For that reason the citizens should have precise information from reliable sources to be able to generate an opinion by themselves and create a strong public opinion. Citizens can achieve that if they practice the ‘lifelong learning’, and develop competences to leverage the city’s intelligence.

Longworth (1996) explains that the “Lifelong learning is the development of human potential through a continuously supportive process which stimulates and empowers individuals to acquire all the knowledge, values, skills and understanding they will require throughout their lifetimes with confidence, creativity and enjoyment in all roles, circumstances and environments”.

Working in develop the lifelong learning in each citizen will increase the intelligence of the complete city. To develop the individual competences to generate a strong and focused individual opinion will help increase a strong and focused public opinion as well.
<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence</td>
<td>Lifelong learning</td>
<td>Information self-management</td>
<td>The citizen identifies the most important sources of information for him context.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen clearly identifies the advantage of current information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continuously acquisition of new</td>
<td>The citizen identifies the opportunities of personal growth produced by the acquisitions of new competences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>competences.</td>
<td>The citizen identifies new competences applicable to his/her context and environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen is able to plan a complete program to acquire new competences and to prove the self-control to implement it.</td>
</tr>
<tr>
<td></td>
<td>Professional and</td>
<td>The citizen proves the continuous</td>
<td>The citizen proves the continuous interaction with colleagues.</td>
</tr>
<tr>
<td></td>
<td>social contexts</td>
<td>interaction with colleagues.</td>
<td>The citizen proves that he/she verifies continuously the most relevant source of information for his professional context.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she identifies the social implications of the most important political notices in the week.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she verifies continuously the most relevant source of information for his social context.</td>
</tr>
<tr>
<td></td>
<td>Application of</td>
<td>The citizen proves that he/she</td>
<td>The citizen proves that he/she has participated in projects of different professional areas.</td>
</tr>
<tr>
<td></td>
<td>knowledge in</td>
<td>has participated in projects of</td>
<td>The citizen proves that he/she has participated in projects of different social areas.</td>
</tr>
<tr>
<td></td>
<td>different context</td>
<td>different professional areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3.3 *Financial*

According to García (2007) the Financial Capital [is the] “capability to generate and sustain a healthy monetary base”. The easiest way a citizen can leverage the financial capital is taking care of his individual health. Frenk (1994) points out that “the health plays a very important role in dismissing poverty, because healthier individuals are more productive, and a productive individual reflects in better wages; at the same time a healthy individual can compete in equal conditions to others. So, health puts the individual in equity of circumstances, and that improves their wages, but also the economic growth”.

Another point to attack is the social inequity encouraged basically by the discrimination and the social sectors; Kilksberg (2006) explain that "A wide number of researches indicate that the inequity acts like a powerful break of the development” and explains some consequences in the national and international levels. A citizen can increase the financial capital of the city in two ways. First, he/she can take care about the attention and proliferation of the ‘public space’. Second, he/she can take care about the ‘tolerance to diversity’.

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Health care</td>
<td>Health and Quality of living</td>
<td>The citizen points out why and how his purchasing power increases when his health improves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen points out why and how eating habits, sports habits and hygiene habits increase his health.</td>
</tr>
<tr>
<td>Indexes of health</td>
<td></td>
<td></td>
<td>The citizen identifies what is and purpose of the body mass index (BMI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen identifies what is and purpose of the waist-hip ratio (WHR)</td>
</tr>
<tr>
<td>Utilization of the Index of health</td>
<td>Hygiene habits</td>
<td>The citizen identifies the oral hygiene habits</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen identifies the body hygiene habits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Active participation in health care</td>
<td>The citizen applies his knowledge about hygiene habits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she exercises in a daily routine</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen maintains a balanced alimentation</td>
</tr>
<tr>
<td>Capital</td>
<td>Area</td>
<td>Competence</td>
<td>Indicator</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Attention and proliferation of the public space</td>
<td>Understanding the public space</td>
<td>The citizen identifies the difference between public space and private space from a social perspective and not by a legal perspective</td>
<td>The citizen proves that he/she understands the concept ‘Collective Act’.</td>
</tr>
<tr>
<td>Development of public space</td>
<td>The citizen identifies the social advantage of promoting and development of the public space</td>
<td>The citizen identifies the individual advantage of promoting and development of public space</td>
<td></td>
</tr>
<tr>
<td>Promotion of public space</td>
<td>The citizen proves that he/she participates in the collective acts no matter if they are cultural or commercial</td>
<td>The citizen proves that he/she utilizes alternative transport other than the automobile</td>
<td>The citizen proves that he/she acquires products / services in alternative places other than the malls</td>
</tr>
<tr>
<td>Tolerance of diversity</td>
<td>Religious diversity</td>
<td>The citizen proves that in similar conditions, treats equally people of different religions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Racial diversity</td>
<td>The citizen proves that in similar conditions, treats equally people of different races</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sexual diversity</td>
<td>The citizen proves that in similar conditions, treats equally people of different sexual preferences</td>
<td></td>
</tr>
</tbody>
</table>

### 3.3.4 Relational

Garcia (2007) explains that the capital “relational [is] the capability to develop quality interactions with all significant internal and external agents”. One form to increase this capital could be the promotion of tolerance. Shatz (2004) considers that tolerance is the base for the security in a social environment as well as an important concept for democratic life. Amartya Sen (2000) exhibits that the “the social and economic inequity based on gender, can injure the global performance in a lot and different areas, affecting demographic, medical, economic and social variables”.

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According to these authors, this paper proposes that if a citizen takes care about increasing the ‘tolerance of diversity’, ‘social cohesion’ and ‘gender equity’ the capital relation will increase.

**Table 11.** Relational

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relational</td>
<td>Tolerance of diversity</td>
<td>Religious diversity</td>
<td>The citizen proves that, in similar conditions, treats equally persons with different religious beliefs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Racial diversity</td>
<td>The citizen proves that, in similar conditions, treats equally persons of different races</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sexual diversity</td>
<td>The citizen proves that, in similar conditions, treats equally persons with different sexual preferences</td>
</tr>
<tr>
<td></td>
<td>Social cohesion</td>
<td>Integration in the community</td>
<td>The citizen proves that he/she participates in the neighbourhood activities</td>
</tr>
<tr>
<td></td>
<td>Gender equity</td>
<td>Gender equity</td>
<td>The citizen proves that, in similar conditions, treats equally persons of different gender</td>
</tr>
</tbody>
</table>

3.3.5 *Human*Individual

The Human individual according to Garcia (2007) is the “capability to create conditions for the full biological and psychological development of residents”. Borja (1998) exposes that "in the public space the diversity is expressed, the interchange is produced and tolerance is learned. The quality, the propagation and the accessibility of public space will define, in a big part, the citizenship development”. Borja (op. cit) defines the public space as the social collective space, public and multifunctional, characterized by the accessibility and evaluated by the intensity and quality of the social relations that it promotes between groups, behaviours and cultures. This author, proposes that a “city that functions exclusively by private cars and with specialized and closed centres (administrative centres, shopping centres, etc) does not make easier the development of the citizens, promotes the division, and the individualism and exclusion”.

In that sense, the citizen’s competences that, at least, should be developing to increase the human individual capital are presented in table 12.
Table 12. Human Individual

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Individual</td>
<td>Attention and proliferation of the public space</td>
<td>Understanding the public space</td>
<td>The citizen identifies the difference between public space and private space from a social perspective and not by a legal perspective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she understands the concept ‘Collective Act’</td>
</tr>
<tr>
<td>Development of public space</td>
<td></td>
<td>The citizen identifies the social advantage of promoting and development of the public space</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The citizen identifies the individual advantage of promoting and development of public space</td>
<td></td>
</tr>
<tr>
<td>Promotion of public space</td>
<td></td>
<td>The citizen proves that he/she participates in the collective acts no matter if they are cultural or commercial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The citizen proves that he/she utilizes alternative transport other than the automobile</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The citizen proves that he/she acquires products / services in alternative places other than the malls</td>
<td></td>
</tr>
</tbody>
</table>

3.3.6 Human collective

Garcia (2007) defines the Human collective capital as the “capability to enhance the goal achievement potential of its constituent communities”. The first step to reach the city’s goals is to define them, so, there should be a social organization and citizen participation to planning, developing and improving each goal.

Velasquéz (2003) explains that citizen participation “improves the efficiency and effectiveness of the public management as long as it can conciliate intentions and construct consensus, by decreasing the environment barriers, and reaching results with the acceptance of the interested”. For that reason table 13 proposes the citizen participation to leverage the city’s human collective capital.
Table 13. Human collective

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human collective</td>
<td>Citizen participation</td>
<td>Uses of alternative media to express ideas</td>
<td>The citizen proves that he/she uses the web 2.0 to express ideas in social networks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she uses the web 2.0 to organize pacific mobilizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support to the community</td>
<td>The citizen proves that he/she continuously donates money</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she continuously donates time and effort to some social projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voting</td>
<td>The citizen proves that he/she has voted in the last three public elections</td>
</tr>
</tbody>
</table>

3.3.7 **Instrumental-material**

Garcia (2007) defines the Instrumental-material as the “capability to take advantage of location and to build and renew a world-class physical infrastructure”. According to that definition, take care about investment on sustainability will leverage the Instrumental-material capital. Mancl et al. (1999) proposes three areas of knowledge to improve the city’s sustainability:

1. The environmental literacy is the understanding of the interactions between natural systems and human social systems
2. Ecological energetics (Sun, water, wind).
3. Materials cycling that involve the understanding the accumulation of resources in the natural cycles.

In another sense, the corruption affects the government budget by decreasing the inversion in infrastructure and affects the perception of the external investors because of the lack of clear and strict laws. Mauro (1997) express that the “Corruption may also bring about loss of tax revenue when it takes the form of tax evasion or the improper use of discretionary tax exemptions. […] By affecting tax collection or the level of public expenditure, corruption may have adverse budgetary consequences. […] The allocation of public procurement contracts through a corrupt system may lead to inferior public infrastructure and services”.

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### Table 14. Instrumental-material

<table>
<thead>
<tr>
<th>Capital</th>
<th>Area</th>
<th>Competence</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumental-material</td>
<td>Transparency</td>
<td>Reproach the corruption</td>
<td>The citizen identifies corrupt situations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen knows the impact of corruption in the society activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transparent actions</td>
<td>The citizen proves that he/she has denounced corruption acts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she has not offered or accepted bribes no matter the situation</td>
</tr>
<tr>
<td>Ecological footprint</td>
<td>Environmental commitment</td>
<td></td>
<td>The citizen proves that he/she understands the ecological impact of his actions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she knows and uses ecological energetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she knows and practices the material cycling.</td>
</tr>
</tbody>
</table>

#### 3.3.8 Instrumental-intangible

Garcia (2007) specifies that the instrumental-intangible capital is the “capability to transfer knowledge and foster innovation in all major areas of city life”. Ducker (1985) explained that innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service.

Ducker (op. cit.) suggests that innovation depends on the entrepreneurship, but innovation is also about research, so the "scientific and technology education", "art and culture", and "entrepreneurship" will leverage the instrumental-intangible capital.

### Table 15. Instrumental-intangible

<table>
<thead>
<tr>
<th>Capital</th>
<th>Rubro</th>
<th>Competencia</th>
<th>Indicador</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumental intangible</td>
<td>Academic skills</td>
<td>Education and self-development</td>
<td>The citizen points out which characteristics and why they can be improved if he/she increases his/her educational level</td>
</tr>
<tr>
<td></td>
<td>Creative skills</td>
<td>Cultural practice</td>
<td>The citizen proves that he/she practices some art</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurship</td>
<td>Entrepreneur’s attitude</td>
<td>The citizen proves that he/she participates in initiatives (social, laboral) that improve his environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The citizen proves that he/she identifies opportunities or areas to improve in his environment (work, society, government, business) and promotes the improvement</td>
</tr>
</tbody>
</table>
3.4 Implementation’s requirements

The review of taxonomies allows us to notice that the instrument to evaluate and develop the competences were dynamic web sites, games, animations, videos, forums, audios, chats, interviews, reports, questionnaires, observation and others.

Almost all the tools can be used in a dynamic web site. Even more, using a web site allows availability for a wide number of users and a faster proliferation in searches and social networks. It also allows work by groups, individuals, public and private institutions.

For these reasons, using a website to design and implement the tool will be the best option. In order to be accessed by a mayor number of users this tool should be free of cost and easy to use and configure.

The web site should look like figure 3 and should have three sections: 1: Introduction, 2: Choice the area to improve and 3: Progress. In the introduction (see figure 3) there will appear a video explaining how the tool works, this video should be motivating and express why the development of competences is worth while.

![Figure 3. ‘Introduction’ screen](image)

In the second option (see figure 4), the user can choose the area to evaluate and develop, so it is not necessary to follow an order, the citizens can choose the areas most interesting for them. The answers are recorded by date in order to be able to present an analysis. The citizen only sees the areas and the competences to develop. The citizen sees the specific questions of the indicators and the cases, but not the indicators.
In the third section (see figure 5), the personal statistics and recommendations are shown. In this last section, a chat is enabling to exchange opinions with other citizens and experts.

4 Conclusions
The work of the authors and institutions reviewed, allowed designing 30 competences and a tool to evaluate and develop them. This research suggests that there are concrete
actions that citizen can do to improve their city’s value, and that each citizen can evaluate and develop the competences by himself.

The next step is to implement the tool in a case of study. The plan is to evaluate a group of teenagers between 13 and 18 years. The evaluations will be once per month. At the end of 6 months the results will be compared, as long as the environment that interacts with. The case of study is expected to prove that the citizens, once that they have developed the competences, promote positive changes in their environment.

References


The Most Admired Knowledge City Report. 2008 edition. The World Capital Institute & Teleos


The importance of the community supported university for the development of an emerging knowledge city: a Brazilian case

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Structured Abstract

Purpose – The present paper describes the case of the city of Caxias do Sul - southern Brazil - as an emerging knowledge city analyzed through two social agents: the University of Caxias do Sul and the United Association of Neighborhoods. The objective of the study is to analyze the elements that characterize Caxias do Sul, considering her communitarian social capital from the perspective of the capital system theory.

Design/methodology/approach – Initially, we present the most important concepts about knowledge cities, social capital and communitarianism. We defend the importance that the Community Supported University concept has in the enlargement of the social agency, proactivitity, and civic values. A Community Supported University is considered a non-profit organization; it is neither public nor private institution. The University of Caxias do Sul was created by a group of organization of the civil society, to whom the property belongs. But the most important aspect is that this kind of university has deep insertion in the regional community, interacting with their various segments through the deliberative superior council. Therefore, the results point out that Caxias do Sul can be considered as an emerging knowledge city by its capacity of social agency i.e. the proactivity of individuals and groups in social context to obtain collective benefits.

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Originality/value – This characteristic is more related to the identity, relational, and instrumental capitals, but we intend to prove that we found, in fact, a cross element in the capital systems original concept, that is the social capital.

Practical implications – Considering these findings, the study tries to suggest some contributions to both emerging cities and capital systems concepts.

Keywords – emerging knowledge cities, capital systems, social capital, community supported university, Brazil.

Paper type – Academic Research Paper

1 Introduction

This study describes and analysis the importance of the Community Supported University (CSU) - not to be confused with the community college concept in the USA - for the development of a potential emerging Knowledge City (KC) located in the southern region of Brazil. The city is Caxias do Sul. The main factor that identifies this region as a potential emerging Knowledge City is its intangible Community Social Capital formed by its Identity Capital, Relational Capital, and Structural Capital. If we consider that the development of a KC is based on the identification, mediation and developing of the components that add both value and an own identity, than the Community Capital, seen as a characteristic of a particular city or region can be the foundation on which that city or region builds its development.

In addition to the above, in order to analyze the case of Caxias do Sul and its Community Supported University (CSU), it is important to realize that the model of the CSU as well as the KC have in their basis the concept of social capital as one of the essential parts of its operational functioning, the human capital that sets up the structures forming the institutions of group cooperation. In fact, the social capital is a resource (Coleman, 1990, Bordieu, 1985) and is productive because it allows that certain objectives may be reached what would not happen without it (Coleman, 1990). The effects expected can occur in different ways for the person or for the group, and that leads Durston (2000) to postulate two different forms of social capital: the individual and the collective or community concerns the human individual capital comes up mainly with social relations with subject matter of trust and reciprocity and extends self-centered network. However, the social capital group or the community, in contrast, expresses in complex institutions with content of collaboration and management. More specifically, the social-level knowledge-based development does not reside in the interpersonal relations, but in complex systems and in the normal structures of management and sanction. For this reason, the classical definition of the community includes aspects of activities coordinated with a certain common purpose, self-government, cultural superstructure and sense of identity (Durston, 2000).

2 The role of social capital in the knowledge cities context

One of the main structural observations that the global economy has allowed us to witness in the last 30 years says with respect of the creation of value in a Knowledge Based Economy (Martinez, 2006). “Basically, the so-called Knowledge Economy...is a transition from predominantly material-based value production systems to predominantly knowledge-based value-production systems” (Carrillo, 2006, p.44).

In the context of regional development, this concept has already materialized with the appearance of Knowledge-Cities, “where the political agenda is developing the context or
structural capital from human capital growth to collective wealth” (Edvinsson, 2006, p.63).

In spite of the many cities that have proclaimed being a KC and many others that have defined strategies aimed at becoming this, for some of the players the “common framework for the understanding and development” still is in construction (Carrillo, 2006, p. 43) but they have highly benefited of the success stories of some existing the Cities of Knowledge (Ergazakis, Metaxiotis, Psarras, 2006). From these experiences we can infer that urban centers are understood as value systems, i.e. global communities are configured around an organization of values that joins them. This organization of values appears in its capital systems that characterize them and structure them. In this context, the structure of the capital systems is basically considered as an economical model once it treats of knowledge-based values that allow the future development of a human system, in this case a city, through a new combination of existing values, traditional or based on knowledge. In other words, a knowledge city can emerge from the identification, evaluation and systematic and integrated development not only of its traditional capital but also of its knowledge capital (Carillo, 2005). The structure of the systems composed of various capitals in a City of Knowledge is proposed by Carrillo (2006) based on taxonomy of system value categories, which are:

- Metacapital: Referential Capital - Identity Capital and External Intelligence;
- Articulating Capital - Relational Capital and Financial Capital.
- Input Capital: Investment Capital.
- Production Capital: Agent Capital and Instrumental Capital
- Output Capital: Product Capital

“Where we are able to capture completely and consistently the capital system of any given entity, we would be representing its ‘value blueprint’ the state of the system with reference to its ideal state” (Carrillo, 2006, p.55).

Given this ideal state as a result of a process of identification and systematization of the main values of an entity, we postulate that when the values of the community social capital are strong in a city and also underlie some of its major institutions, we can identify it as a possible emerging knowledge city. Indeed, the social capital from a city can be the basis on which its values are identified and its knowledge-based development strategies are established.

The term “Social Capital” appeared in the academic community with the intend to mark the importance that networks and relationships have which are based on trust, cooperating, and collective action as a basis for the survival and functioning of neighborhoods in cities. The studies of Coleman (1988), Putnam, Leonardi and Nanetti (2002) as well as Fukuyama (2000) indicated the importance of this capital also in the relationship among individuals as well as in that of nations and it is considered as an inherent resource in extended and nuclear family relationships, and social organizations.

This capital is represented by characteristics of the social organization that can improve the efficiency of society and facilitate the coordination of actions. The authors that write about this subject have identified a number of common elements for its creation, such as social networks, trust, reciprocity, civic participation and social norms (Nahapiet & Ghoshal, 1998; Onyx & Bullen, 2000).

Social networks are characterized by collective actions of individuals in the society (Onyx & Bullen, 2000). In order for a network to be formed it is necessary to have spontaneous propensity in social interacting and that capacity to form new associations and to cooperate within the established referential terms (Fukuyama, 2000).
A second element that is characteristic of social capital is trust. This is considered a fundamental element for the prevision of the inter and intra organizational depth (Smith, Carroll & Ashford, 1995). Currie and Stanley (2008) consider that trust is derived from the rules of reciprocity and of the systems of civic participation.

With regards to relationship building trust between partners is considered a determinant factor for an efficient interchange of knowledge (Dirks & Ferrin, 2001; Nahapiet & Ghoshal, 1998; Tsai & Ghoshal, 1998; Li, Barner-Rasmussen & Björkman, 2007). Fukuyama (2000) considered trust as an existing expectation in the community where honesty and cooperation are part of regular behavior which is based on established norms accepted by all. Putnam, Leonardi and Nanetti (2002) use the example of the rotating credit associations that have united people, (friends and families) for the purpose of making monthly money deposits in order to generate a central fund destined for the benefit of the group members.

Every month one of the members received the total contends of the fund while the contributions continue until all members of the group have received that sum.

In order for this rotating credit association to function well there needs to be an elevated level of trust among its members. If one of the participants disappears after receiving payment, all other participants are hurt.

Another element of social capital is reciprocity. By reciprocity Onyx and Bullen (2000) understand an action of providing services for the benefit of others with the expectation that this action will grand the performer a future benefit in return. Coleman (1988) sees reciprocity as the retribution for a favor.

The civic participation for Coleman (1988) is seen as an action in association of different types. Putnam, Leonardi and Nanetti (2002, p. 30) conclude that a civic community is characterized by “acting citizen engaged and involved in the public spirit by egalitarian political relationships in a social structure strengthened by trust and cooperation”.

Characteristics of a civic community are: a group of citizens, which implies equal rights and obligations for all individuals, a unified community, for an important part moved by the horizontal relationships of reciprocity and cooperation, while the vertical relationships of authority and dependence are hardly present; the perception of responsibility among the leaders; the existence of wide participation by the citizens in government; the importance given to public spirit by the citizens in general; trust among the members of that society (Putnam, Leonardi & Nanetti, 2002).

In the study of social capital and its importance in the creation of intellectual capital, Nahapiet and Ghoshal (1998) propose three dimensions of social capital: A structural, a relational, and a cognitive. For these authors under social capital can be understood to “the sum of the actual and potential resources embedded within, available through and derived from the network of relationship possessed by an individual or social unit” (Nahapiet & Ghoshal, 1998, p. 243).

These dimensions of social capital have worked as basis to advance the understanding of the concept in various research exercises (Macke, Vallejos & Toss, 2010). In the structural phase of the social capital what is analyzed is: the presence, or lack of the ties between the players, a configuration of the morphology of the network – describing the patterns of the ties through the variables such as density, connectivity, and hierarchy – and the intentional content of the networks – in other words, if it was created for one objective and it is used for another.
The relational dimension describes the type of personal relationship, developed through a history of focused interactions that influence the components and behaviors, such as trust, respect, friendship, which will determine the level of socialization, acceptance and prestige.

A third dimension of social capital which Nahapiet and Ghoshal (1998) call cognitive refers to the resources that emanate chaired visions, interpretations and significance systems, primarily codes and narratives that are chaired. Considering the literature about knowledge cities we can observe that the social capital permeates the different types of capital of knowledge. For that reason social capital can be understood as an agglutinating element of the capital systems. This argumentation is especially valid in the analysis of the case with the emerging city that will be disused further in this paper.

3 Caxias do Sul: An emerging knowledge city in Southern Brazil

With a population of approximately 410,166 inhabitants, Caxias do Sul is the second most populous city of RS (Rio Grande do Sul) state. The city is highly industrialized, is the second Pole Metal-mechanic in the country and one of the largest in Latin America with more than 6,500 industries. Accounting for approximately 5.83% of GDP of RS. Caxias do Sul is the 4th most developed city in the state and also the 12th most developed city in Brazil with a Human Development Index of 0.857. Brazil's HDI in 2009 was 0.813 (PNUD, 2010)

Caxias do Sul is the most economically important city of the Italian immigration region. The city presents evidence of a strong identity capital supported by the strength of its culture rooted in years of large flows of Italian immigrants around that began around the year 1875.

The ethnic group of immigrants who settled in the city came from all over Italy from places like Tyrol, Veneto, Lombardy, and Trentino, as well as from the Italian cities of Cremona, Milan, and Belluno. A census conducted in December 1876 counted 2000 Italian immigrants living in this region. This immigration process makes the culture in Caxias do Sul an important factor that characterizes it as a city. Some evidence of the importance of culture to its capital identity:

- In 2006 the city was the first place in the rate of Municipal Management in Culture between 5562 Brazilian municipalities.
- In 2007, for the third consecutive time, the city was the State Capital of Culture.
- In 2008 the city was the Brazilian Capital of Culture.
- The city maintains the following cultural institutions: Museum, House of Culture Percy Vargas de Abreu e Lima, Theatre, Public Library, Municipal Art Gallery, Municipal Culture Center Dr. Henrique Ordovás Filho, Wind Orchestra, Coral City of Caxias do Sul, City Dance Company, Unity Theatre, Department of Art and Culture, Department of Memory and Cultural Heritage.
- The University of Caxias do Sul maintains the Core Visual Arts of Caxias do Sul, the Symphony Orchestra of UCS, Museum, Publishing, Exhibition allery.

3.1 Communitarianism values in the development of Caxias do Sul

A major strength of communitarianism is the central role of the moral dimension in the construction of a "good society" (in the words of Putnam, a civic community). Moreover, there is an emphasis on citizen participation in collective affairs, the rescue of the role of family and schools to civic education, the quest for balance between rights and
responsibilities and the recognition of cultural diversity, without compromising the identity of groups and communities (Etzioni, 2003; Schmidt, 2010).

Presented in this way, communitarianism presents itself as an alternative path between excessive regulation of state and market; for communitarians, the values of solidarity, reciprocity and community ties will prevail, naturally, upon market forces and the logic of policy. In this sense, the virtues of responsibility of the collaboration norms of reciprocity and altruism may build a civic community. In practical terms, a civic community is characterized, first, by the participation of citizens in public affairs, "the civic community citizens seeking what Tocqueville called" self-interest properly understood ', ie self-interest defined in the context of the needs general public, self-interest that is sensitive to the interests of others " (Putnam, 2002, p.102).

These values of communitarianism can be seen in the city of Caxias do Sul by analyzing the community movement that is embodied in the experience of neighborhood associations and their main association, the UAB (União das Associações de Bairros).

The neighborhood association, UAB of Caxias do Sul was founded on May 19, 1963. It is an association with a legal entity of a political nature. It is not a business association and its lifetime is undetermined. The UAB consist today of 217 neighbors associations which together make up a population of more than 100,000 people, or ¼ of the population of the city. If we consider that the electorate of Caxias do Sul consists of 310,000 voters it is not hard to imagine what the political weight of this Association is.

The UAB has in it statutes written that is cannot be an entity associated with any political party. It is independent, unified and democratically run with the mission to unite and congregate the community’s entities of neighbors in the corresponding neighborhoods as well as those living in population nuclei of the municipality and to motivate them to participate in the search for solution for the collective problems. In addition to this, UAB looks to develop actions that allow the community to better its living conditions, consumer protection, environmental protection, human rights, security, health, education and culture, housing, transportation, recreation and other community related issues. It can organize public meetings, in a court of law it can represent its members, and act in any way within the law that it sees fit, including the organization of meetings etc. to represent the interest and improve the living conditions of its members. In addition to the UAB the University of Caxias do Sul is one of the evident results of the strength of the community oriented values in Caxias do Sul and the history of its institutions is profoundly connected as will be shown in this work.
3.2 University of Caxias do Sul: The importance of an community supported university

The creation of the University of Caxias do Sul has some antecedents that characterize the community oriented element in its character. In 1949, the city of Caxias do Sul created a High School of Arts; in 1958, the Diocesan Miter created the Economical Science School and in 1957 the Sisters of S. José Congregation created the Nursing School. In the year of 1960 the Law school, was created and kept by the Hospital Society Nossa Senhora de Fátima. In the 60s, the various community organizations began seriously working at creating a University. Three institutions of the Community in Caxias took the initiative: the City Hall, the Diocesan Miter of Caxias do Sul and the Hospital Society of Nossa Senhora de Fátima: a Mayor, a bishop of the Catholic Church and a representative of the healthcare industry. The next thing that happened was the conception of the UCS, under the sign of plurality and respect for the differences among its people, as a university. The Presidential Decree number 60.200 of February 10th, 1967 establishes the Caxias do Sul University which, as intended by of its creators should, have a regional character. This ideal persisted. But in 1968 and the beginning of 1969, UCS created three University campi: one in Bento Gonçalves, one in Lajeado, in the Taquari Valley, and the third one in the region of Campos de Cima da Serra, in Vacaria, extending the Faculty to these cities and preparing students for graduation in one of seven different degrees (Zorzi, 2009)

Nowadays, the UCS is in the region that has the most diversity and dynamic economy of the Rio Grande do Sul State where it keeps fulfilling its mission and contributes to the sustainable development of the region. In this sense, it develops its activities of teaching,
researching while expending to dozens of cities used in this study without losing the perspective of a University.

The UCS in its totality reaches a wide geographical area which includes seventy cities together with more than one million inhabitants. UCS also counts more than 32,000 students preparing to graduate in one of the 53 degrees offered.

When a University has strong ties with the community this presupposes a strong presence of human capital, which in addition to being an attribute of a community, also manifests by its own nature the expression of institutional complexity.

The Community Supported Universities have among their characteristics important aspects of social-level KBD that give them form and distinguish them from other universities and make them a category next to private and public universities.

According to Frantz and Silva (2002) the Community Supported Universities are distinct, their creation was stimulated by a group of organization of the civil society and, in some cases of public organs, to whom the property belongs; they do not have profits, and their economical results are reinvested in the university itself; they have deep insertion in the regional community, interacting with their various segments; the deliberative superior organs are integrated by representatives of the several segments of the academic community (professors, students, employers) and regional community; the management team (the Dean’s office) are the professors of the university, in many cases elected by the academic community and by the representatives of the regional community; the jury service of the institution is the foundation of the private right, and the organization or civil society; the administrative control and the financial management are done by the institution; in case of closing activities the patrimony is addressed to a similar institution.

The actual regional communities to which regional universities report are no longer the traditional communities from the past. They are permeated by contrasts, heterogeneity and contradictions, but they do maintain significant levels of social capital which secure the capacity to cooperate in projects of collective interest. The message of community supported universities leans of the presumption that they can count on the recognition of the regional community (regional legitimacy) and that the institutional management is guided by the will of the united academic community (internal legitimacy).
Community Institutions do not come from relations and interests of a limited group of people. They presuppose relations and interests extensively shared. The community institutions develop environments where even with conflicts, rivalry and competition, the sense of trust and reciprocity is preponderant and catalyzed by aggregative and innovative leadership’ (Schmidt & Costa, 2009).

For this reason, it seems evident that a Community Supported University can not have the social-level KBD as the prerequisite without this also strengthening it through the knowledge which the University generates, produces, distributes and shares.

By its deep insertion in the regional community, the Community Supported University can also be a structural element in the processes of development based on knowledge as it is the case of Knowledge Cities.

This link is profoundly evident in Caxias do Sul where one of the main local values by which the city identifies itself is its characteristic community orientation. Even in the 1950’s and 60’s the city was characteristic for its communitarianism, evident in the initiative of the larger corporations who anticipated in the creation of foundations for social welfare and voluntarism. In a period when Brazil was living under a military dictatorship that reduced all kinds of human rights and freedoms, professors from the UCS lead initiatives such as seminars on community development. These initiatives can be seen as preludes of the strong social communitarian capital visible primarily in entities such as the Associations of Neighbors and the UCS that we see today and that are strongly related. In fact the history of the UAC and the UCS are intertwined by the actions and decisive participation of people with strong leadership skills in both entities something that over time resulted in a strong relational capital.
In the 1960’s Player A, who was the President of UCS in the year 1987, was coordinating the Community Development Seminars together with the city’s neighborhoods. Still in the 1960’s Player B was President of the UAB and after, professor at UCS. In the 1970’s Player C, who today is the President of the UCS administers training courses for the UAB and also courses in political issues for small groups of people living in the local neighborhoods. In the 1970’s Player D, the current superintendent of the University City was President of the UAB for two governing periods, in addition to being Vice President of the FRACAB (a state federation of neighborhoods) and Vice President for the southern region of the CONAM (a national council of neighborhoods), what indicates a strong presence of leadership activity by this Player in the communitarian areas of the state and even of the country. Still in the 1970’s and 80’s Player E, professor at the UCS was juridical advisor of the UAB, acting strongly against the clandestine land occupations. Today the relationships between the two entities continue to be strong, particularly due to the presence of professors of the UCS in various functions within the UAB and its boards.

In addition to the relational capital the communitarian values of the two entities can also be found in the development of joined project which indicates the presence of structural instrumental capital. Evidence of that capital is:

- The project of Community radio, developed by a team of professors and technicians of the Science Center or Communication of the UCS. Once the project was developed the UCS passed on in a concession format the radio station to the UAB who today operates it, but always with the support of the Science Center or Communication of the UCS.
- The News Paper of UAB which receives financial support from the UCS via advertising commitments.
- Social Events of the UAB who receive support from the UCS in the form of sponsoring and materials.
In fact, the most important aspect of the communitarianism value for UCS is the deep insertion in the regional community, interacting with their various segments. Therefore, the results point out that Caxias do Sul can be considered as an emerging knowledge city by its capacity of social agency i.e. the proactivity of individuals and groups in social context to obtain collective benefits.

4 Conclusion

The identification of a potential KC may occur through the values embedded in the factors that define both the identity and the basis for their development. In the presented case, we interpret Caxias do Sul as an emerging Knowledge City owing to their communitarianism which reflects the values and the potential in terms of social community capital.

Considering the two main highlighted points - the communitarian values and social capital – it is difficult, if not impossible to say what comes first.

These two values form a virtuous cycle of community values transcending the community boundaries feed the social construction based on civic elements.

Our conception of social capital is based on the understanding that this element is strongly linked to an historical and cultural context. Thus, we aim for future research to investigate: (1) the historical-cultural factors which determine the social capital level and communitarian values present in Caxias do Sul and region, (2) the historical roots of the immigration process occurred in the second mid-nineteenth century, in which the region received more than 100 000 Italians, and (3) deepen the study of knowledge systems indicators and to improve the characterization of emerging city under study: Caxias do Sul.

Through this exploratory case study of Caxias do Sul we observed two major guiding principles of this emerging KC: the players and shared projects. From the social player’s imbrications, whose performance permeates many institutions in the city, and common projects, we could to identify the development of a civic spirit, according to the meaning proposed by Alexis de Tocqueville and David Hume.

In short, a true community must be built together from the culture of sharing and reciprocity. For sure, there is always much to advance the tradeoff between security and freedom - between the feeling of belonging and the risk of intolerance to diversity (since the inclusion of some means, concomitantly, the exclusion of others). Nevertheless, a sensible discussion of shared human values is a sine qua non condition for the balance of forces constituting a community.

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Key factors for the success of knowledge cities in Germany: findings of an empirical study, 2010

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Structured Abstract

Purpose – The aim of this paper is to investigate the different strategic approaches of German cities becoming a knowledge city. It also analyses the sustained effects of the “City of Science” competition.

Design/methodology/approach - The paper is based on a multilevel empirical research concept, including qualitative and quantitative approaches. The main part is an inventory count of all participating cities until 2009. The rate of return was 76% (n=35).

Originality/value - The research is the first-ever evaluation of the “City of Science” competition. The study provides statistical data about different clusters of knowledge cities in general, as well as background information on concrete examples. Critical factors for success and failure will be discussed and best practices like those in Oldenburg will be presented.

Practical implications – The results of the scientific study and the best practice analysis provide useful information for cities trying to establish a knowledge-based urban development strategy.

Keywords - German knowledge based strategies/ scientific communication/ networking/ innovative institutional arrangements/ keyfactors for the success of knowledge cities.

Paper type - Practical Paper

1 Introduction

Knowledge, research and creativity have become the main preconditions for innovation in cities and regions. Intellectual capital is recognised by local governments and firms as one of the vital sources of competition in urban and economic development
within a knowledge-based economy. A worldwide competition for talent, universities/research institutes and innovative enterprises can be observed. Essential for this contest is having the profile as a science city. Knowledge-based urban development has gained popularity as a powerful strategy for sustainable economic, social and urban growth and for the post-industrial development of city-regions (Yigitcanlar; Velibeyoglu, 2008:2).

The Stifterverband, the business community’s innovation agency for the German science system, representing 3,000 companies, business associations and individuals, tries to support this process of modernisation through the competition “City of Science” among German cities (www.stifterverband.de).

The winning city is entitled to call itself the “City of Science” for one year, a title, which earns considerable media coverage in the country and encourages local knowledge stakeholders to co-operate. From 2005 until 2009 46 German cities have participated in the contest.

As attorney of the Stifterverband and on the basis of a complete inventory count (N=46 in 2009) the authors analysed in a research programme the sustainable effects of the competition on the participating cities, “winners” as well as “losers”. The scientific study indicates which positive synergies could be found in the cities and which knowledge-based strategies have been set up in the urban spaces. Compared with other studies in this field, it based on a large empirical base.

2 Purpose and research objectives

The purpose of this study was to provide answers to the following research questions:

- How many of the cities analysed could be defined as knowledge cities?
- Did taking part in the contest have a positive impact on the cities, in particular with respect to the networks between partners in science, business, culture, administration and politics?
- Who took the initiative in starting the application: universities, municipalities or other institutions?
- Which stakeholders were normally engaged in these networks? How did they organise the decision-making process? How stable were these structures?
- What kind of innovative institutional arrangements could be found, especially concerning local administration?
- How did they develop innovative ideas for the contest? Top-down or bottom-up, using grass-roots approaches?
- What kind of innovative projects or events were established? How did they raise public awareness?
- How important were these knowledge-related aspects for the profiling of the cities? Was this used actively for image-building processes?
- How many of the cities analysed the essential location factors of knowledge-intensive industries?


Following a list of criteria, cities are encouraged to participate in the annual contest. Criteria for the "Science City" are a wide range of different activities and formats, which are addressed to many different audiences. The concepts from the scientific field should
be as imaginative and interdisciplinary as possible. Of even greater importance is the role of local co-operation between science, industry and the city, which are traditionally characterized by stability and sustainability.

For the award of a title, the following criteria have been established by this body:

- An active role of communities in the network formation;
- Dialogue orientation and a wide range of different activities and formats (e.g., how many different audiences and segments of the public are reached);
- Originality of approaches;
- Interdisciplinary approaches;
- Cooperation between universities and other partners;
- Cooperation between science and industry;
- Cooperation of science with art and culture;
- Sustained effects of urban activities;
- Importance of science for urban development.

3 Methodology

The scientific study of the University of Applied Sciences in Osnabrück and the Stifterverband took place from the 01.01.2009 to 01.05.2010 and consists of a multilevel empirical research concept, including qualitative and quantitative approaches. The study is based on an extensive analysis of documents and websites (secondary research). The applications were particularly evaluated with regards to network structures, institutional arrangements, innovative forms of scientific communication, political back-up programs and strategic concepts. Relevant stakeholders out of ten cities were questioned in face-to-face interviews. These were people who had coordinated the application process or had accompanied it actively; these were: Chief burgomasters, city marketing manager, cultural heads of department, manager of big economic enterprises, employees of city administrations, project managers, press and communication experts, leaders of science and research facilities.

On the basis of these expert interviews, the questionnaire was designed for the complete inventory count of all participating cities until 2009 (N=46). The rate of return was 76% (n=35).
4 Findings of the empirical study (value)

The research is the first-ever evaluation of the “City of Science” competition and provides valid information about the different strategic approaches in becoming a knowledge city in Germany. There is no other study with a comparative empirical basis in this field. The study provides statistical data about different clusters of knowledge cities in general, as well as background information about concrete examples, for instance Oldenburg.

The contest offers the cities involved the chance to recognize their scientific potential, and provides an optimal start for their strategic location positioning. The process of application itself provides many cities not only with the benefits of network education, strategy development and science communication, but also makes them more aware of
their own strengths and weaknesses. The meaning of science and research as the central location factor was more strongly anchored in the awareness of most actors. Suitable location drafts found more acceptance in what is regarded as particularly meaningful in complicated political decision-making processes. Many networks between science, economy, city and culture which were only set up in the course of application, or whose work had intensified were, as a result, anchored permanently in the urban sphere.

It was remarkable that the city administrations could find their specific role in the local networks and concentrated more strongly upon presentation and coordination processes. Today, colleges or research facilities are tuning their own shaping processes more narrowly with the city halls. The establishment of branch-covering networks and new communication and interaction processes intensify the dialogue with the general public.

For example, the evaluation reveals the following results:

- For 85% of the cities analysed, the application for the contest had a positive impact on the networking process. Even though they did not win the title, they still benefited from a large variety of synergies.
- 58% of the cities agreed with the statement that the new networks were established permanently in urban areas and identified through regular meetings. Another 18% said that relations are used by the different actors only when it comes to specific projects or event formats. Networks that were developed for the application to "City of Science" then disbanded or were no longer used, were only in one city.
- In 72% of the cities, new contacts / cooperation between scientific institutions and city government developed through the competition. In 11 cities (34%) commercial enterprises and scientific institutions emerged to establish new collaborative relationships. In 11 cities, the cooperation between science and culture increased.
- 46% of the local authorities were able to involve stakeholders in the application process with whom they had not been in contact with before. New forms of cooperation were established with museums, schools, non-school venues, hospitals, cultural institutions, associations, companies, but also with dedicated individuals. These actors have planned a whole series of events and carried them out independently.
- In 61% of the cities, public administrations acted as moderator, coordinator and central contact point for all partners involved. In many cases, it was the mayor himself, who used his personal contacts and various cooperation partners and corporate sponsors to support his application concept. In these cities special committees were found often, steering system groups or working groups which were settled directly with the political guidance of the city.
- Already 57% of the candidate cities are interested in concrete requirements for highly skilled and creative employees, academics and students in their living and working environment. They research in interviews, workshops, etc. their location preferences and turn the results into urban development policies.

5 Cluster analysis

This study demonstrates that in the majority of cities the process of applying has motivated previously isolated disciplines and areas to work more closely together. The policy-makers and residents of many cities have become aware of the role of science as
an engine for urban development and structural change. New knowledge-based strategies, formats of science communication and networks now exist in the cities. A new enlightenment for science and research has been established with long-standing effects on the minds of numerous citizens. However, substantial differences can be observed in the respectively developing steps of German cities. A cluster analysis divided the sample in three groups: “outriders”, “profiteers” and “latecomers”.

The “outriders”: In these cities, science and research play a determining role for location profiling for many years. The group does not limit itself to classical university towns, which use their colleges and the surrounding science facilities for location communication. The cities also acted against the structural change with science and research which characterizes this group. In addition, it is common that science is classified as an essential developing engine for city development.

The science-based location strategy is secured by town council decisions and is underpinned by many activities relevant for location. Changes in the location draft were not necessary any more within these cities, since strategically developing plans had existed for a long time. Moreover, load-bearing network structures between science, economy, culture and city management were already set up regardless of competitive participation. Similarly, this was true for contacts regarding scientific interests with the respective city administrations. These organised science marketing, maintained the network relations and co-operated in the development of scientific formats.

The synergies from the application process were smaller in this group, because this way had been taking in the knowledge society for a long time.

In the analysis of these cities the following criteria were taken:
- Science and research had already been the central themes for location communication, independent of the competition. The competition had no reinforcing effect, because the best approach had already been established.
- Science was and is now being used as a key driver for the development of the site. Formal decisions ensured the strategic profile.
- The city disposed and still disposes of a strategic developing plan which guarantees sustainability and future orientation.
- The city government had already established strong participation among competition coordinators and contacts for science in the city administration.
- The network structures between politics, science, economy and culture existed already before participation in the competition and were optimally structured, so that innovations were not needed.
- The City operates effective scientific communication. Many styles from the application system have been successfully implemented and permanently anchored.

The “profiteers”: The second category encloses participant cities which have recognized knowledge as a future engine, but they have not yet fulfilled all the criteria. The most important characteristic feature is that the participation in the competition has unfolded the biggest leverage effect in this group. Scientific subjects had their place in strategic city development before the participation in the competition. However, in the course of the application a clear step forward is recognizable. The same is true for the network structures. These were expanded in the course of the application and the collaboration was intensified. Central for the classification was, among other things, that these cities have recognized their weaknesses and their potential to optimize. They have used the competitive impulse actively.

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For the classification of "competition profiteers" the following six characteristics were used. At least five had to be satisfied. In doubtful cases, further positive development trends and activities were included in the assessment process.

- Science and research played an important role before the competition. Afterwards, the application process increased the awareness of these issues significantly, or the competition was classified as an initial function for the dynamics of knowledge development.

- Science had already adapted itself strategically in the location shaping what town council decisions would guarantee / or the competition has caused changes in the location shaping draft.

- Provided that before the competition no scientific contacts were set up, personnel, organizational or institutional changes or restructuring were carried out as a result of the competition.

- Existing weak network structures were achieved by the competitive participation and have changed qualitatively and quantitatively since then.

- The city had a strategic development plan.

- Many of the original event ideas from the application system have been implemented even without the city winning the title and some of these formats have become sustainable.

The “latecomers”: The cities of this cluster are still in the planning phase, which concerns the strategic integration of science in urban development. The presence of universities of excellence or a good reputation as a science city was not sufficient in the context of this analysis for a classification in the first two clusters. The interest of research was not focused on the potential factors, but rather on the strategic basis of a knowledge-based urban development. Participation in the competition had no lasting effect in these cities. The classification of the "late comers" was especially based on the first two clusters and their criteria. In cases of doubt, the existing strengths and potentials were considered and compared with new developments.

For the classification, the following seven features were relevant. Six had to be met at least:

- The strategic profile of the science is being treated as a casual theme, and there is no apparent competitive effect on the profile to be determined.

- Contact persons for scientific topics are not available, and no personnel or organisational changes have been made.

- The networks of the application process will only be used for irregular or occasional collaborations which were established only for the application and then disbanded.

- Strategic development plans on science and research do not exist.

- Ideas and formats from the application processes have not been carried out at all or only to a slight extent. Permanently established events did not occur.

- Notable network effects, new forms of institutions or partners were not apparent.

- Positive trends were difficult to detect and the city had little drive.

The „latecomers“ are primarily small towns with up to 200,000 inhabitants, like the „outriders“. The „profiteers“ will be more likely in the medium-sized cities in which up to
500,000 inhabitants reside. There were a total of six candidates from big cities with over 500,000 inhabitants.

<table>
<thead>
<tr>
<th>Criteria of typification</th>
<th>Outriders n=5 (14%)</th>
<th>Profiteers n=17 (49%)</th>
<th>Late comers n=13 (37%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prominence of science and research for the city</td>
<td>Already essential before the competition</td>
<td>Invigorated by the competition</td>
<td>Identified very late</td>
</tr>
<tr>
<td>Formal decisions of municipal parliament</td>
<td>existent</td>
<td>Changes in the master plan for city development</td>
<td>No / overall less positive trends of development</td>
</tr>
<tr>
<td>Strategic plan of action</td>
<td>existent</td>
<td>existent</td>
<td>No approach visible</td>
</tr>
<tr>
<td>Dedicated contact person</td>
<td>Already existent before the competition</td>
<td>Changes in organization and team</td>
<td>No and also no changes</td>
</tr>
<tr>
<td>Established networks</td>
<td>Well established</td>
<td>Process of optimization</td>
<td>Weakly existent</td>
</tr>
<tr>
<td>Specific types of scientific communication</td>
<td>multifarious</td>
<td>Established and developed by the competition</td>
<td>Only few types are established</td>
</tr>
</tbody>
</table>

**Figure 2. Criteria of typification**

6 **Practical Implications**

In Germany, there are many small and medium-sized cities which have not yet started to distinguish themselves in science and research. Nevertheless, the structural change and globalization require action. The specific features of the three clusters presented above can be applied by other cities as a method of self-evaluation. The results of the scientific study provide useful information especially for these “latecomers”:

- Which knowledge-based development theories exist in Germany, which knowledge-based strategies are successful in other cities?
- How do networks develop successfully? Which actors are important for the local networks?
- How can different interests (economy, science, politics) be combined?
- What can cities do to create knowledge environments and new knowledge scapes?
- Which possibilities of the science communication and science marketing are there?
- What has the competition “City of science” brought to the other cities in this context?
- …
The practical implications can be observed in particular in the "City of Science 2009", Oldenburg. Under the headline "Using scientific communication to transform a city" the municipality tried to develop the city as a stronghold of talents, technology and tolerance (to refer to Richard Florida, whose famous "3 Ts" have been the guideline of the city’s program). The City of Science program 2009 "Übermorgenstadt" (project manager, Dr. Rainer Lisowski, www.uebermorgenstadt.de,) has above all been an event-driven approach to propel the city's recognition as a knowledge-based location. Nevertheless, the events were only the first step the municipality took in order to gain momentum and to achieve an entirely new and younger looking corporate design. The Oldenburg case shows how a medium-sized city and its partners in science and business fostered their position on a more sustainable foundation by economic development and revised urban planning, especially in readjusting scientific and international affairs ("Four track strategy" & "China-Desk").

To support this process of “learning from the best”, the authors will publish a code of practice in which all the best practices will be described. The book will be released in May 2011.

7 Conclusion

The first five years of "City of Science" can be evaluated as a success: 85% of the recorded cities in the census (n = 35) revealed positive effects from the competition. These include the creation and establishment of long-term performance networks as well as innovative forms of scientific communication. Despite not having won the title 38% of cities carried out most of the events originally planned for their application. Some of these events have been so successful that they have become an integral part of the city’s events calendar. The joint implementation of events is classified as an important factor in network training.

The importance of science in location positioning in 55% of cities has increased; in 42% of cases the urban profiling concept is being reorganised from the "science" perspective. With the recruitment of research institutions or "high potentials" in cities, new sectors of high importance for the local research system have been added. This shift of emphasis in economic development and city marketing is attributed partly to partaking in the competition.

The cluster analysis shows nearly half of cities (49%, n=17) as "competition profiteers". These have clearly recognized the importance of science and research for location profiling and have strategically anchored this topic. Even without a title win, these cities have benefited from the competition in many different ways.

The other half, which is divided into two groups, has hardly benefited from the competition at all. A small minority of 14% (n=5) is among the "outriders" who have distinguished themselves for years through research and science. They gained a negligible advantage by joining in the competition. The larger proportion of 37% (n=13), the "late comers", do not seriously drive the strategic integration of science into urban development. In this group there are a disproportionate number of smaller cities.

It is striking that the "profiteers" are mainly medium-sized cities that want to be repositioned as a knowledge city. This result could imply that more consideration should be taken of the different sizes of the cities. Small cities, for instance, should be supported differently than medium or large ones.
Critical to the sustained effect of the “city of science” competition is the support of local politics. In some cities there are increasing signs that council members prefer to keep their distance towards knowledge economy issues. These sceptical if not negative signals from councils are expected to continue particularly during times of tight budgets.

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Structured Abstract

Purpose – This paper examines the changing nature of innovation in a knowledge based economy and the challenges of this for traditional policy development.

Design/methodology/approach – It examines the development of an innovation systems approach to economic development and charts this with live examples from a test-bed approach in Greater Manchester, UK.

Originality/value – The paper not only proposes the need for new policy approaches but discusses some of the characteristics of policy interventions that might be designed and the type of leadership that is required to enable innovation systems approaches to thrive as tools of economic development.

Practical implications – It is argued that new approaches cannot be implemented in old ways and that despite the immaturity of policy development to support an innovation ecosystem approach that there are practical steps that can be taken by leaders and public agencies to facilitate their success.

Keywords - innovation systems; networks leadership policy development

Paper type - Practical Paper

1 Overview

Innovative places are poles of attraction in the Knowledge Based Economy. Some places have a greater capacity to create or absorb ideas than others. While Thomas Friedman (2005) declared that “The World is Flat” the truth is that despite global
connectivity and globalised economies, the distribution of innovative capability “congregates” in those places which have an openness to new ideas and the capacity to exploit them. It is a paradox however that until recently, most innovation policy, at least in the UK, has been spatially blind and as a consequence of this, the growth and development of knowledge-based economies may have been hampered by an inadequate understanding of the nature of innovation policy interventions appropriate for such economic development.

This paper reviews the importance of innovation in building thriving knowledge-based economies; the changing nature of innovation and demonstrates the potential to activate place based interventions which aim to strengthen an innovation ecosystem. This is illustrated by analysing recent approaches adopted in Manchester, UK. Whilst implementing place-based innovation may not be new, the approach to inspire and to systematically encourage the development of a more vibrant innovation ecosystem is clearly novel.

2 Background

Knowledge based economies require new approaches to economic development. While the ability to create new knowledge has served development since the dawn of time, there are a number of significant changes which (David and Foray, 2001) describe as transformational that characterise a modern 21st century knowledge economy.

First, the pace at which knowledge is being created, accumulated and at which it also depreciates has increased dramatically - creating the need for new organisations or communities consisting of networks of individuals. These networks produce and circulate new knowledge across organisational boundaries, creating a fertile environment for innovation. Their cross-organisational focus makes them a challenge for conventional supply-side economic development interventions.

Second, the relative and increasing importance of intangibles which rely on human capital rather than purely natural resources or physical capital is a feature of advanced knowledge economies and societies. This focus on intangibles is a trend that has increased since the 1960’s. The need to attract, retain and release the creativity of that human capital in any place goes beyond its physical environment and building form, although each may be necessary if not sufficient to attract and retain talent.

Third, innovation is increasing in both pace and range of sources as it becomes a currency of productivity and competitive advantage in the connected globalised economy. Whilst propinquity may be important for the first two transformational characteristics, it is increasingly likely that innovation value chains will extend globally and therefore the ease of connectivity to other innovation hubs becomes a critical asset for places.

These transformational factors which now drive economic growth together with the underlying ubiquitous presence of the internet and its digital connectivity are leading to a re-calibration of economic development approaches. The differences are well represented in the following table from the Washington Economic Development Commission (WEDC, 2009, Figure 2, p viii).
Such transformation has frequently outstripped both national policy interventions and their associated incentives. In many places innovation policy has lagged behind the rapidly changing face of innovation practice and the lack of understanding amongst policy makers can be seen to put a break on the ability of places to realise their potential to become vibrant innovation hubs in the global knowledge-based economy. This barrier will be discussed further below but it is important also for the sake of policy appropriateness to challenge some of the loose thinking which pertains around innovation.

3 Defining innovation

Innovation is a valued objective of knowledge-based economic development and yet too often it is neither clearly defined nor clearly understood as a process which requires not only ideation and creativity but a reduction to practice and absorption into general use. Innovation is not an end in itself but should be a servant of other objectives - such as new products and processes for business growth or societal benefit. There is a tendency to confuse creativity and innovation.

Landry and Bianchini (1995) set out the difference between creativity and innovation thus “… ‘Creativity is a divergent thought process that generates ideas, and is non-evaluative; whereas innovation is a convergent process concerned with the selection and implementation of ideas.’” While undoubtedly, creativity is a necessary condition for innovation it is not sufficient in of itself. If innovation is what is vital to economic growth and the solving of global social problems, then we also need to factor in the skills of evaluation – including feasibility, cost-effectiveness and adoptability.

This distinction is vital not only for policy makers to recognise but for places to understand - and is indeed frequently cited as a failure in the UK in relation to the links between universities and business. The UK while a leader in R&D and scientific publication has lamented its ability to turn those ideas into innovations which then

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1 From A Barry(1993) the impact of ideas, Intercity December-January – Andy Burnett – Centre for Creativity at the Cranfield school of Management
command a return in the marketplace. The skills of innovation often lead to the profit being gained in other places.\(^2\)

Innovation is iterative. It drives and is driven by the market or users, thriving in a continuous feedback loop between innovation and the uses of innovation. Innovation can be defined broadly - as “a change that creates a new dimension of performance” (Drucker, 1985). It is not merely a new idea - but the practical application of that idea through a new product, a new process, a new organisational operation, a new marketing approach or a new service. Innovation only exists when the new idea is used and/or applied. It can be radical and disruptive, destroying old ways of doing and working and creating obsolescence; or it can be incremental and additive - building on existing knowledge, products and services. Innovation is not universally beneficial.

Innovation applies in the private, public and third sectors and is an important tool to help address some of the biggest societal challenges such as health inequalities or the move to a low carbon future. Innovation is sometimes characterised as involving 3 main players - business, universities and government but the Manchester model of innovation (Manchester: Knowledge Capital, 2009) involves 5 main players:

- businesses, as the focus of economic growth;
- universities and other education/research centres including colleges, schools and NHS – as sources of deep knowledge, ideas, and skilled people;
- government at all levels, as policy-shapers, service providers and facilitators;
- individuals/citizens as end-users of innovation, participants in open innovation platforms, and producers of ideas and innovation;
- third sector organisations and NGO’s, as key players in social innovation and critical areas such as health, the environment and equality of opportunity.

Innovation is no longer the preserve of R&D and university laboratories or manufacturing businesses, but can come from the creative industries, the public sector and consumers themselves. It is now clear that while mainstream university research in science and technology remains important for long term inventive capacity, it is also now recognised that innovations which deliver both new market products and processes and indeed increase economic and social performance may also come from business processes, marketing and enabling technologies (Ibid). Studies of the success of US iconic areas such as Silicon Valley and other technology “hotspots” in the USA, have begun to demonstrate that many other factors beyond patenting and licensing have also played their part (Saxenian, 1994). A “linear, technology transfer or technology push” model from universities to business has been shown to be a narrow interpretation of the actual processes which generate success (Lester, 2005).

Open innovation is driving a new paradigm of cross-sectoral, cross industry and international collaborative efforts in which relational capital is the glue and in which certain individuals and organisations can play crucial “bridging” roles. Supported and fuelled by the ubiquitous availability of digital connectivity, innovation has become distributed and diffuse, requiring very different approaches to policy and practical support mechanisms. Not only are innovations being sourced globally but customers are at the same time demanding a degree of personalisation of products and services that are challenging outdated business to business models and supply chains.

Digital connectivity has exploded not only the supply chains for business but also the customer base (Anderson, 2006). It may seem paradoxical that at the same time “place”

\(^2\) Department of Trade and Industry - past papers.
has become increasingly important in support of globally distributed innovation activity. However, underpinning these new models are the networks of people and organisations (David and Foray, *op cit.*) which by necessity need to interact and exchange knowledge. As effective innovation in a knowledge-based economy requires effective communication across organisational boundaries and the ability to exchange and absorb tacit knowledge, then personal contact “in a place” delivers an effectiveness which cannot happen at “distance”.

4 The challenge for innovation policy

Metcalfe (2007) suggests that the design of innovation policy must be seen not in the context of “equilibrium economics” where a traditional “market failure” approach is central to the design of policy interventions. Likewise Hutton and Schneider (2008) propose that to support innovation it needs to be recognised that the totality and subtlety of elements that generate innovation-driven growth are not captured by the narrow assumptions of market theory. Hutton and Schneider (ibid) make the case that in advanced knowledge economies which rely on innovation to stimulate productivity market failure is the norm rather than the exception. This presents a conundrum for regional economic development agencies that are guided by the doctrine of equilibrium economics in assessing their investments. In the context where the ‘place’ for a distinct policy intervention called innovation policy in a broader “policy mix” is not always well articulated, objectives are loosely defined, targets imprecisely set, intervention logics weakly articulated, external factors impinging on the success of implementation of measures poorly understood, a limited evaluation culture and even rarer impact analysis, how do they support a more innovative environment - to stimulate growth in a knowledge-base economy if the standard rules do not apply?

To be appropriate, innovation policy has to recognise that:

- Economies evolve because knowledge evolves and innovations are the vehicles that bring new knowledge into use;
- Changes in knowledge are not external to the economic system but are embedded within it;
- Science and markets are both knowledge transmission systems;

In this context it is argued that an innovation systems approach is the most appropriate lens for policy design to support increased levels of innovation. However, while an innovation ecology is the basis for a system, it is not a system in of itself until subsets of the actors are connected with the intention of promotion of innovation and the purpose of the connections is to combine multiple sources of knowledge through the flow of information (Metcalfe, *op cit*).

As part of this paradigm, it needs to be recognised that knowledge is essentially a “personal” attribute (“connaissance” rather than “savoir” as distinguished in French.). This implies that knowledge is a distributed system and it changes in a manner dependent on the connections between the multiple actors - the generation and diffusion of innovation is as a consequence a system issue and to intervene in such as system relies on the identification of system failures. Common failures that need attention through policy and practical interventions are issues such as:

- Knowledgeable actors being missing from the system, for example “design agencies”;

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- Connections being absent which disrupt the flow of knowledge across sectors or between universities and firms;
- System boundaries are drawn in the wrong place and access to vital knowledge, competencies or components of the innovation value chain are out of reach.

A system-based approach to innovation would drive rather different incentives and interventions than the classical equilibrium economic (market) theorists would propose. If innovation is a key wealth creator, Hutton and Schneider propose that too much emphasis on competition, fast outcomes and commercialisation drivers could well undermine innovation. Likewise overly zealous monopoly and protection policies (such as IPR’s) can have the same destructive effect. Policymakers need to aim for what they term “goldilocks” markets that permit both creative destruction and sufficient rent to reward risk-taking (op cit, p 28).

If innovation systems rely on person to person exchange of knowledge and reciprocity, then the issue of “trust” may be paramount. Recent research is beginning to discover the importance of a collaborative and trust-based approach to the effective operation of markets and indeed the development of successful innovation ecosystems. Reciprocity and trust-based networks underpin the development of vibrant innovation systems. Elinor Ostrom’s work challenges the basis of the Tragedy of the Commons - a construction of neoclassical economics that proposes that naked self-interest will destroy the “public good” through over-use. Ostrom has proposed that markets can organise production and consumption efficiently, but only when supported and nurtured by networks and communities. Through her work Ostrom proposed a new architecture of governance - what she called “polycentric governance”. This mirrors the conditions needed for a thriving innovation ecosystem - horizontal sharing of leadership outside the organisation and distributed leadership - where multiple actors work in their own individualistic way towards a common goal. The “jamming super-group” approach put forward by Benneworth (2007) in his examination of leadership for innovation.

Although the innovation systems approach was designed to reflect national building blocks for innovation, there is nothing inherently national in these characteristics. Indeed if anything, it is more likely that an innovation systems approach will work most effectively at an identifiable community level where communities of interest and shared values and objectives can be readily identifiable.

Contributors to a study of national innovation systems (Lundvall, 1992) proposed that innovation happens when “interactive learning” between users and producers occurs (Andersen and Rossi, forthcoming). Geographic and cultural proximity was seen to encourage interactive learning and therefore innovation. Whilst an innovation systems approach is beginning to gain credence with policymakers, Andersen and Rossi (op cit) argue that policy formulation for this approach is not yet mature.

An innovation systems approach to innovation (NESTA, 2006, 2007) is a far cry from the well tried policy interventions such as technology and science parks, incubators supporting university-industry technology transfer or raising local venture funds. Modern

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3 It has long been recognised that the venture capitalists of Silicon Valley prefer to invest locally - where they can get to know the individuals of the management team and build a trust-based approach to innovation. Culture and organisational landscapes are critical to the shaping of the innovation system. Saxenian (op cit), documents this well in her comparison of the fortunes of Silicon Valley in comparison to Boston Route 128.

4 Elinor Ostrom was awarded the Nobel Prize for Economics in 2009.
innovation is now understood to be a multi-directional and iterative process that involves multiple actors. An ecology approach is however challenging for policy makers. Stimulating the vibrancy of an ecology requires not only an understanding of the innovation assets in a place but also the form of interventions across diverse policy areas including education and skills; business support and a changes in the culture of attitude to risk.

Innovation policy has grown to subsume science and technology policy. Firms must increasingly complement their own R&D efforts by gaining access to externally generated knowledge and learn how to manage a wide spectrum of collaborative arrangements for knowledge generation (Coombs and Metcalfe, 2000). Innovation in a knowledge-based economy is an emergent process based on the gradual introduction of interactions that link previously unconnected agents, knowledge and goods in order to produce a relationship of interdependence. Networks are a powerful tool to make such connections. The innovation journey for a place then must be seen as a sequence of events in which new ideas are developed and implemented by people who engage in relationships with others and make the adjustments needed to achieve desired outcomes within an institutional and organizational context.

From the characteristics that we have discerned from innovation systems theory, there would seem to be a number of key attributes of the system which should be encouraged, apart from an approach that corrals the necessary ingredients for a local ecology and its connectivity to a national ecology. These include:

- Person to person knowledge exchange;
- Connecting institutions and people who may be vital to the system but are currently disconnected;
- Building a “community of innovators” that leverage reciprocity and trust and mutual self-interest;
- Leadership which can operate beyond the boundaries of the leader’s organisation - working in an “horizontal” and dispersed fashion and a style which is permissive of “emerging” innovation;
- A process for interactive learning by the community (learning by doing).

Having understood the mechanisms for a vibrant innovation system, the partners in Manchester agreed to undertake a test-bed approach to their initiative.

The following section describes the portfolio of actions which have been initiated in Manchester to implement an activation of the local innovation system. This is a unique trial of a deliberate and systematic approach to the development of a more vibrant innovation ecosystem through which the city-region addresses its fundamental and long-term problems and challenges.

5 Innovation in Manchester

Manchester is and always has been an innovative place, a place where people have new ideas which are taken up and in some cases, have changed the world. Manchester is the perfect place for ambition on the city region scale.

Many of the building blocks (the ingredients that form the ecology) are already in place – international connectivity, good and fast improving digital infrastructure, world class universities, great civic leadership and ambition, a vibrant third sector and a bedrock of great home grown businesses coupled with national and international names attracted by our people and the quality of our transformed regional centre.
There is also an impressive network of people from the private, public and third sectors who are completely committed to our city and have dedicated significant time and energy to the question: how do we make Manchester a leading city for innovation?

5.1 The rationale for a focus on innovation

Innovation is identified as one of five key drivers of productivity, alongside investment, skills, enterprise and competition. The contribution made by innovation to economic growth is significant: improvements in productivity resulting from innovation, technological catch-up and restructuring have been estimated to account for between a third and a half of the average business sector’s Gross Domestic Product (GDP) growth over the past two decades (Scarpetta et. al. 2000).

GDP is a proxy measure for innovation but recent work (NESTA, 2010) has shown that a modified version of GDP may still be the most practical measure. If Manchester maintains the pace of innovation seen in recent years, it will at best retain its position of 57th out of 78 large metropolitan areas across the world as ranked by per capita GDP in 2006 (OECD, 2006). For Manchester to match similar cities in Europe and to address major economic, social and environmental challenges, the city region needs to proactively accelerate the pace of innovation as an essential component of its economic, social and environmental strategies.

The Manchester Independent Economic Review (MIER, 2009) states

“Innovation is absolutely central to economic growth and prosperity in the long term. Cities and regions with a higher proportion of innovative businesses and individuals are those which prosper and whose inhabitants thrive”(MIER, op cit, p4)

In partnership with NESTA and North West Regional Development Agency (NWDA), Manchester partners have taken small steps over the past months to accelerate the pace and nature of innovation through the Manchester Innovation Investment Fund. Partners recognise that significant barriers and challenges need to be addressed if the level of innovation dynamism in metropolitan areas in other locations such as Helsinki, Finland or San Diego is to be realised in Manchester. It is notable here that the partners were able to step outside their proscribed approach to investment assessment and take a bold step which supported a “strategic added value” approach. NESTA’s commitment to this was significant in challenging others to support their propositions, while Manchester City Council and other local leaders were sufficiently confident of Manchester’s “absorptive capacity” to new ideas to give it their support.

6 Testing the innovation systems approach

Early in 2007 the Chief Executive of NESTA addressed the Manchester: Knowledge Capital annual lecture. He set out his vision to make innovation flourish in the UK and
how Manchester might play its part. He challenged the city to join him on the journey and noted the intentions of the city to establish a fund to support its innovation journey. He promised if this came into being that NESTA would be an active partner. During 2007, the city geared up to create a programme which aimed to:

- Achieve a step-change in the capacity for innovation in Manchester;
- Strengthen the innovation system across the city-region;
- Create a unique demonstration programme which could act as an exemplar for other UK and global players - a test-bed for interactive learning.

At this point in time NESTA was driving forward the thinking on understanding the nature and role of innovation and producing leading-edge research. Manchester had an ambition to undertake both a major research-based review and to seed entrepreneurial innovation. Based on the Manchester Science City Prospectus in 2005, the experience of stimulating the innovation ecosystem and supporting Innovation partnerships with the private sector had been a major challenge due to lack of any dedicated funding. This combination of factors and alignment of ambition and objectives led to the agreement to create the Manchester Innovation Investment Fund (MIIF) to support the test-bed.

6.1 Innovating an innovation systems approach

Van de Ven et al. (2008) drew on 17 years of research to describe the temporal characteristics of an Innovation Journey showing how and why innovations emerge, develop, grow or terminate. Their insights shine a light on the need to appreciate the sequencing of events over time. From their research we can discern a “road map” of how the innovation journey unfolds. Our experience in charting our way and adopting and adapting the latest 21st century thinking on innovation as it was researched and published by NESTA, was challenging as changing practices and addressing failures in a system is a complex task.

Our experience in Manchester reflects the general findings of studies across the EU (Reid, 2009) which describes the policy challenges in introducing an ecosystems approach. Reid characterises the position of such innovation policy as “...a misunderstood concept in terms of policy design and delivery, squeezed between a powerful ‘research lobby’ and more classic economic or industrial development policies. (Reid, Op Cit, p9). This uncomfortable positioning means that resistance to the novelty of the approach needs to be overcome and accepted by those more comfortable in a traditional paradigm of the linear R&D model or sectoral based interventions.

Arnold (2004) depicts four systemic failures:

- Capability failures (firm deficits, such as the lack of absorptive capacity);
- Institutional failures (barriers in universities, performance gaps in other agencies);
- Network failures (problems in the linkages between innovation actors or path dependency barriers from industrial structures; too rigid competition or monopolies);
- Framework failures (restrictive practices and background conditions such as consumer demand or attitudes to risk).

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8 No additional funding was accorded to the Manchester city-region under the Science City initiative.
To tackle each of these in a system wide approach is not only daunting but potentially prohibitive in terms of public investment and lead-in time. A pragmatic approach to the most significant barriers to enable step-wise progress and improvement was seen to be the only practical approach.

It is important to recognise however, that Manchester’s journey was purposeful and based on substantial knowledge of what works. It was nonetheless “innovating innovation.” The team did not have a recipe book; a road-map or any experienced guide who had taken an identical challenge with a city-region of 2.8M people. Our focus was unashamedly seeking to address the perceived network failures whilst encouraging others to address identified specific barriers in other system characteristics. This, we believed could achieve the greatest impact with our relatively limited resources. Some of the most critical aspects of our journey are set out below.

6.2 Leading the journey

The leaders in this partnership were critical to charting our course and remain vital to our final destination. They had the courage; the foresight and the tenacity to step in when needed; to step back when appropriate and to encourage, guide and sometimes chide when necessary. They invested their time, their funds, their power and their personal brands - to secure the best possible outcomes. Without that leadership, the journey would have been impossible. NESTA’s own research on “Leading Innovation” (Benneworth, 2007) describes the journey in the transformation of an “ordinary” region into one driven by innovation as being led by a coalition of actors, See Figure 1.

![Figure 1. Leading Innovation (Benneworth, 2007)](image-url)
While this approach appears a simple process, the author notes that the transition from one stage to another is often not straightforward and that a key aspect lies in having the right leadership for the right phase/stage of the journey. The aspiration of an innovation-driven region is to achieve the status of a “jamming super-group”. A region that can hold the big names together effectively and coalesce a community with multiple and competing visions for innovation policy, alongside great depth in innovation capacity - a place like Silicon Valley.

The challenge remains to ensure that the energy from the process does not dissipate as was observed through the MIRP studies (Van de Ven, op cit) or that innovations stop completely when some are implemented or when resources run out.

“Investors or top managers/leaders make attributions about innovation success or failure... they significantly influence the fate of innovations and the careers of innovation participants.” (Ibid, p 183).

Manchester and its partners need to be mindful of this danger, especially at a time of resource constraint and heightened sensitivity regarding outcomes and impacts. The establishment of the Manchester Innovation Group which crosses city-region boundaries and which straddles the convergent and divergent cycles of innovation has already adapted the approach to improve the boundary spanning function and to embed innovation in the formal governance structures of the city-region.

6.3 Innovation Manchester - building a community of innovators

The Innovation Manchester initiative aimed to develop networks among diverse actors in the innovation system and enable them to develop and deliver disruptive new solutions to the innovation challenges they themselves regarded as most serious and urgent. It ensured that businesses and higher education institutions were not only advisors on strategy, but an integral part of the solution.

A central part of Innovation Manchester was the Innovation Teams programme. This brought together 70 of Manchester’s most influential business leaders across six growth sectors (namely: Advanced Manufacturing; Biomedical; 21st Century Logistics; Creative; Sports; Digital Technologies). The businesses were taken through a facilitated process and the teams generated solutions to what they regarded as the most pressing barriers to greater innovation in Manchester. The external facilitation brought examples from all over the world of how other cities had approached their innovation challenges. Each team developed a business plan for their group and identified the gaps and opportunities from a private sector point of view. Over 21 potential projects were identified by the teams with milestones; private sector champions for leadership and each was assessed by a “Board” from the funders who selected projects for funding in terms of the critical factors which they addressed; their stage of development and their readiness for implementation. Projects were effectively divided across three routes:

- Feasibility and Pilot Programme
- Embedding in the mainstream
- Further concept development.

Three examples are illustrated below and the teams were thrilled if their projects were selected to be developed and taken forward - and many dedicated considerable amounts of their own resources, time and energy to project development and implementation. However, one of the biggest spin-offs was that people from different sectors met others from completely different sectors and some of the most exciting projects came from
cross-sectoral working. We were told that the most valuable experience was the bringing together of new people in a new network and engaging them with the city leaders and others who were trying to innovate in different ways, different businesses and different places. The Innovation Manchester network was born.

Work continues to build and animate this Innovation Manchester network through the careful use of social media. The social media strategy was something that was developed and adopted in real-time. The strategy continues to build on the success of the Innovationmcr Twitter and blog activity. These free tools were used to raise awareness of Innovation Manchester and have now been expanded to a range of engagement approaches which have developed conversations with and between members of the community via the Innovation Manchester LinkedIn group.

Innovationmcr to date has 1057 Twitter followers, and is included in 63 ‘lists’, demonstrating significant reach, influence and perceived value. The blog is now established on a newly configured website. The blog is an important part of the communication offer and is read by many for the interesting think pieces on innovation. The Innovation Manchester Network on LinkedIn now has 329 (relevant) members. This is a free to use service, again demonstrating great value for money. The Innovation Manchester LinkedIn group has been recognised as demonstrating good practice, with a ‘no sales or spamming’ policy. There are currently 53 live discussions, 42 of which have been started by members outside the core team, indicating a good level of members’ interest, engagement and ownership. This is particularly important, because we can draw on areas of group activity to ensure that our ‘face-to-face’ network activity is relevant and interesting. For example, the University of Salford has used the group to find business placements for MBA students, and group members have received special discounts and free passes to local third party events and workshops.

The LinkedIn group is used as a mechanism for finding new ‘unusual suspects’ to bring into the Innovation Manchester core network and to support the development of the latest Innovation Manchester programme (Innovation Boardroom). A first ‘mini-boardroom’ has sprung up spontaneously from the group discussions. A group of people currently outside the main membership have come together in an ‘Open Innovation’ approach to explore ideas for efficiency savings in the public sector. Manchester Business School hosted the meeting and output from this group will be fed into the Public Sector Innovation Boardroom later in the year.

For those Network members who are not ‘social media natives’ we have employed an “Innovation Activist” to ensure continuity through a fortnightly email, the Innovation Manchester Update, which regularly receives positive feedback from recipients is sent to 267 network members.
The use of social media tools has enabled the original network to expand and yet to keep linked to the original participants and we are currently undertaking a social network analysis study on the membership, see Figure 2 below.

6.4 **Innovation pilot projects and demonstrators (interactive learning):**

Innovation systems are not an end in themselves but are a means to economic development and social improvement, therefore, rather importantly, Manchester has used the network and the work which the Innovation Teams have undertaken to drive forward its economic progress, through innovative programmes which have furnished solutions to local problems or challenges.

In total, the innovation Manchester programme has supported the development of over 25 interventions, each of which has been separately evaluated and tested. Further work is proceeding to record and encapsulate the findings and lessons from these projects and a selection of them have been recorded in a recent NESTA publication - “Driving Innovation in Cities: Learning from Greater Manchester (NESTA, 2010). A snapshot only of three is given here.

6.4.1 **The Manchester Masters**

The **Manchester Masters** developed and managed by PR company Tangerine, was designed to inspire businesses to turn a negative trend around. This highly selective programme gives top graduates exposure to a broad range of marketing career opportunities in Greater Manchester. Successful candidates receive paid placements in local companies over the span of an academic year, giving them the kind of broad work
experience that they would normally only find in the graduate trainee programmes of a
major corporation and making them aware of the quality jobs available on their doorstep.
This programme was designed to address the specific problem that Manchester was
routinely losing its most talented creative students to London, whilst the creative
companies in Manchester were unable to compete with the internships of their larger
rivals - by working together the small companies demonstrated the maxim of “collaborate
to compete”.

6.4.2 Manchester: Integrating Medicine and Innovative Technology (MIMIT)

While the Manchester Masters programme might be characterised as demand-led
innovation. MIMIT drives demand for innovation by building lasting relationships
between clinicians, scientists, engineers and industry that can help identify emergent
technology and pull it to market to address urgent, unmet clinical needs. A collaboration
between the University of Manchester and Greater Manchester NHS and Primary Care
Trusts, and in partnership with the world-leading Centre for Integration of Medicine and
Innovative Technology at the Massachusetts Institute of Technology, this aims to
capitalise on existing, underexploited strengths in medical technology in the Manchester
City Region and to significantly increase the output of commercialised medical
technology innovations from Manchester City Region.

MIMIT supports a large team of ‘site miners’ – specialist clinicians and research
scientists - to identify unmet clinical needs and identify promising technologies and build
productive relationships between them. Short-term impacts are already impressive.
The programme was in effect a “franchise” from a successful programme in the USA -
Manchester being the first place in Europe to test and adapt the model for a different
system. The programme was an excellent demonstration of the “openness” of Manchester
to good ideas wherever they are to be found and the absorptive capacity of the innovation
system in the city.

6.4.3 Fablabs

A third approach was to focus on helping innovators benefit from knowledge shared by
others while encouraging them to share their own knowledge in return, increasing the
value of the innovation ‘commons’ for all. In Manchester, this approach was exemplified
by Fablabs. Fablabs are Fabrication Laboratories: community workshops that provide the
space, tools materials and skilled staff for anyone to make pretty much anything. They
create a space, tools and advice to help individuals to unlock their capacity to create and
invent.

At first glance, Fablabs look like a traditional physical infrastructure investment. But
their novelty comes in the way they change the incentives for innovators to share their
intellectual property with others. Businesses and inventors can pay to use the facilities to
make proprietary prototypes, but they are open to anyone who wants to tap into their
powers of invention for free if they share the fruits of their labours with the public.
Manchester’s Fablab opened in winter 2009, joining a network of over 30 Fablabs around
the world, from Boston to Afghanistan.

This programme was a shining exemplar of what Ostrom has written about in
innovation systems - the complete antithesis of the “tragedy of the commons”.

These three examples demonstrated that through a “learning by doing” approach, the
Innovation Manchester programme was able to extend its reach to a far wider community
of innovators. The project leaders themselves became intermediaries in the system and
demonstrated the “power law” of networks. The Innovation Manchester programme has
some months still to run and it is hoped that by the end of this time the effect on the
innovation system will have been self-sustaining. The current shock to the system of the financial crisis will be its biggest test.

7 Conclusions

In many ways it is too early to draw firm conclusions from the test-bed of Innovation Manchester or to draw firm recommendations for policy interventions which both support and activate the power of innovation systems. Many of the lessons are not about the “what” of the process but about the “how”. Engaging mutual self-interest and creating a vibrant Community of Innovators is not susceptible to a “command and control” mechanism or a top-down planned intervention - it is about empowering people to innovate; unleashing the power of networks; connecting the flows of knowledge to purposeful outcomes and moving away from an approach which gathers “ingredients” of the system. It is important to have these ingredients; to know the authentic competencies in a place; to understand the assets and opportunities and challenges and while a recipe is important, the best chefs or conductors add a certain je ne sais quoi to the process. What is appropriate for Manchester may not necessarily be the right approach for other places - knowing the local circumstances is vital.

Key challenges which we set out to address have been met through the recruitment of the energy and commitment of many different individuals across Greater Manchester. The right kind of leadership was critical. The need to convince and to address inertia in the policy community has begun. Early outputs have demonstrated a measure of success through specific projects. The inadequacy of assessment and evaluation tools has begun to be addressed and the power of a networked approach has seen impact far beyond the initial interventions. The difficulty of attribution of impact remains as a significant challenge for the coming months and years. The Manchester test-bed has not yet told its full story - but its implications when available will hopefully enable policy makers and local economic development practitioners to be better able to release the power of innovation for the benefit of their local populations and improve the approaches to policy and interventions in other innovation ecosystems.

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Deconstructing the triple helix model of knowledge based urban economic development

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Structured Abstract

Purpose – This paper examines two critical components in the successful implementation of university-business partnerships in location-specific knowledge based development.

Design/methodology/approach - First it highlights the contribution of absorptive capacity as a dynamic concept and the way in which this has been operationalised at the firm level. Second it examines the role of location based policies and mechanisms in facilitating the roles of universities in city-region innovation systems.

Originality/value – It draws on empirical research studies and a practical implementation exemplar from Greater Manchester, UK. The paper contributes to the operationalisation of the concept of absorptive capacity which hitherto has been described but not analysed and examined from a practitioners point of view. In addition, it extends the concept to location-based approaches to economic development.

Practical implications - This for the first time guides the actions of those who are charged with strengthening the operation of triple-helix partnerships in specific locales.

Keywords - absorptive capacity, knowledge transfer, universities, business, local economic development

Paper type - Practical paper

1 Introduction

The ability of firms to absorb knowledge and translate it into improved or new products, services, and processes is a critical element of their ability to innovate. However
we argue that this concept of “absorbptive capacity” may be extended to the characterisation of local innovation systems. In particular, we propose that the elaboration and operationalisation of the concept becomes a valuable tool for local economic development organisations seeking to engage with local universities and develop their contribution to knowledge based innovation.

We have observed that it is a property of modern localised innovation systems that they are complex emergent systems which are not susceptible to direct management by public policy makers in the manner of directing resources to be applied to achieve a predetermined outcome. However they may nevertheless be observed and described with a view to identifying rate limiting steps or barriers which are inhibiting the realisation of opportunities and which are therefore susceptible to interventions which may overcome such obstacles.

Recent research by the Council for Industry and Higher Education (CIHE) and its collaborators has identified and characterized the dependency of knowledge based innovation on the construct of absorptive capacity. This particularly applies to the use of higher education institutions as knowledge sources by business in the practice of open innovation (Abreu, Grinevich, V. Hughes, A. Kitson, M. and Ternouth. 2008; Cope, J.; Garner, C.; Kneller, R., Mongeon, M. and Ternouth, P.; 2009; Docherty, D. Herrmann, K. Ternouth, P. 2010). This paper presents a meta-analysis of the original research reported in these publications in which Ternouth was Principal Investigator for CIHE. Higher Education (wrongly in our view) has been described as “the driver of innovation”1. Our research has demonstrated rather that it is a key supporter of knowledge based innovation in ways that are dependent on the fit between the research resources, expertise and outcomes and individual company innovation processes and strategies (Docherty, Herrmann and Ternouth, 2010 op cit). Innovation is largely driven by the perception and pursuit of opportunities by and within organisations. We argue that because the effectiveness of this support is dependent on absorptive capacity of the innovation ecosystems and because such ecosystems have a distinctive place based character that this provides policy makers who have economic development responsibilities with the basis for interventions which can boost innovation by diagnosis of and attention to such localized limitations.

2 Absorptive capacity – conceptualisation

It has been demonstrated that within the firm, the ability to make use of external knowledge is dependent on the individual abilities of its workers, on the previous level of internal know-how, and on the quality of internal communication mechanisms, which together constitute a firm’s absorptive capacity (Cohen and Levinthal, 1989, 1990; Zahra and George, 2002). However this concept of absorptive capacity needs to be operationalised at the company level (Zahra and George, (2002)) to be practically useful in the microeconomic context. Abreu et al (op cit) observed that there were distinctive characteristics of successful business university projects which provided an insight to the way in which this can be described. This reflects the nature of absorptive capacity as

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1 “Today, universities are accepted as being one of the prime sources and drivers of innovation and receive some of their funding from government, directly or indirectly, as a consequence.” http://www.innovationuk.org/news/innovation-uk-vol6-1/0348-drivers-of-innovation.html
realized in a dynamic process rather than just an inherent set of capabilities. These characteristics included:

- The identification of opportunities
- The co-formulation of projects
- Embedding in company operations
- Diffusion within the company.

2.1 From Firm to Dyad – absorptive capacity in university – business partnerships – the double helix

Research carried out which was summarised in Docherty et al (op cit) and now described here in more detail emphasised the importance of the dyadic nature of absorptive capacity. Van den Bosch, van Wijk and Volberda (2003) citing Lane and Lubatkin (1998) described the importance of considering a learning dyad in an evaluation of absorptive capacity. That is that absorptive capacity is not a property of an organisation in isolation but a property of the learning dyad. The ability of either to learn from the other or work productively together is a specific property of the partnership.

Investigations into the rationale for companies to work with universities and what they do to create value from this enabled a number of cultural and structural components to be discerned. The cultural elements include the business strategies and the beliefs and behaviours which give effect to these. The structural elements include the accepted practices and processes which can routinise the processes of identification, absorption and application of external knowledge together with the staff capabilities and capacity which operate these. The cultural components included beliefs and practices affecting how innovation is carried out and in particular the potential role perceived for universities.

The importance of the innovation strategy adopted by the company is critical. There are distinctive competitive advantages available to companies collaborating with universities (Docherty et al op cit). However a company operating a closed system of innovation or operating an open system but which does not believe that universities have anything to offer is unlikely deliberately to seek university partners. In this context absorptive capacity also has a qualitative dimension. This dimension concerns at what point in the innovation process university research is perceived by the company as becoming relevant and the type of project it will anticipate developing with a university. Four main motivations were discerned, which ranged from seeking to understand the potential opportunities which might arise from future research, through seeking to evaluate the utility of research outcomes, characterising the approaches which research might suggest for addressing a set of commercially relevant opportunities or issues, to collaboration in a project with an agreed set of outcomes rendered possible by the application of research.

Companies experienced in working with universities recognised that the motivation and outcomes varied with their own business strategy and type of product or service offered. This affected the distance from commercial application at which the incorporation of research outcomes in their own innovation processes offered a real competitive advantage. Thus a medium technology manufacturing company which identifies an opportunity for enhancing the efficiency of a manufacturing process would be expected to engage with the knowledge base considerably closer to market in the degree of application specificity than would a pharmaceutical company seeking to understand the direction of research to anticipate influences on its potential pipeline in 5
years time. Understanding and having an expectation of the role which a university might play is a capability in company and university staff which can be developed through experience but the lack of which is a potential barrier (Docherty et al op cit). It is on such an expectation that the identification of opportunities to work together and co-formulate projects depends. The extent to which this expectation is shared is a component of the absorptive capacity of the dyad.

Our research has also demonstrated that the range of potential contributions that university research expertise and outcomes may make to company innovation processes and value chains is extremely broad. In approximately 100 successful cases only 20% delivered new technology into company products, undermining completely any concept of technology transfer being the dominant mode of economic impact from research (Cope et al op cit). See figure 1, below. We also observe a substantial differentiation between different universities in the roles that they may play in innovation systems. Understanding both the range of impacts and the differentiation between universities is part of the capabilities which contribute to absorptive capacity within the learning dyads.

![Figure 1. Range of Value Chain Impacts – from Cope et al 2009.](image)

We have observed that the majority of successful business university projects are the result of the co-formulation of ideas and implementation plans between company and university staff (Cope et al, op cit). Such co-formulation is important in order to localise academic research against company specific projects (Allen, Tushman and Lee, 1979, cited by Abreu et al op cit). This co-formulation was described as the key role of academic and company “gatekeepers” and is reliant on the tacit knowledge of the research possessed by academic staff and of company processes and technologies by company R&D or production staff. The term “gatekeeper” here refers to those who perform an active role in translating knowledge from an external context to an internal. Both sources describe the key role of academics rather than commercial or technology transfer offices in performing this function. The term “gatekeeper” is used here for consistency with the previous literature, notably Allen, Tushman and Lee (op cit) although it is acknowledged
that in the sales and marketing context it has negative implications (meaning a controller and limiter of access rather than a facilitator and translator).

Performing this translation activity requires effort and commitment and is in turn dependent on the development of personal, trusting and working relationships between the gatekeepers. We have argued that Business – University interactions display many of the characteristics of buying and selling in industrial markets described in the “Interaction Model” (IMP Group, 1982)). The development of relationships is so important to the concept of place based innovation ecosystems that it is worth rehearsing these conclusions at some length.

“These relationships cannot be understood as a series of serially independent transactions in the way that consumer markets are described and understood. Instead, transactions can only be examined as episodes in the development of often long-standing and complex relationships between the buying and selling organisations. This approach emphasises the interdependence of buyer and supplier (with the buyer being as dependent on the supplier as the latter is on the former), the limited number of potential buyers and suppliers available to each other and the active participation in a search for new relationships by each of potential suppliers and buyers – not just suppliers, and the transaction cost involved in developing such relationships.”

Social interaction is particularly important where there is a high cultural distance between the two organisations, where it is necessary to “learn” the social system pertaining in the other organisation or its market and where it is necessary to determine how and in what way a product or service may be supplied which will meet a buyer need. These are all a common feature of business – university interactions. Repeated episodes are important in the build up of trust before a high dependency relationship may be developed. Interpersonal contacts are important for problem solving, exchanging social values and demonstrating commitment to and credibility with the other party.

Companies value the trust and understanding developed in existing relationships and in the co-creation of projects (“where it is necessary to determine how and in what way a product or service may be supplied which will meet a buyer need”) and in learning the value system of the other party.

University public space activities (such as the stimulation of networks, entrepreneurship centres, alumni networks, conferences, seminars, workshops and boardrooms and conferences) (see Cosh, Hughes and Lester, (2006)) are an important means of identifying potential relationships through which potential company and university gatekeepers may come into contact. They are important in the formation of contacts because they allow for a conceptual space in which contacts between these boundary spanning individuals may be formed in a relational rather than transaction oriented context and for the emergent process of opportunity identification and project formulation to take place. In this context they correspond very closely to the Japanese concept of “Ba” (Nonaka, Toyama, Konno, (2000)) in providing physical and conceptual space to develop opportunities for knowledge exchange and management by the gatekeeping roles in both the universities and business. They have the effect of taking university academics out of the “teach tell” paradigm which we have observed to present barriers to the identification of opportunities by companies (Cope et al op cit). Companies need the capacity and capability to develop and implement these projects but such absorptive capacities are potential only unless the perception of an opportunity is triggered. The ability and propensity to activate these “triggers” is an important component which turns potential absorptive capacity into actual absorptive capacity (Van

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den Bosch et al op cit). The extent to which opportunities are available to operate these triggers by enabling the re-positioning of university research in relation to its ability to address a commercial opportunity is a part of what might be described as the absorptive capacity at the level of the innovation ecosystem as it affects all potential actors.

2.2 Embedding & diffusion

University research outcomes do not normally immediately fit into company value chains as “ready for market” products or services. Companies need to take steps to absorb and embed new knowledge assets in order to make use of them within the business. (Cope et al op cit, Abreu et al op cit) This embedding usually takes the form of the co-creation of an intellectual asset by company and university staff (new technology, new process knowledge or development methodology) and its incorporation into company manufacturing or business processes such that it is under the control of and therefore of direct utility to the company. This requires effort by company staff and the commitment of company resources. The way in which companies operate the innovation processes which achieve this may be highly formalised and particularly in high technology industries with long investment paths to market (such as the pharmaceutical or aerospace industries) this embedding is likely to be carried out at an early stage in the process (Docherty et al op cit). Irrespective of the degree of formality or codification of the innovation process there are two common features which affect the ability of the company to absorb and apply co-created knowledge. Firstly the company needs to have some form of organic R&D capability from which the embedding activities might be resourced and secondly the company needs to be able to commit the staff and other resources (such as plant and equipment) to implement the embedding. The ability of the project champion (such as the company gatekeeper) to obtain the management commitment to provide the necessary intellectual and financial resources and schedule their availability is a key element of absorptive capacity. These activities take time and effort and may themselves require support from the university partner.

The acquisition of an intellectual asset by the company may not by itself result directly in economic impact. Kneller (2009) observed that simple absorption into company R&D labs may not ensure a translation into economic impact if support for the necessary commercial exploitation is not obtained from senior management. The company’s ability to diffuse such intellectual assets for application is a key part of its innovation capability. Abreu et al (op cit) note in particular the ways in which companies such as Rolls Royce and BAE Systems deliberately develop these aspects of their structural capital to enable the widest possible scope for exploitation by the company. Experienced companies recognise that a considerable commitment to project management by the company and deliberate attention to the embedding and diffusion process is important to obtain real benefit from academic collaborations.

3 Absorptive capacity as a emergent property of innovation ecosystems

Thus far absorptive capacity has been treated largely as a property of either individual companies or as a property of teaching / learning dyads. However our research has identified many cases in which there was no existing firm to localize and exploit research outcomes against market opportunity and new companies are formed as either university spin outs or start ups. Ternouth (2002) Garner and Ternouth (2003) and Cope et al (op cit) described the circumstances in which such company formations are potentially viable as
those in which although there is a potentially viable market application the market
currently lacks the absorptive capacity in existing firms to identify and realise the
opportunity. Notably such cases also involve the identification of potential applications
which are in market sectors other than those which originally provided the context and
motivation for the academic research.

It is characteristic of successful start up companies included in the cases researched
that entrepreneurship is seen to play a significant role in their foundation. The description
of entrepreneurship which corresponds most closely to the activities which brought these
companies into being and developed the business is that of Saras Sarasvathy (2008) In
this context “entrepreneurial behaviour” describes the identification of opportunities
potentiated by latent market need and identified assets. The identification and
qualification of opportunity is heavily influenced by the resources which are to hand and
which those may be encountered. Opportunities are qualified and pursued by the
identification of and partnership with potential stakeholders in the venture. Risk is
managed on the principle of “affordable loss” rather than risk tolerance. (Drew &
Sarasvathy, 2009) This approach “ begins with a determination of how much one is
willing to lose and leveraging limited means in creative ways to generate new ends as
well as new means.” This is an iterative process which may change the objective
depending on the resources which may be marshalled against the opportunity and new or
additional opportunities identified. Most importantly this iterative character is entirely
reliant on contacts formed in existing or new networks. It uses the very practice of
building the venture to bring other stakeholders on board and identify new opportunities.
It is characteristic of an effective ecosystem that it provides opportunities to use formal
and informal support networks in a way that is described for the “innovation ecology”
that grew up in Oxford in the last decades of the 20th Century (Hague and Holmes, 2006).
These networks provided entrepreneurs with the opportunity to meet potential partners,
academic collaborators, generate ideas, receive advice and raise funding. The networks
grew with the businesses as an emergent process.

Entrepreneurial behaviour is also observed in the actions of effective academic and
company gatekeepers and they may receive support through precisely the same networks.
Hence it is useful to consider the concept of absorptive capacity of the innovation
ecosystem itself. It is relevant to the formation of new and development of existing
business with the support of the HEI knowledge base. For example the ecosystem itself
provides a context for university and company gatekeepers to meet “in the public space”
thereby contributing to and supporting the absorptive capacity of the individual
organisations.

Sarasvathy (2008, op cit) contrasts the entrepreneurial with the managerial approach
which seeks to reach a defined objective in the most efficient manner with the resources
provided and the strategic approach which seeks to assemble the resources needed to
reach a given objective. It is important to state that this is not a judgement of the value of
the different approaches. Each style is needed at different stages of an innovation project.
It would be impossible to deliver a new therapeutic to market if all of process were
managed in an entrepreneurial fashion but it may be entrepreneurial behaviour that
recognises the opportunity in the first instances and convenes stakeholders in support.
Introducing products into market will require a progression through strategic (identifying
the best way of meeting a determined end) to managerial styles.
4 Leveraging absorptive capacity as a strategy

Absorptive capacity may be deliberately supported as a strategy for promoting economic development through exploiting the research base in higher education. We have argued (Abreu et al, op cit) that UK Knowledge Transfer Partnerships programme (now successfully transferred to Sub Saharan Africa) does this by:-

a) supporting the gatekeeping and co-formulation process with expert advisors employed by the Technology Strategy Board,

b) developing the organic R&D capability of the company with a good graduate closely supported by an expert academic supervisor

c) assisting the partners by assisting them to operate a structured project management process; Docherty et al (op cit) drew attention to the need for business – university projects to be subject to strong project management processes to ensure that the benefits were obtained and that this was a key learning point for newly collaborating companies.

Cope et al (op cit) reported that a similar modality of industry university collaboration had been developed organically by several US universities with graduate students supported by university professorial staff acting as interns in collaborating companies. Also in the UK programmes such as the Engineering Doctorate and Industrial Doctorate Centres help to develop the organic R&D capability of companies through doctoral level research projects which take place embedded in participating companies addressing projects which offer commercially valuable outcomes. Griffith (2000) showed that the return on externally carried out research to companies increased in proportion to their own organic R&D capability. Docherty et al (op cit) observed cases in which the experience with such assisted modes as Knowledge Transfer Partnerships stimulated further organically generated projects with new partner universities. The same principles through which the absorptive capacity of companies engaged in open innovation through collaboration with university researchers may be deliberately supported are being applied in the development of a pilot programme by the Ministry of Industry and Trade in the Czech Republic (entitled “Innovation Activity – Promotion of Knowledge Transfer”)

5 Cities, city regions and knowledge based innovation

Innovation Ecosystems such as that described in Hague and Holmes (op cit) are location specific. Innovation involves processes which include the identification of opportunities to provide new products, processes and services which involves the assembly and co-ordination of a variety of assets (intellectual, physical, human and financial) a key property which influences their identification and use is common location. We have observed, for example the importance of contact and the development of personal relationships between gatekeepers.

The concept of “place” and “location” may vary from region to region and is in part at least affected by the components of absorptive capacity and (and in particular the ability to exert traction on resources and act at a distance) of the individual actors. Brown and Ternouth (2006) reported that for large companies such as BT “local” typically meant within Europe or where it had embedded infrastructure (as at MIT). Nevertheless location and proximity will have a major impact in cases where the company comes into contact with potential collaborators through the university’s public space activities or if, motivated by a search for capability, the company contacts the nearest university as the default option. In such cases, the transaction costs are processed implicitly by the company and where the capability that is sought appears readily available, it would be
reasonable to expect that local partnerships would tend to form more frequently than
distant ones. We have observed in the research reported in Abreu et al, Cope et al and
Docherty et al that spin out companies tend to form close to the university from which the
research originates either because the academic researchers from whom the founding
technology springs retain academic appointments and remain an important collaborator
with the company or because the company needs access to graduates from the source
university. In the majority of cases reported in Hague and Holmes (op cit) that the
companies remained in Oxford.

Abreu et al (op cit) reported that there is little evidence that the transaction costs
involved in the interaction are often explicitly processed in partner selection. It is more
likely that where world-leading expertise is deemed critical in the interaction, a pragmatic
decision will be made on how the interaction will be managed although the extent to
which it might be developed might be limited or the threshold on how beneficial the
interaction needs to be to proceed might be raised. However Unilever, as reported in
Docherty et al (op cit), did make explicit decisions as to whether the requirement for and
benefits of world leading expertise outweighed the transaction costs of working at a
distance. Transaction costs may, however, have a larger impact on the decision of small
companies, who will generally not have a dedicated staff for dealing with university
interactions, to interact with academics. Proximity may therefore be more a more relevant
factor for small companies compared to larger firms and is particularly important for the
interactions between entrepreneurs and potential stakeholders.

The importance of universities as economic actors for city and regional economic
development agencies arises from the fact that they do not move. Abreu et al (op cit)
described them as “local economic “anchors”. They are both suppliers of and can act as
attractors of talent. For example the decision to establish Toshiba Europe Research in
Cambridge was heavily influenced by the quality and quantity of the research. When it
spun out “Terraview” not only was the University a source of talent for the new business
but it attracted supporting organisations and companies such as the investors.

6 Economic development agencies and the roles of universities

Knowledge based innovation as observed in the cases we have studied is at its
inception an emergent process. Public Authorities may be able to support it but other than
through the medium of procurement (Ternouth, 2007) are unlikely to be able to direct it.
They may however be able to lower barriers by influencing the ability of the ecosystem to
support it. The competitive advantages of places; their ability to attract and generate the
resources for innovation and to create the environment in which the barriers to the
absorption and application of knowledge to innovate are low and the prospects of success
for innovators high) will determine their ability to generate economic and social capital
for the wellbeing of companies and citizens.

A lack of absorptive capacity of the innovation ecosystem might arise from such
factors as:-

- A lack of organic R&D capacity in local companies;
- Assets are missing from the local ecology such as premises, specialised
  premises, operating plant, specific technologies, knowledge, finance or access to
  market channels;
- Opportunities are not perceived by potential stakeholders (ranging from the
  simple awareness of open innovation as a strategy at one extreme or of the
potential relevance of university research at the other).

- Potential complementary stakeholders are unaware of each other or have barriers to contact;
- The organising principle (such as entrepreneurial behaviour) is lacking;
- The results of interventions or investment in innovation are not identified with a view to providing positive or negative feedback.
- Translators (or active intermediaries\(^2\)) who could act as brokers between stakeholders and assist them lack the capacity to organise information and justify the investment in interventions do not exist.

Many of these barriers can be addressed by public agency intervention in particular stimulating and supporting the role of intermediaries/ transactors. In addition universities are well placed to act as delivery agents, where strong partnerships exist between economic development agencies and their local institutions.

Universities are key actors in any innovation ecosystem however an understanding of the complexity of the role which such institutions may play has not always been recognised by local economic development agencies. Too often, universities are seen as “suppliers” to the local economy, delivering an educated workforce or undertaking research tasks on commission. True innovation ecologies recognise the breadth of functions which universities can play from their “public space” role to being key businesses in their own right in the locale. Thriving innovation ecologies can benefit from a broad spectrum of engagement with their local universities. As generators of research; educators of talented students; businesses and social institutions in the community, universities can bring a wealth of resources to support innovation and to assist the level of absorptive capacity for innovation in the city-region.

For example, if what characterises the successful use of R&D is its widespread adoption for the benefit of society, then cities which partition their research and scientific activities in separate enclaves divorced from the people in the city and separated from businesses and the market are unlikely to win the race for increased innovation. Understanding the mechanisms behind innovation implies very different strategies. Indeed, Lester (2005) points out that the university role in the local innovation processes will depend on the nature of the local economy (Op cit). At different stages of industrial transformation, the local innovation system needs universities and research institutes to play different roles. In a local innovation system which is operating at an advanced level – as an innovation hub in the global knowledge economy - then universities should be operating to provide national and regional links into the global knowledge economy. They can exchange knowledge, gather intelligence and facilitate international flows of highly – skilled people who in turn, create and attract high value-added businesses (NESTA, 2007).

In less well developed local innovation systems, universities need to play different roles. “Not all local economies are like Silicon Valley; not all industries are like biotechnology or software and not all universities are like Stanford”( Lester, op cit, p28). The development of local/regional innovation systems and the role played by their local/ regional universities need to be aligned. A university’s contribution to the local innovation system needs to be sensitive to the nature of the local economy and the development of the local system and its universities therefore need to be allowed to vary and be understood in this context. Building on the importance of shared expectations we

\(^2\) A term coined by SURF at the University of Salford, Manchester UK.
can argue that this common understanding is part of the system’s absorptive capacity. Seeking to clone Stanford University in an undeveloped ecosystem or seeking to clone Silicon Valley where there is no equivalent university are both doomed to failure unless the needs of each part of the system can be met by different means.

In a recent policy briefing, NESTA (2007) has described five roles which universities play in relation to innovation:

- Generating knowledge needed for innovation;
- Developing the skills for innovation;
- Exchanging knowledge;
- Acting as a hub in an international network of knowledge;
- Providing regional leadership.

Given the need for differentiation as described above, this range of roles will be variable depending on the local/regional context. The roles however go far beyond the narrow definition of a university-business technology transfer model which dominated the first generation of thinking on knowledge-based regional economies. In advanced knowledge economies, the last two roles are where universities can begin to play the role of “gatekeepers to the system itself” in the local innovation system. Just as gatekeepers provide valuable translation roles in relation to the knowledge exchange across the university-business boundary, universities as organisations are increasingly able to act as hubs in an international network of knowledge flows. Over 40% of the scientific output over the last five years in the UK involved international collaboration (Lester, op cit). Likewise universities are frequently central to local economic development and innovation initiatives. However, their capacity to act as gatekeepers for the local economy is not guaranteed and neither is the absorptive capacity of the local economy guaranteed to respond.

In this context, independent innovation intermediaries can play a vital role in building alignment and a web of relationships across the region. Such intermediaries will bear the responsibility for ensuring that all actors in the innovation system are clear regarding their respective roles at any point in time. This in itself is a challenging role as innovation ecosystems are by definition not fixed. An innovation ecosystem is dynamic, growing and evolving according to new needs and new circumstances and subject to change as a result of new policy initiatives (Wessner, undated). It is a system of interlinked individuals, organisations and firms and therefore is challenging to either represent visually or in which to intervene holistically.

Creating an innovative culture across a metropolitan area requires foresight, optimism, leadership and perseverance. Manchester has shown such characteristics across the decades. When the Core Cities\(^3\) were asked in 2003 to define their prospectuses for the coming 10-15 years, Manchester embraced the vision of a city revived by the talents of all of its citizens, using the powerhouses of the city’s universities, its cultural assets and its intellectual capital. Manchester sought to become a leading Knowledge City, with a vision which embraced creativity, innovation and enterprise. A new partnership was born to lead the effort – Manchester: Knowledge Capital.

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\(^3\) The Core Cities Group is a network of England’s major regional cities: Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield.
Manchester: Knowledge Capital – innovation intermediary

Manchester: Knowledge Capital was established as a partnership of city, university and business leaders – an intermediary agent to align the efforts of the partners and to drive forward the innovation in the city, a partnership umbrella which enables short-life task focused partnerships to be established, to deliver and to redeploy as the agenda requires. This is a powerful approach to a difficult way of working. It relies on strong relational capital. Manchester: Knowledge Capital is a vehicle that has to lead without authority, which has to stimulate new approaches but which has also to recognise and embrace the diverse objectives of all the partners and to broker collaborative working and deliver ambitious change. Leadership in this context is not always straightforward. It involves working across institutional and thematic boundaries and it involves accepting, and persuading others to accept, that a long-term view is essential and that the rejuvenation of the city needs not only new physical infrastructure but also strong social and relational capital across its diverse communities and institutions. The Manchester: Knowledge Capital partnership is looking and planning ahead – scanning the horizon, seizing opportunities and tackling the challenges that Manchester has to address to maintain and build on its remarkable transformation. The Manchester: Knowledge Capital partnership is in effect acting as a knowledge broker (McKinsey, 2010) across the city-region and working with the partners, including each of the four universities to ensure that their roles are aligned with the vision for the city-region innovation system.

The push for innovation in Manchester is not only about increasing the number of start-up companies from the science base, not only about increased external private sector investment and the development of new science facilities. These will all be important but in Manchester for example, the financial and professional services sector accounted for almost twice the GVA as the life science industries in the city and employed over 33,000 more people. Likewise the rate of growth in the financial and professional services in Manchester was one and a half times the national average between 1998 and 2003. The digital and communications and new media industries in the city all grew at a faster rate than the national average and generate almost the same output as the life sciences. A strategy for innovation that does not include these dynamic sectors would be obviously insufficient.

The role of each of the city-region’s four universities differs. The University of Manchester is a research intensive institution with £274m of research spend, currently ranked 5th in the UK and 40th in the world on the Shanghai Jiao Tong Index. The University aims to be in the Top 25 in the world rankings by 2015. Research income is set to double and the university forecasts that its regional economic contribution of £1.4bn will double by 2015. Manchester Metropolitan University (MMU) attracts more students from disadvantaged backgrounds than any other UK higher education establishment. It is also one of the largest providers of science, engineering and technology courses in the country. MMU’s regional economic impact is estimated at £690M p.a. and rising. The University of Salford is noted for its innovative and applied courses that satisfy the needs of students and employers. It has a research focus on real-world issues and is in the top one-third of research universities in the UK. The University

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4 Manchester figures quoted here are for the City-Region: City Region Development Plan, 2006, Manchester Enterprises, UK.
5 GVA – Gross Value Added (standard economic output measure used by OECD.)
of Salford has an increasing focus on digital media as it re-located part of its campus to MediaCity:UK. The University of Bolton received University status in January 2005. The University prides itself on its links with business and courses related vocational placements. Bolton has an outstanding reputation of supporting its students into successful careers and has an imaginative approach to enterprise and links with the local community.

This variability is reflected in the different ways in which each of the institutions contributes to the innovation ecology in Manchester and each engage with Manchester: Knowledge capital’s range of programmes which have been designed to stimulate innovation across the city-region and to ensure that the knowledge assets which are generated locally support the broader efforts of the economic development agenda. For example, the University of Manchester Business School was instrumental in undertaking the baseline research which led to the development of an Innovation Prospectus for Greater Manchester, drawing in evidence and experience from many different places around the world.

Manchester Metropolitan University has been hugely successful in creating the space (Innospace) for student start-ups and spin-ins from the local community. The University of Salford is playing an increasingly important role in the digital-media space and leading on the approach to the use of “open data” for services in local communities.

Each of the institutions and individuals from academia play vital roles in the Innovation Manchester initiative which has sparked great levels of commitment and enthusiasm among team members, unleashing real energy and commitment to driving the innovation agenda forward. Just as university public-space activities are an important means of identifying potential relationships through which potential company and university gatekeepers may come into contact so are urban networks and spaces for people to meet and form new purposeful relationships.

Innovation Manchester has enabled relationship capital to grow by reducing the friction to knowledge exchange increasing the absorptive capacity of the ecosystem. It adds to the “public space” available for the conception and development of opportunities and energises and stimulates the discourse. The Innovation Manchester initiative was designed specifically to enhance the environment for innovation in Manchester. As such it was designed not specifically to increase the level and quality of knowledge exchange between universities and local firms, but rather to address some of the gaps in the ecosystem set out in Section 6 of this paper. The programme under the Fund consisted of both large scale background research which has informed actions across the ten authorities of Greater Manchester and a range of facilitation exercises bringing together individuals from business, academia and public agencies to identify areas where there were barriers to innovation in the locale.

A series of six short-life Innovation Teams, grouped broadly by sector and consisting majorly of business leaders created a diverse agenda of interventions to “animate” the

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6 MediaCity:UK is a major new development which will host the BBC as it moves out of London. The University of Salford and the BBC are the “anchors” of this exciting new development.

7 The Innovation Investment Fund – supported by the following partners. NESTA, NWDA, Manchester City Council, the Manchester: Knowledge Capital Partnership and Commission for the New Economy (Manchester Enterprises).
ecosystem - the best of which were subsequently funded by the Innovation Investment Fund.

This initiative has begun to deliver over 25 projects from access to technology for young people across the city to a “Manchester Master’s” programme for the creative industries in conjunction with MMU. A digital ticketing project is being put together by people from the sports, logistics and digital teams – to run a UK pilot. A group from the advanced manufacturing team has established the UK’s first “Fab Lab” licensed from MIT to showcase and allow hands-on support for advanced manufacturing. More generally, the project is developing a continuous and continual process for innovative ideas across the city-region, building on the relational capital established through the project and allowing ever-widening participation from business, academia and the public sector. A series of “Inspiring Innovation” seminars has brought challenging speakers and local audiences together at multi-disciplinary and multi-sector events. These events have not only produced challenging topics but have brought new ideas into the city and have enabled different groups to be more receptive to new thinking and problem solving. In addition, the mixing and melding of the six teams has grown into a lively and vibrant network of local connections across individuals from different backgrounds.

It is too early to finally judge the formal impact of this initiative but what is already evident is the power of these new networks in terms of the flow of information and the ability to align disparate efforts across the city-region and the fact that a number of the individuals involved are now trading with each other and self-starting their own initiatives. We believe this is a sign of enhanced absorptive capacity with the Manchester Innovation Ecosystem. Understanding the nature of absorptive capacity and the critical role which relationships and face to face contacts play in securing co-development; collaborations and breaking down perceptual barriers across the different groups which constitute the triple helix in a place has already led to increased partnership working and greater social interaction and the absorption of new ideas and an increased appetite for innovation as a vital process in the continuing transformation of Manchester’s Knowledge Economy.

8 Conclusions

To date, the concept of absorptive capacity has been a theoretical construct which has enabled those studying businesses to explain potential differential performance in relation to the ability of businesses to mobilise external knowledge. However, through detailed and empirical study, the authors have shown that the concept has underlying characteristics which can be amendable to interventions and improvement. Whilst this is undoubtedly important in improving the quality of the university-business dyad, this paper argues that a broader conceptualisation whereby absorptive capacity is seen as an underpinning attribute of localised and vibrant innovation ecosystems - begins to reveal roles for key institutions in such systems in improving the capacity of the system to absorb and utilise knowledge to drive up the pace and the potential success rate of local innovations.

Using the exemplar of Manchester, UK, the paper explores the differentiated role of universities in any innovation ecology and the complementary role of a locally-focused innovation intermediary - Manchester: Knowledge Capital in aligning the institutional roles with the needs of others in the ecology and as a knowledge-broker and connector in the system. Places which are seeking to strengthen and develop their capacities for innovation could benefit from the use of such a framework to examine their respective
ecologies. Understanding the role and constituents of absorptive capacity is an essential part of this endeavour.

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Towards a unified method for the knowledge based urban development framework

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Structured Abstract

Purpose – The growing debate in the literature indicates that the initiative to implement Knowledge Based Urban Development (KBUD) approaches in urban development process is neither simple nor quick. Many research efforts have therefore, been put forward to the development of appropriate KBUD framework and KBUD practical approaches. But, this has lead to a fragmented and incoherent methodological approach. This paper outlines and compares a few most popular KBUD frameworks selected from the literature. It aims to identify some key and common features in the effort to achieve a unified method of KBUD framework.

Design/methodology/approach – This paper reviews, examines and identifies various popular KBUD frameworks discussed in the literature from urban planners’ viewpoint. It employs a content analysis technique i.e. a research tool used to determine the presence of certain words or concepts within texts or sets of texts.

Originality/value – The paper reports on the key and common features of a few selected most popular KBUD frameworks. The synthesis of the results is based from a perspective of urban planners. The findings which encompass a new KBUD framework incorporating the key and common features will be valuable in setting a platform to achieve a unified method of KBUD.

Practical implications – The discussion and results presented in this paper should be significant to researchers and practitioners and to any cities and countries that are aiming for KBUD.
Keywords – knowledge based urban development, knowledge based urban development framework, urban development and knowledge economy.

Paper type – Academic Research Paper

1 Introduction

The 21st century has marked the beginning of new advancements in the field of information and communication technology (ICT) which has impacted significantly on the overall spatial pattern and socio-economic fabric of cities. The ongoing transformation of advanced economies from manufacturing to services and then to knowledge-based activities has also influenced urban planning, development and management of economic activities. The impact of what has been broadly labelled as the knowledge based economy, coupled with the issues of globalisation and rapid urbanisation has (becos kmuna is referring to ‘the impact’ kan) thus mooted new ideas to plan for a development that encompasses the needs and requirements of the economy and society. The nature of city development is also changing as society is becoming increasingly knowledge-based. This is because activities in the knowledge sector are becoming more important and require conditions and environment which are very different from those required by the community-based activities which are declining (Knight, 1995). The rise of knowledge-based economy is also seen as the main driver of global and local economic development (Yigitcanlar, 2009a). The aim of urban planning in the era of knowledge based economy is to achieve a sustainable development by creating a strong urban core, harnessing its economic strength and addressing social exclusion and avoiding physical dereliction.

In answering to the transformation towards knowledge based economy, many research works focus on the emerging knowledge economy, the rising network society and the sweeping impacts of ICT (Graham and Marvin, 1996, Castells, 2000, Ergazakis, 2004, Winden and Berg, 2004). However, limited researches were undertaken to specifically deal with the physical planning and spatial environment of cities that serves to shelter the society of the knowledge economy and their related supporting activities. Knight (2008) argued that little consideration is given to the cities’ knowledge resources, the cultures that produce knowledge, the knowledge based activities and the effects which their restructuring have on cities. There is also a growing debate in the literature signifying the weaknesses of present urban planning system as unable to be dynamic and cope with the economic changes and global challenges.

Cities must formulate development strategies for knowledge based development. There is a strong correlation between creative and innovative places to economic growth. Durmaz, Yigitcanlar and Velibeyoglu (2008) agreed that the era of knowledge economy has promoted knowledge generations and acknowledged creativity and innovation as central to urban growth. The symbiosis that exists between the era of knowledge based economy (where knowledge production is vital) and urban planning and development needs to be investigated. More importantly, the shift in local economies towards the knowledge-based economy has produced more global, competitive, innovative, creative knowledge based activities and relevant developments. These activities have started to reshape the urban environment and will definitely bring effects to the socio-spatial development order. As knowledge economy gains momentum around the world, there is
an urgency to analyse, quantify and qualify the foundations at city level since it is in the city where knowledge is produced, distributed and marketed.

The era of knowledge-based economy has led to the development of the notion of Knowledge Based Urban Development (KBUD); a beneficial set of instruments in order to improve the quality, welfare and competitiveness of cities (Yigitcanlar, 2007b). KBUD has gained popularity as a powerful strategy for sustainable economic, social and urban growth, and for the post-industrial development of cities (Yigitcanlar, Velibeyoglu and Baum, 2008b). The process of implementing KBUD approaches is neither simple nor quick and it has to be viewed from the multidisciplinary angles (Ergazakis, 2008). Urban planners, however, will still have to play a key role in deciding the future directions of cities development. There are currently many research efforts put forward to the development of appropriate KBUD frameworks and KBUD practical approaches. The examination of present KBUD approaches have has permitted one to identify an emerging pattern although a unified method has yet to be established (Ergazakis, 2006). This paper aims to outline and compare the most popular KBUD frameworks and practical approaches, and provide a summary incorporating their important and common features. It employs a content analysis technique whereby it is a research tool used to determine the presence of certain words or concepts within texts or sets of texts. The discussion and results presented in this paper should be significant to researchers and practitioners as well as to any cities and countries that aiming for KBUD. It is structured under five (5) sections. Following introduction, section two (2) examines on the relationship between knowledge based economy and urban development. It explains how the shift in knowledge economy has impacted the socio and spatial aspect of cities development. Section three (3) discusses KBUD as a new paradigm in urban planning. Section four (4) examines selected popular KBUD frameworks identified from the literature. Section (5) evaluates and summarises their common features while the last section (Section 6) provides conclusion and gives recommendation for future research.

2 Knowledge based economy and urban development

There are a few factors. Globalisation and rapid urbanisation have changed the nature of city development. The transition towards knowledge based economy which emphasises on the production of knowledge has certainly affected the process of urban development. Organisation for Economic Corporation and Development (OECD) (1996) defines knowledge economy as a term established to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels in human resources and combating social exclusion. There are a number of major changes that are bound to have an impact on the patterns of human activity and urban living. Carillo (2004) has categorised these changes into four aspects namely dematerialisation (i.e. a lesser volume of material inputs and outputs); environmentalism (i.e. a greater concern with sustainability); an experience upgrade (i.e. the capacity to attain the same results without the conventional means of space and time and essentialism (i.e. the understanding and pursuit of ever more fundamental values).

Knight (1995, 2008) argued that current cities development has been viewed primarily from the perspective of city planning with a focus on their physical form and built environment (e.g. on land use zoning, building and infrastructure). Very little consideration has been given on their knowledge resources or to the cultures that produce
Previous emphasis has been made on attracting tangible forms of wealth (i.e. labour, land and capital) and knowledge as an intangible asset is often ignored. With the advent of the global knowledge-based society, there is a greater attention that needs to be given to the cities structure and making that knowledge as an input to local development.

The types of environment which need to be developed for knowledge-based activities, therefore, differ significantly from those developed by commodity-based activities and call for different development strategies. Carillo (2004) claims that the most immediate impact of the knowledge-based economy in relation to the urban environment is the reduction in displacements made possible by the internet and wireless telecommunications. Working, schooling and shopping pattern will be changed substantially. Some of the most distinctive characters of industrial city such as commuting, suburban residence, central districts and zoning in general are fading and they will be replaced by the distribution of work and learning, e-services, empty office space and zone reconversions. He further points out that the most important aspects of knowledge urban experience will no longer require presence and simultaneity, and therefore the current patterns of transportation, scheduling, configuration, zoning and infrastructure. The present configuration, organisation and life style of urban centres might be more of inheritance of tribal, hierarchical and material production patterns than an urban design and culture fit for knowledge-based society (Graham, 2002). The new city designs should, for example, consider the notion of accessibility rather than proximity and contiguity, networked knowledge innovation zones rather than classical land use zoning, and the flow of information, goods and people rather than users and products’ movement from one area to another.

Ergazakis et al., (2006) highlight that nations and international organisations have realised that the challenges facing modern societies call for development strategies that are knowledge-based. The task for cities in the era of knowledge economy which characterised by globalisation is that, cities need to create environments where knowledge resources are valued, create conditions conducive to their development, and they must ensure that their knowledge resources are securely anchored (Knight, 1995).

A knowledge-based approach to city development seeks to address the issue related to cities being a place where knowledge is created and marketed by providing a framework for defining city’s role as a knowledge centre. It is important to identify the need of city’s knowledge sector and creating conducive city’s environment for the knowledge-based activities. Knight (1995) argued that cultures producing global knowledge are of particular concern because as these cultures develop, their local linkages weaken, distanced and disengaged from the affairs of the city. Within the same line, Knight highlighted in 2008 that “The quality of life in cities will continue to decline unless cities protect local values and support efforts to valorise local knowledge.” (Knight, 2008; pxv). In the long run, cities will lose out as the knowledge market is global. Hence, the quality of future cities in answering to the global challenge of the era of k-economy will become a crucial question and its answers create a challenge for architects, urban designers, planners, developers, and decision makers alike around the world.

3 Knowledge based urban development

In recent years, urban planning has consolidated its interest in the paradigm of post-modern social production under the rubric of KBUD (Carillo, 2004; Yigitcanlar, O’Connor and Westerman, 2008a). KBUD has become an important mechanism for the
development of cities. It is seen as a beneficial set of instruments in order to improve the welfare and competitiveness of cities (Yigitcanlar, 2007b). KBUD is a development approach that aims at sustainable development and economic prosperity, which helps in making cities compatible with the knowledge economy, and provides their citizens with the opportunity to foster knowledge creation, knowledge exchange and innovation (Ergazakis, Metaxiotis and Psarras, 2004). The importance of KBUD within the paradigm of knowledge based economy is seen as the best alternative for the present practice of urban and regional planning to respond to the change(s). Cities, being a place where such knowledge is created and marketed, need to respond effectively in order to promote a more sustainable socio-spatial order. The social benefits of KBUD also extend beyond aggregate economic growth as KBUD provides a platform for cities to be resilient to economic changes and secured in a network connections anchored at local, national and global coordinates. It also offers quality of place to attract and retain talent. The promise of KBUD is a secure economy in human setting in line with the sustainable urban and economic development (Yigitcanlar, 2007b). Many acknowledge that KBUD is the latest approach in urban planning which offer a dynamic, strategic, flexibility and participatory urban planning.

The creation of KBUD also presents significant new opportunities and challenges to the way the government, people and organisations think, operate, and manage their activities. In the knowledge era, KBUD needs to focus on catering and attracting knowledge-based activities and high-technology industries that are expected to contribute significantly to employment, Gross Domestic Product (GDP) and exports. Factors of production such as labour, capital, raw materials and entrepreneurship remain important but knowledge is the key driving force underlying growth and a valuable commodity, not only as a factor of production but also as a commodity to be traded (Hearn and Rooney, 2008).

There are ten important conditions that are conducive to the development of knowledge-based cities; the community is able to define, perceive and value knowledge as a form of wealth; the city acknowledges the importance and contribution of knowledge worker; the city is able to make the public understand the nature and role of knowledge; place knowledge resources at regional terms; give priority to improve knowledge infrastructure; ensure all members of society have access to careers in knowledge based activities; promote city as a centre of excellent; offer incentives and mechanisms favouring investment in locally based knowledge resources; futuristic vision emphasising on knowledge and other immaterial factors and develop civic leadership (Knight, 1995).

What needs to be emphasised is that the development of knowledge economy requires a different city environment and KBUD is tailoring for this. It concerns primarily with upgrading human and organisational capacities and creating environments which are conducive to innovation, learning, creativity and change. Some of the successful KBUD exemplars include the famous Silicon Valley in California and Route 128 in Massachusetts. The accomplishments of these two developments were based mainly on knowledge network that encompassed both regional learning institutions and profit industry research teams, and the knowledge, in the form of innovations. Their success has inspired many cities and demonstrated that KBUD has been able to provide a platform to offer a competitive advantage and promote a new form of local socio-spatial and economic development in the era of knowledge based economy (Yigitcanlar, 2007b).

KBUD transcends many areas of economic, social and urban policy, and has three broad purposes (Yigitcanlar, 2008). Firstly, KBUD is an economic development strategy
that codifies technical knowledge for the innovation of products and services, including urban services, market knowledge for understanding changes in the economy, financial knowledge to measure the inputs and outputs of production and development processes, and human knowledge in the form of skills and creativity, within an economic model (Lever, 2002). It aims at a local economic development that is competitive and integrated with global knowledge economy. Secondly, KBUD indicates the intention to increase the skills and knowledge of residents and employees as a means for intellectual, human and social development (Gonzalez et al., 2005). It aims to increase the quality of life by providing necessary services for societal development. Thirdly, KBUD builds a strong spatial relationship among knowledge community precincts for augmenting the knowledge spill-over effect that contributes significantly to the establishment and expansion of creative urban regions and supports linkages and knowledge transfer between these precincts (Yigitcanlar et al., 2008c). It also aims an urban development that is ecologically sensitive, sustainable and safe. In essence, the main attributes of KBUD are high levels of economic success, high levels of knowledge intensity, diverse knowledge industries, strong academic institutions, excellent communications and transport infrastructure, unique offering to investors and individuals, strategies to ensure all benefit from knowledge and economic success (Yigitcanlar et. al., 2008d).

4 Knowledge based urban development models

Heywood (2009) examines that the measurement method on KBUD varies based on the geographical area being observed i.e. either at national, regional or municipal level. There are a number of models which attempt to provide a general evaluation of KBUD. Also, there are a number of international economic organizations such as the Organization for Economic Co-operation and Development (OECD), World Bank (WB), European Commission (EC) and Asia-Pacific Co-operation (APEC) which have provided some practical directions to build the knowledge economy in developed and developing countries (World Bank, 1999; OECD, 2001; APEC, 2000; European Commission, 2000). The literature, however, indicates that there is no viable framework to develop integrated KBUD strategies exists (Dang and Umemoto, 2009) and the present initiatives towards KBUD are not unified (Ergazakis, 2009). Despite the fact that many cities globally are now considered as successful examples of KBUD, only very few of them that may have managed to formulate integrated strategic approaches, while the initiatives and approaches of the rest of the cities are rather ad-hoc and not based on structured and specific methodologies.

A study by Ergazakis, Metaxiotis, Psarras and Askounis, (2006) also revealed that the present KBUD approaches are fragmented and the need to follow a common approach is apparent and this is also a conclusion of a study conducted by Martinez (2006) on comparing cities. Ergazakis et.al, (2006) have analysed the KBUD approaches of six cities that have explicitly adopted KBUD in their urban development process; Barcelona, Stockholm, Munich, Montreal, Dublin and Delft. They have concluded that each city’s approach is different although all are targeting towards the same goal of KBUD. Barcelona has developed a strategic plan to place the city into the leading group of urban regions in the information and communication (ICT) league. Delft has chosen a project based approach and Stockholm followed a process-oriented approach. Meanwhile, Dublin and Montreal were focusing more on physical infrastructure and ICT related investment. This paper has selected the following five KBUD framework models i.e. MAKCI model,
KBUD Analysis model, KBUD Characteristics model, KnowCis model and ALERT model. The common key characters identified from these models will be used for the development of a unified KBUD framework. These models are selected as they are the most popular and relevant in the context of urban planning.

4.1 The Most Admired Knowledge City Awards model

The Most Admired Knowledge City Awards (MAKCi) is an international consulting process which was first established in 2006 by the World Capital Institute to identify and recognize those communities around the world who successfully engage in formal and systematic knowledge-based development processes under the flag of Knowledge Cities. It gathers a number of criteria drawn from a wide research and knowledge based development. The MAKCi framework is fundamentally a knowledge-economy model which involves an assessment of the value base on which the future development of a city is made possible. The model has eight knowledge capital dimensions to stand as indicators for the whole KBUD exercise and all are equally weighted. The characteristics offered by this model range from the element relating to physical urban setting such as the identity capital which emphasises on the city’s character to the social issues on the value of individual citizen. Table 1 shows the key features of KBUD framework and their respective details highlighted by MAKCi in 2009.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
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<tbody>
<tr>
<td>1. Identity Capital</td>
<td>All formal and informal elements in the city that have contributed and/or are contributing to determine the city’s identity, its clarity and differentiation (i.e. historic profile, city characterization, belonging, etc)</td>
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<tr>
<td>2. Intelligence Capital</td>
<td>Refers to the city’s systems capacity to sense, make sense of and respond to external agents and events which are significant to the city’s welfare (i.e. city’s strategic planning agencies, city public/private future centres, prospective studies)</td>
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<tr>
<td>3. Financial Capital</td>
<td>Refers to the city’s articulation of monetary denomination of production value dimensions which elicit economic sustainability within the capital system (i.e. macro indicators: investment, GDP, tax system, un/employment etc).</td>
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<tr>
<td>4. Relational Capital</td>
<td>Refers to the city’s articulation capital that provides cohesion and makes social integration possible (i.e. ethnic diversity, individual health habits, intellectual and cultural competencies, etc)</td>
</tr>
<tr>
<td>5. Human Individual Capital</td>
<td>Refers to value generating capacity of individual citizens that contribute to the city’s system of capitals (health: biological inheritance and physical development; education: holistic personal development)</td>
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<tr>
<td>6. Human Capital (Collective Base)</td>
<td>Refers to the collective cultural fitness and team based value generating capacities of all citizens that contribute to the city’s system of capitals (i.e. demographic structure, public health, social welfare intellectual heritage, civic culture, innovation and entrepreneurial capacities etc).</td>
</tr>
<tr>
<td>7. Instrumental</td>
<td>Refers to the material-based means of production through</td>
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The KBUD analysis model introduced by Yigitcanlar (2008) has classified the requirements for a city which aspire for KBUD into four different characteristics i.e. society, environment, management and economy as shown in Table 2. KBUD needs a “society environment” where an effective education and skill building strategies is required in order to increase skills and knowledge of residence. Secondly, KBUD requires an environment where a strong spatial relationship among knowledge clusters to augment the knowledge spillover effect that contribute to the establishment and expansion of creative urban regions and support linkages and networking between clusters. Thirdly, KBUD requires an institutional arrangement to oversee the development. Finally, Yigitcanlar (2008) insists on “economic environment” where a strong economic development strategy is needed to codify technical knowledge for innovation, market and financial knowledge as well as human knowledge in the form of skills and creativity. He further emphasises that the economic environment must create a local economic development that is competitive and integrated with the local economy.

<table>
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<tr>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Capital (tangible)</td>
<td>which other capitals leverage their value generating capacity. Instrumental capital includes natural existing before the settlement and infrastructure.</td>
</tr>
<tr>
<td>8. Instrumental Capital (intangible)</td>
<td>Refers to the knowledge-based means of production through which other capitals leverage their value generating capacity (i.e. organisation and production systems in electronic and non electronic repositories).</td>
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<table>
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<tr>
<th>Characteristics</th>
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<tbody>
<tr>
<td>1. Society</td>
<td>Effective education and skill building strategies (Quality of Life, Human and social development, Intellectual Capital)</td>
</tr>
<tr>
<td>2. Environment</td>
<td>Strong spatial relationship among knowledge clusters (Quality of Place, Sustainable, Unique Identity)</td>
</tr>
<tr>
<td>3. Management</td>
<td>Institutional arrangement to oversee development (Strategic and integrated, Democratic and transparent, Social equity)</td>
</tr>
<tr>
<td>4. Economy</td>
<td>Strong economic development strategy that codifies knowledge (Knowledge based, Competitive, Creative and Innovative)</td>
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The KBUD characteristics model introduced by Van Winden, Van Den Berg and Peter, (2007) has discerned seven structural characteristics that are conducive to the city in coping with the requirements of the knowledge era. These characteristics are deemed necessary for a city to be able to acquire, create, disseminate and use knowledge effectively for greater economic and social development. They have identified seven main characteristics of KBUD strategies namely the knowledge base, industry structure, quality...
of life, diversity, accessibility, social equity and scale. Table 3 shows the seven characteristics and their respective descriptions.

**Table 3. The KBUD Characteristics Model (2007)**

<table>
<thead>
<tr>
<th>Characteristics</th>
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<tbody>
<tr>
<td>1. Knowledge base</td>
<td>Cities with a high score of workers with tertiary education shows a better performance on many economic parameters</td>
</tr>
<tr>
<td>2. Industry structure</td>
<td>Cities with a weak industrial structure (specialised in traditional industry) have many interrelated problems</td>
</tr>
<tr>
<td>3. Quality Of Life</td>
<td>Cities that offer a good quality of life will attract and retain talented population</td>
</tr>
<tr>
<td>4. Diversity</td>
<td>Cities that are more diverse will foster growth</td>
</tr>
<tr>
<td>5. Accessibility</td>
<td>Cities with high accessibility and international connection are more successful in acquiring knowledge</td>
</tr>
<tr>
<td>6. Social Equity</td>
<td>Cities with high level of social exclusion indicates that a large part of its population are insufficiently used</td>
</tr>
<tr>
<td>7. Scale</td>
<td>Cities size matters as an attraction factor for companies and knowledge workers</td>
</tr>
</tbody>
</table>

### 4.4 The KnowCis model

The KnowCis methodology was developed by Ergazakis et al., in 2006 to assist and support local authorities in the process of planning and developing their cities as Knowledge Cities. It has nine different dimensions as shown in Table 4. According to them, the approach is easily adapted as the proposed approach is generic as they have tried to incorporate most of the aspects that should be considered on a KC development initiative. For the implementation, however, each city can easily determine where its effort will be focused, according to the present strengths and weaknesses.

**Table 4. The KnowCis Model (2006)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Concept</td>
<td>Promotion of the Knowledge Cities concept and continuous improvement of concept’s visibility</td>
</tr>
<tr>
<td>2 Support</td>
<td>Improvement of Knowledge Management process within the city</td>
</tr>
<tr>
<td>3 Infrastructure</td>
<td>Improvement of ICT infrastructure of the city and citizens’ ICT literacy level</td>
</tr>
<tr>
<td>4 Participation</td>
<td>Assurance of equal participation and involvement of all citizens</td>
</tr>
<tr>
<td>5 Business</td>
<td>Support of research, business innovation and entrepreneurship</td>
</tr>
<tr>
<td>environment</td>
<td></td>
</tr>
<tr>
<td>6 Public sector</td>
<td>Reinforcement of public sector’s role in promoting and sustaining the concept</td>
</tr>
<tr>
<td>support</td>
<td></td>
</tr>
<tr>
<td>7 Networking</td>
<td>Strengthening of networking and synergies between all social actors</td>
</tr>
<tr>
<td>8 Human skill</td>
<td>Increase the availability and skill level of human capital</td>
</tr>
<tr>
<td>9 International</td>
<td>Enhancement of the inclusive, international and multiethnic-character of the city</td>
</tr>
<tr>
<td>network</td>
<td></td>
</tr>
</tbody>
</table>
4.5 The ALERT model

The Alert Model by Corey and Wilson (2006) is an approach and a normative support system for local and regional planning practice in the global economy and network society. The model which is represented in the form of conceptual framework is a planning support system designed for the use of the diverse and wide-ranging stakeholder and planning practitioners who seek to engage planning in the steering of these new technology-enabled and knowledge-based development forces to attain desired outcomes. At its best, the model can catalyse and stimulate the stakeholders to invent their own strategies that capitalise on the unique assets and development potential of the locality’s community. The acronym of ALERT is derived from the keywords that define the content of the model: Awareness, Layers, Electronic business (or e-business), Responsiveness and Talk. Table 5 shows the key characters of ALERT model in relation to KBUD framework.

Table 5. The ALERT Model (2006)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Awareness</td>
<td>Continuously updating information (Compare local facts and economic profile to elsewhere best practice peer city-regions; actionable knowledge level)</td>
</tr>
<tr>
<td>2. Layers</td>
<td>Understand the present position (Identify principle competitor city-regions; global and national)</td>
</tr>
<tr>
<td>3. E-Business</td>
<td>Present state of a locality’s business assets and resources (Analyse the present state of a locality’s business assets and resources)</td>
</tr>
<tr>
<td>4. Responsiveness</td>
<td>Access to opportunities (Levels of responsiveness, E-government, broadband)</td>
</tr>
<tr>
<td>5. Talk</td>
<td>Engagement and collaborative behaviour among the principal representative stakeholder individuals, institutions and organisations (Governance, human capital development, enterprise culture development)</td>
</tr>
</tbody>
</table>

5 Evaluation and discussion

The examination of present KBUD models in the earlier section shows that each model offers a conceptual difference towards the establishment of KBUD frameworks. Common characteristics and certain key features, however, draw a pattern of recurrence among them, and these recurring elements can easily be identified and grouped. Table 5 simplifies and groups the common key features identified from the five most popular KBUD models discussed in the previous sections. These common features can be categorised into four major domains i.e. social, physical environment, economic and management.

A careful examination on these models, however, suggests that, there is room for modification that may lead to the establishment of a more unified and effective KBUD framework in the future. Although all models have comprehensively covered the basic elements necessary in urban planning i.e. social, physical, economy and governance, there has to be some adjustment required. It can be seen that all characteristics within the examined models are equally emphasised and hence, may affect the validity of the model.
What is proposed is that, there has to be some weight assigned to each element and as such, these elements can be ranked in a hierarchical order according to relevance and importance.

Table 6. Summary of KBUD Models

<table>
<thead>
<tr>
<th>Theme of key features</th>
<th>The MAKCi Model</th>
<th>The Analysis Model</th>
<th>The Characteristics Model</th>
<th>The KnowCis Model</th>
<th>The ALERT Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio cultural development</td>
<td>Relational Capital (Soc)</td>
<td>Society (Soc)</td>
<td>Knowledge Base (Soc)</td>
<td>Participation (Soc)</td>
<td>Talk (Soc)</td>
</tr>
<tr>
<td></td>
<td>Human Individual Capital (Soc)</td>
<td>Social Equity (Soc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human Capital (Soc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Environment and Urban Development</td>
<td>Instrumental Capital- tangible (Env)</td>
<td>Environment (Env)</td>
<td>Industry Structure (Env)</td>
<td>Concept (Env)</td>
<td>Layers (Env)</td>
</tr>
<tr>
<td></td>
<td>Identity Capital (Env)</td>
<td>Quality of life (Env)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scale (Env)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Development</td>
<td>Financial Capital (Eco)</td>
<td>Economy (Eco)</td>
<td>Diversity (Eco)</td>
<td>Business Environment (Eco)</td>
<td>E-business (Eco)</td>
</tr>
<tr>
<td>Management and Governance</td>
<td>Intelligence Capital (Man)</td>
<td>Management (Man)</td>
<td>Accessibility (Man)</td>
<td>Public Sector Support (Man)</td>
<td>Responsiveness (Man)</td>
</tr>
<tr>
<td></td>
<td>Instrumental Capital – intangible (Man)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Eco – Economic, Env- Environment, Man- Management, Soc- Society,

Table 6 shows the suggested framework for a more unified and effective KBUD framework. It is developed based on the common key features identified from the popular KBUD models, with a further elaboration on measuring the domains. While the columns on “domains” and “characteristics” are more general in identifying the elements that need to be incorporated in the KBUD assessment framework, the “indicators” and “parameters” columns are more specific in providing elements that are quantifiable and measureable. The characteristics that need to be included in the framework can be categorised into four domains covering all aspects of urban planning i.e. socio-cultural, urban development economic development and management (governance). The suggested framework also proposes the respective characteristics as well as indicators and parameters for evaluation. A more comprehensive model will have a different weight in each domain, characteristics, indicators and parameters.
<table>
<thead>
<tr>
<th>Domains</th>
<th>Characteristics</th>
<th>Indicators</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Society (Socio Cultural Development)</strong> [weight]</td>
<td>Quality Of Life</td>
<td>Housing Affordability</td>
<td>Levels of housing affordability for average income group</td>
</tr>
<tr>
<td></td>
<td>Community facilities</td>
<td>Number of community facilities per capita</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human &amp; Social Development</td>
<td>White collar jobs</td>
<td>Ratio of white collar: blue collar jobs</td>
</tr>
<tr>
<td></td>
<td>Literacy rate</td>
<td>Trend analysis of literacy rate</td>
<td></td>
</tr>
<tr>
<td><strong>Intellectual Capital</strong></td>
<td>Level of education</td>
<td>Ratio of population with tertiary education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-workers</td>
<td>Number of k-workers per capita</td>
<td></td>
</tr>
<tr>
<td><strong>Environment (Urban Development)</strong> [weight]</td>
<td>Quality of Place</td>
<td>Green area</td>
<td>Ratio of green parks per capita</td>
</tr>
<tr>
<td></td>
<td>Urban amenities</td>
<td>Ratio of selected urban amenities per capita</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>Public transport initiative</td>
<td>Percentage of government budget on public transport</td>
</tr>
<tr>
<td></td>
<td>Environmental Programmes</td>
<td>Percentage of government budget on environmental programmes</td>
<td></td>
</tr>
<tr>
<td><strong>Unique Identity</strong></td>
<td>Cultural Factors</td>
<td>Numbers of international cultural events</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cultural Facilities</td>
<td>Number of cultural facilities</td>
<td></td>
</tr>
<tr>
<td><strong>Economy (Economic Development)</strong> [weight]</td>
<td>Knowledge-based</td>
<td>Knowledge industries and businesses</td>
<td>Number of knowledge industries and businesses</td>
</tr>
<tr>
<td></td>
<td>R&amp;D centres</td>
<td>Number of R&amp;D centres</td>
<td></td>
</tr>
<tr>
<td><strong>Competitive</strong></td>
<td>FDI</td>
<td>Trend analysis on FDI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multinational HQ</td>
<td>Numbers of multinational HQs</td>
<td></td>
</tr>
<tr>
<td><strong>Creative and Innovative</strong></td>
<td>Creative industries</td>
<td>Number of creative industries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patents</td>
<td>Number of patents per year</td>
<td></td>
</tr>
<tr>
<td><strong>Management (Governance)</strong></td>
<td>Vision of organisations</td>
<td>Direction of vision of the organisation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multidisciplinary personnel</td>
<td>Number of personnel within the organisation</td>
<td></td>
</tr>
<tr>
<td><strong>Democratic and Transparent</strong></td>
<td>E-government</td>
<td>Number of government services with e-facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-submission</td>
<td>Number of e-submission for planning application</td>
<td></td>
</tr>
<tr>
<td><strong>Social equity</strong></td>
<td>Wealth distribution</td>
<td>Percentage of wealth distribution among the 20% richest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to employment</td>
<td>Numbers of unemployment</td>
<td></td>
</tr>
</tbody>
</table>
6 Conclusion

The advantages that KBUD offers are very important in setting the future direction of cities development. It can be clearly seen that KBUD is a new concept that can guarantee a sustainable form of development and making cities more competitive in the era of knowledge economy. This paper highlights in general five most popular KBUD models identified from the literature. What can be concluded is that these models of KBUD frameworks are fragmented and not unified. Each signifies different strategies although they are leading to the same goal of achieving KBUD. There are various approaches and emphases that each model has developed. However, there are some similar trends and common characters that can be identified from the above models. A pattern of recurrence of the significant features and their key findings can be traced from the analysis conducted. A generic model for future KBUD framework has been suggested in this paper that incorporates four major domains i.e. environment, management, economic and society. More importantly, each domain suggested should be given a certain weight to ensure a more effective and valid model. It has to be noted that the KBUD conception is still evolving in order to produce more sustainable outcomes of cities development. The debate in the literature indicates that the process of implementing KBUD approaches is neither simple nor quick and some argue that the issues should be viewed from the multidisciplinary angles. Although a unified method may have been developed, a continuous review and evaluation are required in order to ensure that the KBUD framework is more comprehensive and provides a true reflection of the present scenario.

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The arts and the creation of the 21st century knowledge-based organisations

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Structured Abstract

This paper presents the role and relevance of the Arts as a management means to support and drive organisational value creation dynamics. Arts are recognised as instruments to handle and affect the aesthetic characteristics of organisational systems both at micro and macro level. Through the deployment of the arts it is possible to activate a different development of the knowledge-based dimensions of the organisations. This paper explores how the adoption of arts-based initiatives can drive the development of 21st century knowledge-based organisations.

Purpose – The purpose of this paper is to provide a new perspective of how to support and drive the development of knowledge-based systems. In particular the relevance of managing aesthetics dimensions is introduced and explored.

Design/methodology/approach – The paper mainly adopt a conceptual perspective and presents an exploratory nature.

Originality/value – The paper sheds light on a completely new research area and aims to define the conceptual pillars of a new research stream.

Practical implications – The paper although has a conceptual nature can provide useful insights to be applied in practice.

Keywords – arts and business, knowledge-based development, arts-based initiatives, business performance improvement, value creation

Paper type – Academic Research Paper

1 Introduction

The arts in organisations represent a management means to support the enhancement of organisational value creation capacity and the improvement of business performance. Traditional organisations’ views of arts, and the implications of those views for the contents, nature and features of the management initiatives for business performance improvements, have considered the arts, at the best, as something nice to have and to support for socio-cultural reasons, an accessory with little impact on organisational value creation.

Starting from the definition of the Scientific Management principles by Frederick Taylor (1991), management has been essentially interested in the design, implementation, assessment and control of the rational and engineering dimensions of organisational working mechanisms and components grounding the performance of business processes and the achievement of strategic objectives. The positivistic approach has dominated the development of modern management with its paraphernalia of models, approaches and
tools providing interpretative and normative guidelines to perform management initiatives to affect organisational processes’ efficiency as well as to drive business growth. The fundamental idea of the modern management has been that it is possible to define and manage organisations essentially as an efficient system able to achieve, without inconvenience and/or unexpected negative events, the targeted business objectives. In accordance with this view, the arts have not had any role to play in management. At the best, they have been considered as a component of promotional strategies, organisational social responsibility policies, training activities for employees, and investment strategies based on the creation of art collections.

This paper presents why the arts, in the forms of Arts-Based Initiatives (ABIs), represent a fundamental platform to develop the knowledge-based organisations of the twenty first century so that they can be able to create superior value.

2 How arts can help organisations to face the great management challenges of the 21st century

In today’s complex business landscape, as the management is challenged with new problems the arts provide a new territory inspiring executives both to see their organisations differently, and to develop organisational management systems. For organisations, it is more and more difficult to plot, according to a specific business development vision a clear course to achieving the targeted value creation objectives. Organisations are continuously challenged to find new routes to accomplish the strategic business objectives and to deliver value to stakeholders. They have to develop new capabilities to be agile, intuitive, imaginative, flexible to changes and innovative. Therefore, managers find themselves in the position of managing organisations, recognising them as ‘living organisms’ in which the human beings and the organisational aesthetic dimensions play a central role as they shape organisational capabilities enabling organisations to better fit the complexity and turbulence of the business landscape.

The new problem the management has to focus on and solve is not only the technical efficiency of the organisational business processes, which has traditionally represented the main management concern, but rather the dynamic adaptability and resilience of the organisation. This problem requires, firstly, a shift of the attention from outputs and input-output ratios to outcomes and impacts, and secondly, a revaluation of the centrality of the human nature in organisations.

The twenty-first century business landscape is scattered with ambiguities, uncertainties, complexity, a high pace of change, dynamism, and unpredictability. In such a context, the success of an organisation is based not only on the scientific definition of an efficient system, which guarantees a standardised quality of business processes’ outputs, but also and particularly on the creation of emotive and energetic organisations in which employees feel engaged, in control of themselves and of the situations around them, and experience happiness and wealth. In addition, in today’s advanced mass-consumption economy, the evolution of consumers’ behaviours requires organisations both to satisfy actual, emergent and potential bundle of organisational stakeholders’ wants and needs, and to create intangible value in the form of experiential value-added, i.e. to produce products that let people undergo fulfilling experiences that involve their emotions.

The arts can make a distinctive contribution to the creation and management of emotive and energetic dimensions of organisations as well as to the development of
organisational assets that incorporate intangible value. This allows to develop knowledge-based organisations in which not only the technical knowledge is valued and exploited to support value creation mechanisms, but also the emotive knowledge is recognised as a key source of organisational value creation. In particular the managerial deployment of arts allows managers to affect the organisational aesthetic dimensions. Through the arts it is possible to foster aesthetic people’s experiences and manipulate organisational infrastructure’s aesthetic properties. This enables the management to handle emotional and energetic dynamics in organisations, in order to develop organisational capabilities that in turn impact on business performance improvements.

3 The Arts-based initiatives and the management of emotive knowledge

The use of the arts in management is addressed by introducing the notion of Arts-based Initiatives (ABIs). An ABI is a planned and purposely managerial use of art forms to address management challenges and business problems with the aim of developing employees and infrastructure affecting the organisational value creation capacity. In contrast with the modern management that focuses the attention mainly on technical efficiency, the focus of the use of the arts is on the organisational aesthetic dimensions that evoke and mobilise people’s knowledge related to emotive traits. This does not mean that ABIs have no room for efficiency, on the contrary they significantly contribute to a system’s productivity, but they do so impacting on organisational dimensions that cannot be controlled analytically and rationally, and nevertheless play a fundamental role in explaining the success and the excellence of organisation. They are the knowledge domains related to the emotive and energetic factors affecting the behaviours of employees and characterising the features of an organisation’s infrastructure.

In order to investigate the role and relevance of the arts in management, it is adopted an utilitarian perspective which recognises the need to integrate the traditional rational-based view of the organisation with the emotive-based perspective of the organisational life and components. The fundamental thesis is that the organisational value creation capacity depends on the deployment and exploitation of people’s emotions and energy. The control of technical knowledge is a necessary condition, but not a sufficient one for the success. Organisations need to integrate the technical knowledge with the emotive knowledge that denotes the contents and characteristics of the knowing process related to human emotional traits. The arts provide the approaches and tools to handle emotional and energetic dynamics within and around organisations. By adopting ABIs, managers can harness the aesthetic dimensions of organisational components and support the creation and management of emotive knowledge for the achievement of operational and strategic objectives.

Referring to the arts, I mean all the possible art forms. Therefore my attention is not focused on a specific art form, but on the arts in general. Although I recognise that art forms are not mutually equal, my concern is on the employment of the artistic products and processes to activate and induce aesthetic dynamics that affect the emotive knowledge characterising employees and infrastructure in organisations.

The arts in organisations represent fundamental management resources and sources for the organisational development. The investigation of the relevance of the arts starts from the acknowledgement that the business is already familiar with the arts and they are pervasive in organisations both at micro and macro level. They are an integrated part of people’s life as well as of the daily organisational life and they can be found in both
internal and external business manifestations. In particular, within companies, the arts can either simply take the form of paintings, posters, photos, use of colours and designed artefacts displayed in the working spaces - such as reception, offices and/or in the factory -, or they can be adopted as an approach to entertain and develop employees. At the same time, externally to an organisation, the arts can be discovered in the organisation’s logo that distinctively defines and communicates the identity of an organisation. In addition, the arts can be increasingly found at the intersection between the organisation and its markets. The arts can be used to build and communicate the identity and reputation of the organisation, for example, by sponsoring artists and arts events, or they can be adopted as a fundamental trait of the products’ design, in order to better satisfy today’s customers who search new value-added dimensions. For some organisations the production and use of works of art are their main business focus. This is the case of the cultural industry. The attention of this book is focused instead on the intentional use of the arts as a management means to develop organisational knowledge assets and drive the growth of organisational capabilities that affect the organisation’s capacity to create value and improve business performance.

Analysing the role of arts in today’s knowledge-based organisations the central question to be addressed is: What is the value of the arts for business? This issue involves other important questions such as: Why do twenty-first century organisations need to use the arts as a management means? How are organisations experimenting the use of the arts to solve their business problems? How can we classify and analyse the managerial use of art forms in organisations? What are the organisational benefits of ABIs and why organisations should invest in them? How can ABIs support the achievement of business objectives and organisational growth? How can managers and arts-based providers manage ABIs with the aim to drive business performance improvements?

To answer these questions, the research journey has to cross many disciplinary boundaries. Indeed the answers to the new emergent business problems increasingly lie at the intersection and convergence of the solutions developed in different scientific fields. The purpose of the research addressed in this paper is to contribute to lay the foundations of a new research area by investigating the links between the arts and business in order to delineate how managers can build the new generation of knowledge-based organisations that are better equipped to face the challenges of today’s complex business landscape. My research makes a two-fold contribution. On the one hand, it provides the conceptual pillars useful to understand how the arts can inspire the management to blend the rational-based approaches with the emotive-based view of the organisational life, activities and value creation capacity, recognising the role and relevance of people’s emotions and energy. On the other hand, it proposes managerial principles and frameworks to support managers to adopt the arts in organisations as an instrument to develop organisational components and improve business performance.

I see the adoption of the arts in management as the source to create organisations that are more human and that take into account the human-based nature of business. Indeed, the arts bring with them the passion of life and contribute to transform the organisational working mechanisms and components so that they are able to engage employees in their daily work activities, to inspire executives to shape organisations as living organisms endowed with capabilities to face today’s business complexity and turbulence, and to make organisations more aware of the value propositions delivered to stakeholders.

In the paper the links between ABIs and business performance are explained. In particular, it is addressed the linkages between ABIs and organisational knowledge assets,
highlighting that the arts act as a trigger and a catalyst for the creation and management of sensible knowledge. Recognising that ABIs, first and foremost, impact on knowledge assets, the Arts Benefits Constellation is presented as a framework to assess the impact of the use of the arts on organisational knowledge domains. I argue that ABIs affect business performance improvements by activating a cause-and-effect chain that impacts on knowledge assets, influencing organisational capabilities that in turn characterise the quality and productivity of business processes with a result in terms of achievement of operational and strategic performance objectives. To assess the business performance benefits generated through the ABIs, the Arts Value Map is proposed as a model based on the mapping visualisation technique.

4 Final remarks

Although the management discipline has been populated with many different models and conceptualisations that have nourished the business growth, one century since the definition of the Scientific Management principles the organisational management systems appear, in my view, to be stuck in the rational-based perspective. The characteristics of the new business age force to recognise that the quality and the productivity of organisational business models increasingly depend on emotional and energetic factors. My research over the past decade has investigated the key intangible assets driving value creation. I have discovered that people’s emotions and energy are strategic factors to improve business performance. My investigation on the role and relevance of the arts in management sheds light on how ABIs can be deployed both to humanise organisations developing emotional and energetic dynamics affecting business activities, and to support the development of management innovations that can drive the definition of a new generation of management systems more suitable to face the challenges of the twenty-first century business landscape. This book is a research endeavour to disclose the power of the arts to manage those aesthetics and emotions that shape organisations and drive value creation.
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The knowledge-based bio-economy in Europe

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Structured Abstract

Purpose – The purpose of this paper is to provide an overview of the emerging Knowledge-Based Bio-Economy (KBBE) in Europe. The first objective is to explore different perspectives and understanding of the bio-economy and its key components. This provides the foundations for the second objective, which is to critically discuss the bio-economy in terms of positive and negative impacts as well as drivers and constraints.

Research methodology – Within the KBBE, the focus of this paper is on bioenergy, particularly biofuels for transport and the biorefinery concept. This paper is based on a literature review, discussions with European researchers and practitioners, and questionnaires of bioenergy industry associations.

Originality – This paper argues that the growing KBBE and bioenergy in Europe face a host of socio-technical issues that comprise a mix of technological, economic, social, political, environmental, regulatory and cultural aspects. This research work highlights discussion points of increasing relevance for the bio-economy, including the role of public-private networks; city-regions as drivers of the KBBE through ‘guiding visions’; and consumer-citizens and NGOs as key players in the development of the bio-economy.

Practical implications – This research work begins to explore the complexity of the KBBE. It provides insights into the emerging bio-economy in the European context and highlights topics of growing importance. The paper concludes with reflections on the bio-economy in terms of definitions, components and perspectives; visions, positives and negatives; and challenges, drivers and constraints.

Keywords – bio-economy, bioenergy, sustainability, europe, socio-technical

Paper type – Academic Research Paper

1 Introduction and background

The Knowledge-Based Bio-Economy (KBBE) represents a significant shift in socio-economic, agricultural, energy and technical systems. The concept of the KBBE can be understood as an economy where the basic building blocks for materials, chemicals and energy are derived from renewable biological resources, such as plant and animal sources. This type of economy can meet the requirements of sustainable development from environmental, social and economic perspectives. The bio-economy is being made possible by the recent surge in scientific knowledge and technical competences that can be used to harness biological processes.

The purpose of this paper is to provide an overview of the emerging KBBE in Europe. The first objective is to explore different perspectives and understanding of the bio-economy and its key components. This provides the foundations for the second objective,
which is to critically discuss the bio-economy in terms of positive and negative impacts as well as drivers and constraints. This paper is based on a literature review, discussions with European researchers and practitioners, and questionnaires of bioenergy industry associations, including the World Bioenergy Association (WBA), the European Biomass Association (AEBIOM), the Swedish Bioenergy Association (SVEBIO), the Spanish Bioenergy Association (AVEBIOM), and the Renewable Energy Association (REA) in the UK, which represents bioenergy interests.

Within the KBBE, the focus of this paper is on bioenergy, particularly, biofuels for transport and the biorefinery concept. This paper argues that the growing KBBE and bioenergy in Europe face a host of socio-technical issues that comprise a mix of technological, economic, social, political, environmental, regulatory and cultural aspects. Finally, this research work raises discussion points around the bio-economy, including the importance of public-private networks, the role of city-regions, and the engagement of consumer-citizens and NGOs.

2 Analysis and discussion

2.1 What is the bio-economy? What are the key components of the bio-economy in Europe?

The concept of the bio-economy is interpreted in many ways by different actors and there are a variety of terms related to the KBBE (see Box. 1). Since the bio-economy is developing and emerging now, the definition remains flexible and open to additions and changes. For the OECD (2006) the bio-economy can be understood as “the aggregate set of economic operations in a society that use latent value incumbent in biological products and processes to capture new growth and welfare benefits for citizens and nations” (OECD, 2006, p.3). While this first definition is rather technical, a second definition by the OECD (2009, p.8) focuses on biotechnology by suggesting that “the bio-economy can be thought of as a world where biotechnology contributes a significant share of economic output”. The OECD (2009) further states that the bio-economy will involve 3 elements, including:

- the use of advanced knowledge of genes and cell processes to design and develop new processes and products;
- the use of renewable biomass and efficient bioprocesses to stimulate sustainable production; and
- the integration of biotechnology knowledge and applications across a range of sectors.

The bio-economy is being made possible by major progress in scientific knowledge and technical competences to utilise biological processes for practical applications (Langeveld & Sanders, 2010). The OECD (2009) views biotechnology as the key component for the bio-economy and argues that biotechnology can offer solutions to many of the health and resource-based challenges facing the world. The OECD (2009) states that there are 3 main sectors where biotechnology can be applied – agriculture, health and industry. The OECD (2006) suggests that the emerging bio-economy and biotechnology will drive significant changes in the global economy over the next 30 years.

The European Association for Bio-industries (EuropaBio) places the definition of the bio-economy, or the bio-based economy as it is called by EuropaBio (2010), in firm
contrast with the current fossil-based economy. In summary: “The application of biotechnology for sustainable processing and production of chemicals, materials and fuels from biomass creates an opportunity to reduce significantly our dependence on coal, oil and gas” (EuropaBio, 2010, p.4). Industrial biotechnology or white biotechnology is considered a key component of the bio-economy by EuropaBio (2010). Industrial biotechnology involves transforming agricultural products and organic waste into other substances, in a similar way as crude oil is utilised as a feedstock for producing chemicals.

In 2005, a conference entitled ‘New Perspectives on the Knowledge-Based Bio-Economy’ was organised in Brussels, Belgium. This event highlighted that knowledge is an extremely valuable resource that Europe will rely on to maintain its competitive edge in the global economy (EC, 2005). Interestingly, it was suggested that the bio-economy is one of the oldest sectors (including all industries and economic activities that produce, manage and exploit biological resources, such as agriculture, food, forestry and fisheries), but the life sciences and biotechnology are transforming it into one of the newest sectors. Overall, there was a strong position at this conference that the KBBE will play an increasingly important role in the global economy, where knowledge is the best way to increase productivity and competitiveness, improve quality of life, and protect the environment and social model in Europe (EC, 2005).

In 2007, experts from academia and industry were invited to contribute to a paper to outline perspectives of the KBBE within the next 20 years. The resulting paper, called the Cologne Paper, was published at the conference ‘En Route to the Knowledge-Based Bio-Economy’ hosted in Cologne, Germany. The Cologne Paper presents findings from 6 workshops on the topics of framework, food, biomaterials and bioprocesses, bioenergy, biomedicine, and new concepts and emerging technologies (EC, 2007). This visionary document states that biotechnology will be an important pillar of the European economy by 2030. In particular, the products of white biotechnology and bioenergy will be major parts of industrial production in Europe by 2030 (EC, 2007).

Bioenergy industry associations show some diversity in perspectives on the bio-economy. Heinz Kopetz (questionnaire, 18 June 2010) of AEBIOM states that the “Bio-economy is a rather new word. It is that part of the economy that relies on energy and raw materials originating from green plants.” Tricia Wiley (questionnaire, 3 September 2010) of the REA points out the UK Biomass Strategy (DTI & DEFRA, 2007) provides a definition of the bio-economy as “economic activities which capture the latent value in biological processes and renewable bioresources to produce improved health and sustainable growth and development”. The UK Biomass Strategy is based on the definition of the OECD (2006).

**Box 1. Terminology for the Bio-economy**

<table>
<thead>
<tr>
<th>Description</th>
<th>Definition</th>
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<tr>
<td><strong>biomass</strong> (plant and animal matter) for many purposes. When it is utilized to produce heat, electricity or fuels for transport it is commonly called <strong>bioenergy</strong>.</td>
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<tr>
<td><strong>Bioenergy systems</strong> comprise both the technical aspects of bioenergy, such as conversion technologies and biomass resources, and the overarching non-technical aspects of bioenergy, such as policies and actors.</td>
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<td>The term <strong>biofuels</strong> is used in many different ways. Sometimes it refers to solid, liquid and gaseous fuels derived from biomass. In other cases it refers to liquid (and gaseous) biofuels for transport, which are commonly categorised as follows: <strong>first generation</strong></td>
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biofuels made from food crops, such as wheat, sugar beet and oil seeds; second generation biofuels from non-food biomass, such as lignocellulosic materials, including cereal straw and maize stalks; and third generation biofuels from algae. Only first generation biofuels can be produced on a large-scale at present. However, the commercialisation of second generation biofuels is expected over the coming decades. The third generation biofuels are in a research and development phase. At the moment the main producing countries of liquid biofuels are the USA (mostly ethanol from corn and biodiesel from soy), Brazil (ethanol from sugarcane) and the EU (mainly biodiesel from rapeseed).

The biorefinery concept offers exciting potential to better manage and capture value from biomass resources. Similar to petroleum refineries, which produce multiple fuels and products from petroleum, biorefineries imply the integrated production of energy, fuels and chemical products from biomass. Biorefineries have been identified as one of the most promising routes towards a bio-based economy and away from the current fossil-based economy. While partial biorefineries exist today, considerable research, development, demonstration and commercialisation is required to make advanced biorefineries a reality.

Biotechnology can be understood as the science of using living things to produce goods and services. It therefore involves manipulating and modifying organisms to create new and practical applications for agriculture, medicine and industry. Industrial biotechnology or white biotechnology uses enzymes and micro-organisms to make bio-based products in a diverse range of sectors, including chemicals, food and feed, bioenergy, paper and pulp, and textiles. Green biotechnology is biotechnology applied to agricultural processes. Blue biotechnology is a term that has been used to describe the marine and aquatic applications of biotechnology. While red biotechnology is applied to medical processes. Modern biotechnology is used to distinguish newer applications of biotechnology, such as genetic engineering and cell fusion, from more conventional methods, such as breeding or fermentation.

Source: EuropaBio, 2010; IEA Bioenergy Task 42 (2009); OECD, 2009

Kjell Andersson (questionnaire, 14 June 2010) of SVEBIO states the following: “I was not aware that there is a concept of an ‘emerging bio-economy’. I think we have a very strong move towards a more sustainable energy system, with more energy efficiency and more renewable energy, of which bioenergy is the major part.” Francisco Gonzalez (questionnaire, 4 August 2010) of AVEBIOM states that bioenergy is at the core of the bio-economy. However, Kent Nyström (questionnaire, 20 August 2010) of the WBA highlights that the key components of the bio-economy are sustainability in a broader sense, fair competition between energy, food and feed, and finally, fair competition for water supply and land use.

In 2004, Kamm and Kamm (2004) argued that the future re-arrangement of a substantial part of the economy to biological raw materials requires completely new approaches in research and development. The dimension of this fundamental change on the economy will be gigantic. The products of the bio-economy can be called bio-based products and bioenergy, while the fundamental technology which will be introduced to replace petroleum-based refineries will be known as biorefineries (Kamm & Kamm, 2004). The principle goal of biorefineries can be defined as follows: feedstock mix + process mix = product mix (Kamm & Kamm, 2004).

The biorefinery concept is a young research area with an open field of knowledge (Niles, 2005). This is reflected in the search for an appropriate definition. Broadly speaking, biorefineries combine the “essential technologies between biological raw materials and the industrial intermediates and final products” (BIOPOL, 2008, p.4). The
IEA Bioenergy Task 42 (2009, p.2) defines the biorefinery concept as “the sustainable processing of biomass into a spectrum of marketable products (food, feed, materials and chemicals) and energy (fuels, power and heat)”. The IEA Task 42 Bioenergy (2009) definition has been widely used to ‘market’ biorefineries but in practical terms there is substantial room for further development of the biorefinery concept.

Biorefineries have been categorised into 3 groups based on the flexibility of inputs, processing capabilities, and product generation. A main goal of biorefineries is to produce both high-value low-volume (HVLV) and low-value high-volume (LVHV) products (Fernando et al., 2006; Taylor, 2008). Minimising and recycling waste streams is also a key aspect of the biorefinery concept (Ragauskas et al., 2006). A phase I biorefinery plant has fixed processing capabilities and uses grain as a feedstock, such as a dry mill ethanol plant that produces ethanol, some other feed products and carbon dioxide. A process utilising wet milling technology can be considered a phase II biorefinery, which also uses grain feedstock. However, it has the capacity to produce various end products and processing flexibility.

A phase III biorefinery can use a mix of feedstocks, produce a range of products by employing a combination of technologies, and it is based on both HVLV and LVHV principles. Examples include whole crop, green, and lignocellulose feedstock biorefineries, which are all in a research and development stage (Fernando et al., 2006). The whole crop, green, and lignocellulose feedstock biorefineries are all based on a single conversion technology. But if several conversion technologies are combined together this can reduce overall costs and provide even more flexibility in product possibilities and power generation – this is known as the integrated biorefinery (Fernando et al., 2006; Octave & Thomas, 2009; Realff & Abbas, 2004).

2.2 *Why promote the bio-economy in Europe? What are the main positive and negative impacts of the bio-economy?*

For EuropaBio (2010) the main positive impacts of developing a bio-economy in Europe based on an increased use of renewable and expandable resources is that it offers considerable potential for reducing GHG emissions, using less water and energy, and generating less waste. All of these factors can make industries in Europe more sustainable and competitive. Furthermore, the creation of new non-food markets for crops in synergy with existing food markets, and in combination with alternative income sources for farmers, can give rural areas a major boost (EuropaBio, 2010). Creating more employment that is dispersed in both urban and rural settings can also be a significant positive effect of the bio-economy.

In the Cologne Paper, sustainability is viewed as a clear goal for bioenergy and biofuels for transport within the KBBE (EC, 2007). This encompasses improving security of energy supply, reducing GHG emissions, minimising waste as well as conserving ecosystems, generating employment, and improving rural social conditions. All of these goals need to be achieved for bioenergy to move towards sustainability (EC, 2007). The positive or negative impacts of bioenergy can go either way in many circumstances. Well-designed bioenergy systems can produce multiple positive impacts. But poorly designed systems can result in negative environmental, social and economic consequences. The impacts of bioenergy systems are also complicated by growing international trade. In short, sustainability is a fundamental requirement for bioenergy – both for domestic systems and international trade.
Bioenergy and biofuels for transport is a subject under heated debate world-wide and especially in Europe (Börjesson et al., 2009; Rosenthal, 2007; Solomon, 2010; WWF, 2008). A target of 20% renewable energy by 2020 has been defined for the EU, and this includes a specific target of 10% biofuels in the overall EU transport petrol and diesel consumption by 2020. Edwards et al. (2008) raise serious questions about biofuels in Europe in regards to the economic costs, feedstock availability, GHG emissions, sustainability of production systems, and impacts on food supply and biodiversity. The findings of Edwards et al. (2008) strongly support the need for sustainability criteria for biofuels and the need for close monitoring of sustainability performance. Indirect effects, such as GHG emissions associated with land use change, are also attracting greater analysis (Birdlife International et al., 2010).

Recently, the theme of indirect effects of biofuels production was the focus of the Gallagher Review in the UK. The main outcomes of this study include: a slowdown in the growth of biofuels is needed; there is probably sufficient land for food, feed and biofuels, but there is much uncertainty; biofuels production must target idle and marginal land and use wastes and residues; specific incentives must stimulate advanced technology; biofuels contribute to rising food prices that adversely effect the poorest; a sustainable biofuels industry is possible; lower targets and stronger controls are required; and enforced global policies are important to prevent deforestation (RFA, 2008). While the Gallagher Review focused on the UK, it is relevant for the EU, and it raises serious questions about the sustainability of biofuels, which is an integral part of the KBBE. The underlying message is that biofuels only make sense if the raw materials are based on truly renewable and sustainable sources.

In 2008, the European Commission decided to establish binding sustainability criteria for biofuels, which came into force in 2010 (EC, 2010c). A key aspect is the involvement of independent auditors to check the whole production chains. The sustainability criteria include that biofuels for transport should deliver GHG reductions of at least 35% compared to fossil fuels, rising to 50% by 2017, and 60% by 2018 for new production facilities, and that they are not obtained from land with high carbon stocks or high biodiversity (EC, 2010d). A different approach was chosen for the use of solid biomass and biogas for electricity, heating and cooling where the EU did not yet consider a need for European sustainability requirements, and the European Commission only made specific recommendations to Member States if they individually intend to apply sustainability criteria for solid biomass and biogas (EC, 2010d). The efforts by the European Commission, the involvement of industry, Member States and NGOs all point towards increased emphasis on the sustainability for bioenergy generally and biofuels for transport specifically.

Not surprisingly, bioenergy industry associations in Europe are largely optimistic about bioenergy systems. However, there is a strong awareness that supportive policy schemes need to stimulate well-designed bioenergy systems that incorporate sustainability. Heinz Kopetz (questionnaire, 18 June 2010) of AEBIOM believes that negative impacts will occur if a sustainable production of biomass is not achieved, which includes the fertility of soils and the availability of water, or if more biomass is used than annually produced, and a competition between food and non-food use of biomass takes place. Kent Nyström (questionnaire, 20 August 2010) of the WBA is confident the expanding bio-economy can avoid substantial negative impacts. Kjell Andersson (questionnaire, 18 June 2010) of SVEBIO states that the main positive outcome of the emerging bio-economy is “a more sustainable energy and
material system, based on solar energy and natural processes, instead of depleting finite resources.” Tricia Wiley (questionnaire, 3 September 2010) of the REA suggests there are a number of economic, security and environmental benefits associated with the bio-economy, including job creation and investments in industry and deprived areas and communities. Francisco Gonzalez (questionnaire, 4 August 2010) of AVEBIOM argues that the generation of employment opportunities in rural areas is the major positive result of the growing bio-economy.

The Bioscience Resource Project (2007) shows there have been very optimistic predications about the development of the KBBE in Europe. For example: “Not only will farmers grow food for a larger population, but much of the economy will also be based on the raw materials they grow: new foods, biofuels, and biomaterials” (EC, 2004, p.15). And furthermore: “With attractive careers and investment prospects, farming and its spin-offs will trigger a migration away from the cities and back to the countryside” (EC, 2004, p.15). However, the Bioscience Resource Project (2007) argues that it is important to remember that experts have been making futuristic visions about agriculture before that have not entirely worked out as predicted. In the 1950s, it was suggested that agriculture would be irrigated with water from icecaps that had been melted by nuclear explosions. This water would be stored in ponds, also created by nuclear explosions. In the 1970s, there were predictions of an era of remote control tractors and multi-story farms. And now in the 2000s, there is the bio-economy (Bioscience Resource Project, 2007).

The KBBE has been embraced by the EU based predominantly on the potentials of modern biotechnology. In 2005, the European Parliament commissioned a report (called BIO4EU) into the status, opportunities and challenges of modern biotechnology in Europe (Zika et al., 2007). This report has been used to argue for greater support for the emerging bio-economy. However, the Bioscience Resource Project (2007) suggests that BIO4EU provides little hard evidence about the future development of the KBBE, and that the modern biotechnology discussed in BIO4EU is not particularly sustainable in its current configurations. The Bioscience Resource Project (2007, p.6) states that “one is forced to wonder whether the KBBE is not so much a real and substantial prospect but more a fantasy future”. This openly challenges the optimistic visions for the KBBE both in terms of the potential for an industrial revolution and to drive forwards sustainable development.

In the context of agriculture, energy and the emerging bio-economy, Smolker (2008, p.1) argues that “if we simply substitute plant biomass energy in place of fossil fuel energy, we are doomed”. Industry is increasingly looking towards large-scale agriculture as a substitute for fossil fuels. Smolker (2008) goes on to argue that there is little question that the quantities of biomass required for the projected bio-economy demand industrial monocultures. In contrast, Smolker (2008) calls for the re-localisation of the production and consumption of food and biomass, demanding a re-vitalisation of community-based multi-functional agriculture. This alternative model of multi-functional systems can provide biomass production, agricultural commodities, and ecological services (Jordan et al., 2007). Here it is clear to see diverging visions of agriculture and energy, and where the bio-economy will confront challenges in relation to its design and overall socio-economic, agricultural and environmental impacts.

It can be expected that NGOs will play an important role in the development of the bio-economy in Europe, particularly in regards to the acceptance of the biorefinery concept and the implementation of biorefineries across Europe. In a survey conducted of NGOs in 6 countries in the EU (Sweden, the UK, Poland, the Netherlands, Greece and
It is clear that the consulted NGOs are active in the bioenergy field (BIOPOL, 2007b). Within the biorefinery field, NGOs appear to be quite positive to biorefineries. However, a substantial number of NGOs are in the process of developing positions on biorefineries (BIOPOL, 2007b).

Interestingly, the bioethics community (which is concerned with ethical issues raised by new developments in biology and medicine) is becoming increasingly interested in bioenergy and biofuels for transport. In 2009, the Nuffield Council of Bioethics in the UK launched a working party to investigate the ethical implications of new approaches to biofuels. The working party aims to identify and investigate the potential benefits and disadvantages as well as ethical, social, legal and economic issues associated with bioenergy, and to develop policy recommendations and an ethical framework to provide guidance on how to make decisions regarding bioenergy. This is a very important consultation for proponents of the bio-economy not just in the UK but for the EU as a whole. Its findings will likely attract political and media attention and have ramifications for the KBBE in Europe.

2.3 How can the bio-economy expand in Europe in a sustainable and competitive way? What are the main drivers and constraints for the bio-economy?

The OECD (2006) states that government policy will play a decisive role in the bio-economy by stimulating or blocking developments. A major challenge facing policymakers is to design policy schemes that promote innovation and development without locking into particular systems or technologies or locking out future opportunities. A degree of foresight or vision is therefore very important in policy formulation for the bio-economy, so that short-term decisions are taken without major negative impacts on long-term developments. The OECD (2006) also suggests that metrics and indicators are needed to track progress of the bio-economy and develop roadmaps.

The drivers and constraints for the bio-economy are vast and involve complex interactions and feedbacks. Some of the major factors include government policy, regulatory conditions, intellectual property rights, human resources, social acceptance, market structure and business models (OECD, 2009). The combination of these factors will create business opportunities that require new business models. The OECD (2009) states that 2 business models in particular could become important. First, collaborative models for sharing knowledge between actors and reducing research and development costs. Second, integrator models that coordinate various actors to create and maintain markets. New types of business models are a recurring theme in discussions on the KBBE in Europe.

Social perceptions of the KBBE and the biorefinery concept will influence market developments. However, such attitudes are not static and can change quickly, particularly if significant benefits can be demonstrated. For biorefineries some of the main challenges are public uncertainty and a lack of supportive regulation. These 2 factors are intimately interlinked. Policymakers will remain hesitant to introduce or maintain strong supportive policy for the biorefinery concept or the bio-economy as a whole if there is a lack of social acceptance, and even more so, if there is direct public and community opposition. When establishing biorefineries, the involvement of local actors and communities appears to be vital (BIOPOL, 2007b). Interactions with local actors in the early stages of planning and development are necessary to increase public acceptance.
EuropaBio (2010) states that the main challenge for policy-makers in the EU is that “a more integrated and strategic approach is needed if Europe is to get serious about developing a globally competitive bio-based economy within the next decade” (EuropaBio, 2010, p.7). For EuropaBio (2010), such an integrated approach should be focused on long-term opportunities and open to partnerships between public and private actors within the EU and around the world. It should involve 5 key aims, including:

- improving and securing access to renewable raw materials for industrial use;
- supporting targeted research, training and innovation;
- developing technologies and systems, and bridging the gap between research and markets;
- stimulating demands for bio-based products; and
- improving awareness of the bio-economy through communication and educational activities.

The major driving force for the KBBE, as defined in the Cologne Paper, is the demand for a sustainable supply of food, raw materials and fuels (EC, 2007). A significant leap in agricultural production and yields is required over the coming decades to meet the food demands of a growing and more affluent population. In parallel, climate change and energy security pose massive challenges for Europe and the world. These overarching issues ‘frame’ the KBBE and they are the main reasons why there is an increasing interest in the development of the KBBE in Europe. Food supply, climate change and energy security demand international cooperation. At the same time, biotechnology is an international business, and the EU therefore needs to intensify cooperation on biotechnology with the USA, but also emerging industrial nations, like China and India (EC, 2007).

While the technical potential for bio-based products and biofuels is impressive, a significant challenge is to increase the scale of activities to compete with petroleum-based products (Bunger, 2010). Bio-based alternatives exist that can replace over 90% of petroleum-based products. But today, bio-based products replace less than 1% (Bunger, 2010). Bunger (2010, p.5) argues that “the sobering reality is that even with the benefit of parity on performance and costs, biofuels and biomaterials will lack the scale to meaningfully change the petroleum picture for decades to come.” Bunger (2010) goes on to suggest that biomass from new crops requires unsustainable land use changes and water resources, so the main feedstocks to focus on should include algae and agricultural and forest wastes.

The Cologne Paper highlights a number of hurdles for the KBBE in Europe to overcome by 2030. There are 3 that particularly stand out and demand action by policymakers. First, the number of qualified people will not keep up with demand as the KBBE grows. Increased emphasis on science education from schools to universities and greater funding for research activities is a prerequisite for the KBBE (EC, 2007). Interdisciplinary education and research will be needed that is connected to technological development and implementation. Second, a thriving agricultural sector in Europe without significant subsides is a vision. Shifting subsidies from agriculture to support innovation in biotechnology is suggested by the Cologne Paper (EC, 2007). Third, a well-informed public (based on communication and engagement) that is aware of both the opportunities and trade-offs with biotechnology will become a competitive edge in the global economy (EC, 2007). At the same time, public opposition can greatly destabilise the emerging bio-economy in Europe.
EuropaBio and the European Technology Platform for Sustainable Chemistry (ESAB) argue that white biotechnology will continue to expand in some sectors due to purely economic reasons. However, a main driver in the near future will be the reduced environmental impacts of biological processes. As the ‘polluter pays principle’ is more established in the EU, effluent streams will become costs rather than being an external factor. EuropaBio and ESAB (2004) suggest that white biotechnology can achieve environmental benefits and reduce costs. Furthermore, there are growing examples of biotechnology where new products are developed, where the properties, costs and environmental performance, could not have been achieved utilising petrochemical feedstocks and conventional chemical processing (EuropaBio & ESAB, 2004).

The marginal understanding of the bio-economy and the ‘missing’ carbon taxes in many European countries are considered key constraints by some bioenergy industry associations. Heinz Kopetz (questionnaire, 18 June 2010) of AEBIOM states: “The basic principle of the bio-economy lies in the fact that the carbon comes via photosynthesis from the atmosphere and not from the earth’s crust. As long as the depletion of the earth’s crust brings more profit than the use of carbon via photosynthesis the development of the bio-economy will be held back.” There are in fact discussions about carbon taxes at the EU level, especially based on the positive experiences from Sweden. In addition to expanding bioenergy, Sweden has also made significant progress on biofuels for transport (see Box 2).

Kjell Andersson (questionnaire, 18 June 2010) of SVEBIO states: “Strong traditional industries lobbying to preserve their dominance (oil, coal, gas, nuclear) and big ‘sunk costs’ in the existing energy systems make it hard for new alternatives to compete. The fossil energy systems also do not, in most countries, pay for their full external costs, like damage on the economy, climate costs, and safety and security costs (nuclear).” Francisco Gonzalez (questionnaire, 4 August 2010) of AVEBIOM concurs that the main obstacles for the bio-economy arise from the capacity of the oil and gas sectors to lobby. For the UK, Tricia Wiley (questionnaire, 3 September 2010) of the REA suggests that complex and inconsistent regulations, and the perceived risks of policy changes, are constraints for the bio-economy.

Box 2. Bioenergy and Biofuels in Sweden

In 2009, bioenergy overtook oil as the largest source of energy in Sweden. Oil accounted for 30.8% while bioenergy provided 31.7% of the total energy use. Impressively, bioenergy has increased in Sweden for the past 25 years. A major reason for the success of bioenergy in Sweden has been the implementation of a carbon tax established in 1991. It is based on the ‘polluter pays principle’ in that emitters of CO2 pay for the current and future costs caused by CO2 emissions. The carbon tax makes it profitable to use fossil fuels efficiently and switch to renewable energy. The carbon tax has transformed the energy system in Sweden towards bioenergy.

Currently, over 1,400 of Sweden’s 4,000 service stations offer fuels from renewable energy sources, predominantly bioethanol. In addition to economic incentives, service stations (of certain sizes) are mandated by law to provide a renewable alternative. Presently, there are some 4.2 million cars on Sweden’s roads and almost 200,000 are flexi-fuel cars (vehicles that can operate on bioethanol, petrol or varying blends). There are economic incentives to purchase flexi-fuel cars, subsidies and tax reforms essentially make bioethanol cheaper per energy unit than regular petrol at service stations, and flexi-fuel cars are often exempt from certain tolls and public parking fees.

Source: SVEBIO, 2010; Borg, 2010; McCormick & Kåberger (2006)
Increasing oil prices, political goals (such as the 20% renewable energy share by 2020 for the EU), and the application of the ‘polluter pays principle’ in some countries with carbon taxes are all drivers. However, as suggested, significant constraints hamper the development of the bio-economy. Kjell Andersson (questionnaire, 18 June 2010) of SVEBIO therefore states that “in general the drivers are still too weak in most countries, which makes it doubtful to talk about an emerging bio-economy.” Interestingly, both Francisco Gonzalez (questionnaire, 4 August 2010) of AVEBIOM and Kent Nyström (questionnaire, 20 August 2010) suggest that the growing awareness of the general public on climate change, energy security and environmental issues is an increasingly important driver for the KBBE.

There are a growing number of EU policies and strategies relevant to biorefineries. However, there are at least 2 important observations to make about the current situation. First, there are numerous examples of potential overlaps, conflicts and synergies between policy regimes in the EU for the biorefinery concept (BIOPOL, 2009). It is difficult to make sense of the interactions between policy regimes. Second, very few policies and strategies specifically refer to the biorefinery concept in any detail. Many of these policies and strategies are much broader than the biorefinery concept, such as rural development and agricultural policy. However, these policy regimes remain very important to creating favourable conditions for biorefineries (BIOPOL, 2009). Overall, the introduction of ‘new’ policies and strategies to support biorefineries will unavoidably interact with existing policy schemes. Such interactions can be complementary, but there are also risks that policies and strategies will interfere with each other and undermine objectives (BIOPOL, 2009).

In 2006 at the ‘European Conference on Biorefinery Research’ in Helsinki, Finland key policy challenges for the bio-economy and the biorefinery concept were openly discussed. Mauri Pekkarinen, the Finnish Minister for Trade and Industry, stated that “coordination of policies remains a major challenge, both nationally and in the EU” (Pekkarinen, 2006, p.1) and that creating predictable business conditions for biorefineries is also a priority. Janez Potocnik, the European Commissioner for the Environment, claimed that “biorefineries can help to transform our fields and forests into this century’s oil wells” (Potocnik, 2006, p.11) but only through collaborations between industrialists, researchers, farmers, financiers and politicians.

Bio Base Europe is a leading initiative for the development of the bio-based economy in Europe. In order to help the transition from a fossil-based economy to a bio-based economy, the EU, Belgium and the Netherlands have decided to establish Bio Base Europe. The Pilot Plant at Bio Base Europe is a flexible and diversified pilot plant based in Ghent in Belgium, capable of scaling up and optimising a broad variety of bio-based processes. Companies and research institutes that are active in the bio-based economy can use the facilities. The Educational Center at Bio Base Europe is a training facility for process operators in various bio-based industries. It is based in Terneuzen in the Netherlands. It contains various educational equipment and training installations. Bio Base Europe can be considered as a building block for the development of the bio-based economy in Europe.

The primary aim of the ‘Food, Agriculture, Fisheries, and Biotechnology’ research theme under the Seventh Framework Programme (FP7) is to build a European KBBE. The research theme is built around 3 major activities: sustainable production and management of biological resources from land, forest and aquatic environments; farm to fork or food, health and well-being; and life sciences, biotechnology and biochemistry for
sustainable non-food products and processes. Within the final part on life sciences, biotechnology and biochemistry, the focus is on the following: production of improved renewable raw materials; processing renewable raw materials, which includes the application of biotechnologies to realise the full potential of bio-based products and biorefineries; and environmental biotechnology, including new ways to protect and improve the environment (EC, 2010).

Interestingly, in this FP7 research theme on ‘Food, Agriculture, Fisheries, and Biotechnology’ there is a high priority given to preventing, reducing and reusing bio-waste across all activities (EC, 2010). Reducing and preventing the generation of bio-waste along the whole production-consumption chains in the sectors of food, agriculture, forestry and fisheries is considered an important element of the bio-economy in Europe. Furthermore, bio-valorisation or adding value to bio-waste streams by recycling (such as utilising bio-waste in soil systems) or reprocessing (such as generating bioenergy or producing bio-based products from bio-waste) are also key aspects of the KBBE (EC, 2010). The ‘Food, Agriculture, Fisheries, and Biotechnology’ research theme can be expected to generate considerable research and development activity for the emerging bio-economy in Europe.

A number of European Technology Platforms (ETPs) are related to the KBBE. Labelled as ‘champions for growth’ ETPs focus on strategic fields, such as food, biotechnology, chemicals, and nanotechnology (EC, 2010b). ETPs bring together diverse stakeholders to define medium-term and long-term research and technological development objectives. The purpose of ETPs is to ensure that knowledge generated through research is transformed into technologies and processes, and finally into marketable products and services. The ETPs that are closely connected to the KBBE include: Food for Life; Plants for the Future; the Forest-based Sector; Sustainable Chemistry; and Biofuels (EC, 2010b). Bio-circle is a project funded by the European Commission that aims at increasing the participation of researchers from outside Europe in research projects under the ‘Food, Agriculture, Fisheries, and Biotechnology’ research theme, and indirectly the ETPs. The Bio-circle project recognises that this research theme often addresses challenges (and opportunities) that are of global interest, and the best solutions often require international collaboration.

3 Reflections and conclusions

This research begins to explore the development of the KBBE. It provides insights into the emerging bio-economy in the European context and highlights topics of growing importance. These include:

Definitions, components and perspectives: The concept of a bio-economy has generated considerable excitement in Europe and around the world. However, it is immediately apparent that the bio-economy means very different things to different people. A better understanding of the bio-economy and its key components remains a vital foundation for the growth of the KBBE in Europe. Put simply, the bio-economy can be defined as an economy where the basic building blocks for materials, chemicals, and energy are derived from renewable biological resources, such as plant and animal sources. The key components of the bio-economy include biotechnology and the biorefinery concept. Biofuels for transport as a key product and agriculture as a source of raw materials can also be considered the foundations of a growing bio-economy.
Visions, positives and negatives: When looking at the positive and negative impacts of the bio-economy a distinction needs to be made between the current status and near-future as opposed to the long-term future based more on visions. There are diverging visions of the bio-economy from wildly optimistic about an industrial revolution in the coming decades to very concerned about potential negative impacts, especially related to agriculture. Additionally, the status today of the bio-economy remains rather unclear, despite some studies to define the scale and attributes of the bio-economy. Finally, there is growing knowledge related to the biorefinery concept and attempts to speed up the development of biorefineries in Europe, but there is still great uncertainty about the potentials and impacts associated with biorefineries.

Challenges, drivers and constraints: The drivers and constraints for the bio-economy are mixed together with challenges (and opportunities). There is also a difference between global and European issues and trends, such as climate change, and more concrete drivers or constraints at the national and local levels. Supportive policy schemes and social acceptance by a broad range of stakeholders appear to be key ingredients for a growing bio-economy. A more integrated and strategic policy approach is required to stimulate the KBBE in Europe, which is combined with a strong emphasis on engagement with the general public and key stakeholders. While there is an increased effort on research and development, there are many difficult policy decisions to make, especially regarding the supply of raw materials for the bio-economy in Europe.

This research work also raises some discussion points around the emerging bio-economy, which are not explored in significant detail in this paper. However, these points deserve further attention and analysis. These include:

The importance of public-private networks: Benner and Löfgren (2007) explore the role of the state and governance in the emerging bio-economy by comparing bio-industries in Finland, Sweden, the USA, the UK and Australia. An initial observation is that the bio-economy is critically dependent on state ‘intervention’. Benner and Löfgren (2007) demonstrate that state support for bio-industries varies across countries. However, there is a general orientation in Finland, Sweden, the USA, the UK and Australia to support bio-industries through creating favourable environments. This involves a complex interplay between publicly funded science and business firms, regulated markets, professional groups, an integrated and supportive role for state authorities, and positive public attitudes to uncertain applications of science (Benner & Löfgren, 2007).

The pattern of governance around bio-industries that is emerging across Finland, Sweden, the USA, the UK and Australia is not liberal or market-based or coordinated and state-led, but it is rather characterised by public-private networks. Benner and Löfgren (2007) argue that Sweden and the USA (often viewed as very different in terms of governance) are both loosely steering and co-ordinating the bio-economy. What is clearly evident – by design in Finland and Australia and through a more evolutionary process in the UK, the USA and Sweden – is a pattern of combined public and private investments in various parts of the bio-economy (Benner & Löfgren, 2007). This paper concurs that the development of public-private networks appears to be an essential characteristic of the emerging bio-economy (Burke, 2008).

The role of city-regions: In a European context, many of the policies and strategies that are implemented by local municipalities were formulated by the EU and filtered through national governments. Silvestrini et al. (2010) examine the implementation of the EU Biofuels Directive in Germany, the UK, Italy and Finland by looking at the role of city-regions, namely Berlin, London, Milan and Helsinki. Interestingly, and extremely
relevant for the emerging bio-economy, is that networking between city-regions is allowing an exchange of knowledge and experiences, and contributing to policy learning around the EU Biofuels Directive (Silvestrini et al., 2010). This paper argues that city-regions are well-positioned to play an important role in the KBBE, especially in relation to biofuels for transport, partly because local municipalities are responsible for many aspects of transport systems and planning issues.

The scope for action by local municipalities is defined by their jurisdiction and responsibilities, and their financial independence. However, local municipalities are often able to establish more ambitious goals and policies than national governments, which is particularly evident in regards to climate change. Furthermore, the goals and policies of city-regions can be condensed into ‘guiding visions’, which can help to mobilise actors and coordinate diverse interests (Späth & Rohracher, 2010). For the bio-economy, ‘guiding visions’ can be hugely important as a mechanism to translate abstract visions of the KBBE (often framed by national or international actors) into concrete agendas based on local and regional contexts. This paper strongly believes that city-regions can act as drivers of the bio-economy in many respects, particularly in terms of ‘guiding visions’ related to climate change.

The engagement of consumer-citizens: Creating awareness amongst the general public and key stakeholders about the KBBE appears to be a vital foundation for expanding the bio-economy in Europe (EuropaBio & ESAB, 2006). This paper argues that an EU strategy for communication and stakeholder involvement is necessary, which is combined with actions across countries and city-regions. However, it is clear that increased information and communication do not directly translate into public acceptance. On the contrary, the success of the bio-economy will likely depend on active public and stakeholder engagement both in policy formulation and specific projects. Demonstrating the benefits of the bio-economy in parallel with trade-offs to consumer-citizens will be required to create the foundations for the KBBE in Europe.

The concept of consumer-citizens can be utilised to shape communication strategies. On the one hand, the bio-economy needs to be marketed to ‘consumers’, and on the other hand, proponents of the bio-economy need to actively engage ‘citizens’ in planning and implementation processes. There is also a need to identify target audiences, particularly opinion-formers that can influence the general public. These include (but are not limited to) journalists in the popular media, political and business leaders, and NGOs. As suggested, NGOs are establishing their positions on the biorefinery concept. It can be expected that NGOs will become further engaged as the bio-economy grows. NGOs are likely to be important opinion-formers for the implementation of biorefineries and the KBBE in general.

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22
The ‘knowledge’ idea: its urban economic, social and cultural relevance

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Structured Abstract

Purpose - Over the past decade or more, the idea of knowledge has become increasingly important as both a descriptor and as a resource for analysis and policy related to economic and social development. References to the knowledge economy, knowledge society and even knowledge capital are now commonplace. Sometimes, the usage has a spatial dimension, linked to the city (as in the Summit title) or region, or even city-region. This is reflected also in the widespread interest in ‘learning regions’. Yet the readiness with which the idea has found its way into the vernacular masks a number of ambiguities about its meaning. It can be taken to refer to the increasing complexity and significance of explicit codified knowledge in production processes, indicated for example by discussion of research commercialisation. It has been used to describe the growing emphasis on skills formation and credentials in public policy. At other times, it has been used much more diffusely to refer to underlying assumptions about the key resources for wealth generation in contemporary advanced economies, perhaps extending also to processes of social and cultural development. ‘Knowledge’, in various forms, is a key element in innovation policies. This paper will explore these various usages of the ‘knowledge’ idea.

Methodology - The paper draws on research undertaken in two international projects, in 2004-05 and 2009-10, in which Melbourne served as a site of multiple case studies, encompassing both commercial and community settings. The analysis will proceed on the basis that greater conceptual clarity will assist with policy formation to enhance the social and economic benefits which we seek from public support for knowledge generation.

Value - This paper will add to the conceptual clarity of the ‘knowledge’ idea, and explore the policy implications of research which attempts to understand the processes in knowledge regions.

Practical Implications - In Australia at least, the dynamics of urban growth are constrained by policies which have contradictory implications for the key institutions which shape the investment in, and application of, knowledge resources. The paper will conclude with some proposals for addressing these contradictions.

Paper Type - Academic Research Paper

1 Introduction

Over the past decade or more, the idea of knowledge has become increasingly important as both a descriptor and as a resource for analysis and policy related to economic and social development. References to the knowledge economy, knowledge society and even knowledge capital are now commonplace. Sometimes, the usage has a
spatial dimension, linked to the city (as in the Summit title) or region, or even city-region. This is reflected also in the widespread interest in ‘learning regions’.

Yet the readiness with which the idea has found its way into the vernacular masks a number of ambiguities about its meaning. It can be taken to refer to the increasing complexity and significance of explicit codified knowledge in production processes, indicated for example by discussion of research commercialisation. It has been used to describe the growing emphasis on skills formation and credentials in public policy. At other times, it has been used much more diffusely to refer to underlying assumptions about the key resources for wealth generation in contemporary advanced economies, perhaps extending also to processes of social and cultural development. ‘Knowledge’, in various forms, is a key element in innovation policies.

This paper will explore these various usages of the ‘knowledge’ idea, drawing on research undertaken in two international projects, in 2004-05 and 2009-10, in which Melbourne served as a site of multiple case studies, encompassing both commercial and community settings. The analysis will proceed on the basis that greater conceptual clarity will assist with policy formation to enhance the social and economic benefits which we seek from public support for knowledge generation.

In Australia at least, the dynamics of urban growth are constrained by policies which have contradictory implications for the key institutions which shape the investment in, and application of, knowledge resources. The paper will conclude with some proposals for addressing these contradictions.

2 Knowledge types

Over the last two decades, a number of writers have explored the context in which ‘knowledge’ has become of such importance. As Drucker has put it:

Knowledge is the only meaningful resource today. The traditional factors of production - land, labour and capital - have not disappeared, but they have become secondary. They can be obtained, and obtained easily, providing there is knowledge. (Drucker 1993, 38).

In the introduction to a book series entitled ‘Resources for the knowledge-based economy’, Prusak, the Series Editor, listed the following trends that were influencing the significance of knowledge:

A) The globalization of the economy, which is putting terrific pressure on firms for increased adaptability, innovation and process speed;
B) The awareness of the value of specialized knowledge, as embedded in organizational processes and routines, in coping with the pressures of globalization;
C) The awareness of knowledge as a distinct factor of production and its role in the growing book value to market value ratios within knowledge-based industries.
D) Cheap networked computing, which is at last giving us a tool for working with and learning from each other. (Prusak, in Klein 1998, ix-x).

Castells has argued that the forces under way at present constitute the emergence of a new ‘mode of development’, which he characterises as the ‘informational’ mode. Castells notes also the significance of contemporary information and communication technologies (ICT) and their implications for reshaping time and space, but more importantly, he points to their role across all industry sectors. Following the early characterisation by the OECD of ICTs as ‘pervasive generic technologies’, Castells went further, noting.
In the new informational mode of development, the source of productivity lies in the technology of knowledge generation, information processing and symbol communication… [T]he action of knowledge upon knowledge itself … [is] the main source of productivity. (1996, 17).

Based on his experience with the Centre for Educational Research and Innovation (at the OECD) and in reviewing the Swedish Development Program in New Technology, Work and Management, and other studies, Bill Ford argued that,

... an enterprise's dynamic comparative advantage is related to the ability to absorb, adapt and implement conceptual changes; the ability to integrate innovations in the organisation; and the ability to learn. How does one enterprise learn faster than another?

This kind of perspective, with its implications for key business decisions, demonstrates the importance of understanding central elements of the informational mode of development. Enterprises have restructured their businesses so as to enhance their capacity to respond promptly and efficiently to an economic environment in which new technologies have radically reshaped assumptions about time and space, markets have become alternately saturated or fragmented into distinct niches, and investment has become increasingly mobile. The environment is understood to be increasingly complex, unpredictable and volatile.

How then, to disentangle the significance and complexity of the idea of knowledge, with its explicit, practical and intangible, tacit dimensions, each of which is relevant to processes of innovation. Depending on context, ‘knowledge’ might refer, for example, to:

a) formal, explicit insights and theories about phenomena and processes which result from formal research, possibly subject to intellectual property arrangements. While some insights and theories might be disseminated through peer-reviewed means, others would be subject to commercial-in-confidence arrangements;

b) capacity to design, think and do, reflected in various curricula for skills formation, and also in on-the-job training activities. While much of this knowledge might also be explicit, other, important elements will be tacit;

c) the kind of ‘real time’ intelligence which organisations gather about their customers, competitors, potential markets, suppliers or internal processes, for the purpose of ongoing improvement of their performance. Sometimes, this kind of knowledge is gathered through regular, systematic process measurement, otherwise through occasional review, use of consultants or from front-line staff experience. It can be critical not only to product or process improvement, and to developing the kind of organizational agility and innovation to which Ford refers; and

d) the intimate feel for key relationships which can be crucial to effective relationships with customers, clients, suppliers. This is much more than interpersonal dynamics, as it involves insight into the circumstances and character of different stakeholders and of the context in which different kinds of interactions occur.

A recent report to the International Regions Benchmarking Consortium, on Research Universities and the Knowledge Region, highlighted different ways of analyzing knowledge (synthetic, analytic and symbolic, for example) but emphasized particularly the difference between tacit and codified knowledge. Whereas codified knowledge is the domain associated typically with research universities, tacit knowledge is at the heart of the interactions within clusters and supply chains in a regional setting.

In reflecting on the four kinds of knowledge outlined above, the importance of the distinction between codified and tacit knowledge becomes apparent. The first two types
are clearly linked with codified knowledge (albeit with significant tacit knowledge evident also in skills deployment), whereas the two latter types are much more intangible and likely to be tacit. These distinctions have importance implications for policy and program initiatives. They underscore in particular the significance of a city-region perspective.

3 Production and deployment of different knowledge types

Lack of understanding of these distinctions can lead to quite contradictory patterns of behaviour, not least in relation to learning issues. On the one hand, firms act as though compelled to observe and to imitate the initiatives of their competitors; on the other, they need to innovate, to seek new ways of establishing dominance within a particular market or sector, and to make their relationships with their stakeholders or customers sufficiently distinctive and productive to win their loyalty. In the 1990s, developments in the motor vehicle manufacture, the software industry and in telecommunications exemplify these patterns.

A broad range of theories, models and programs have been formulated and promoted by management consultants to assist with the restructuring process. The emergence of management theory and practice as a central element of organisational decision-making has contributed, in part at least, to organisations in all parts of the world following diverse yet similar pathways. Even where quite contrasting models of organisational change have been adopted, often with the intent of assisting enterprises to leap ahead of their competitors, many organisations, especially those operating transnationally, now manifest characteristics associated with the informational mode: centralised yet decentralised; with greater flexibility in capital labour relations, as well as in market responsiveness.

The process of environmental intelligence, reading the signals of the ‘market’ and understanding their strategic implications and commercial possibilities, is, therefore, a key element of the ‘learning’ to which Johnston (see above) and business leaders such as Arie de Geus (from Royal Dutch Shell) refer. It is a matter of being outward looking and capable of reading the signs in the external environment, as much as it is of having effective internal research and development and production processes. However, the external orientation needs to be complemented by the development of appropriate arrangements for learning, and for acting on learning, within the organisation itself.

In this context, the concept of ‘learning’ has a variety of dimensions which need to be distinguished. In the first place, there is an important distinction to be drawn between workplace-based learning opportunities provided for individuals so that they can learn how to do their jobs and perhaps to contribute more generally within an organisation, and collective learning which can take a variety of forms, whether related to immediate operational matters or to strategic decision-making. Work-based learning can include formal training classes or tutorials, self-paced learning packages, or more integrated models which involve, most commonly, imitation and trial and error, supported sometimes by mentoring or coaching.

Collective learning is increasingly important for contemporary organisations, however, as the knowledge generated from collective experience is the critical ingredient for innovation, whether incremental or transformational. Within different national contexts, contrasting approaches to collective learning within an organisation have emerged, before diffusing elsewhere. Total Quality Management (TQM) in Japan, and subsequently other parts of the world, ‘learning organisations’, or more specifically organisational learning, in the United States of America (USA), and learning through
partnerships (in northern Europe, Sweden in particular) have all had a focus on
knowledge as the critical ingredient in the organisational change necessary for economic
success. However, each of these approaches is founded in quite different theoretical
paradigms, and can have divergent implications for learning strategies, for workers and
for organisations.

The emphasis on ‘skill’ and greater ‘empowerment’ for workers has lead to debate
about whether the current period of change presages a ‘post-Fordist’ environment in
which workers will recover their skills and relative autonomy as craft workers (see Piore
and Sabel 1984). Even though Castells’s analysis suggests that the informational mode
will preserve, and perhaps reinforce, capitalist power relations, there is some evidence
that aspects of organisational learning offer space within which forms of worker
resistance can take shape and achieve improvements in workers’ lives.

Many organisations have attempted somewhat eclectically to bring together change
strategies which integrate aspects of TQM with learning organisation approaches, or to
implement ‘codetermination’ with their staff. At one level, this is sensible as some of the
practical elements of each approach meet different kinds of needs. At another, however,
there are fundamental contradictions which can undermine substantially the effectiveness
of one approach or another in supporting knowledge generation and its application. These
developments have significant bearing on some of the key research questions of this
thesis, particularly those related to the implications of contemporary developments for the
interests of all members of a society (see Touraine 1989).

4 The urban context

There is now a substantial literature about the regional aspects and context of
innovation. Regional innovation systems have become an increasingly significant focus of
research and of policy over the last two decades. This has arisen from the view that
interaction is critical to knowledge exchange and learning, which in turn, are significant
elements of innovation processes. Notwithstanding the communication possibilities now
available and the emergence of ‘virtual communities’, regional environments and spatial
proximity have been seen as critical resources for understanding the formation of clusters
and their potential significance in facilitating the kinds of interactions that lead to
innovation and hence to increased economic activity.

While there are a number of prominent writers whose work has received a lot of
public attention (Porter 1990, 1998 and Florida 2002, for example), there is now a very
substantial body of research which encompasses all kinds of theoretical perspectives,
industries and locations which illuminates the importance of locality in framing
opportunities for innovation and enhanced economic performance. The research shows
great variety in clusters and how organisations network, depending on historical, industry,
cyclical, cultural and regional circumstances. Much of it has focused particularly on small
and medium enterprises, their relationships with large organisations, and the potential
value of collaboration in enhancing their prospects for growth and increased profitability.

Across different national settings and industry sectors, the studies also raise as many
questions as they answer, about such issues as scale, diversity in type of organisation, the
roles of intermediaries, variations according to industry sector and cultural influences.
Frames of reference vary so often in many of the studies that it can be very difficult to
develop a coherent perspective on many of these issues.

Two key themes recur in the debates about the regional character of innovation
processes, and particularly about the relationships amongst organisations within a region:
the importance of knowledge exchange, especially where it is tacit, not codified in an easily transferable form; and collaborative action to invent, design, produce and distribute competitive products and services. In these respects, at least, regions matter and ‘news about the death of geography is much exaggerated’ (Berry 2003, 55). This seems to be relevant particularly where proximity can enhance innovation at different points in supply chains.

5 Case studies

For more than a decade, the OECD has encouraged research and debate on the concept of learning regions, and its relevance to policy interventions intended to promote economic and social development. CRITICAL (City-Regions as Intelligent Territories: Inclusion, Competitiveness and Learning), a European-funded project, has contributed to research on this and related ideas, focusing on five ‘city-regions’. The CRITICAL research team involved researchers from universities in each of Tampere, Finland; Dublin in Ireland; Dortmund in Germany; Newcastle-on-Tyne in England; and additionally, from Melbourne, Australia.

The project examined the kinds of learning that occur in different types of networks, and their implications for innovation. In the European cities, case studies were conducted on eight networks in various sectors (such as small-medium enterprises, cultural development, training for socially excluded groups, community, sustainability), while four case studies were conducted in Melbourne. The case studies encompassed a mix of informal and formal networks, and explored both systematic learning initiatives and serendipitous activities (see Charles and Duke 2006 for more on the project).

In the analysis of the case studies, a number of key themes emerged, including the direct implications of learning in networks for economic development, for enhancing cosmopolitan identity, for encouraging sustainability, for enhancing social cohesion, and for governance. The last of these emerged as a key issue in the analysis of the Melbourne cities, where the formal responsibilities and boundaries associated with state and local government (and federal policy, in some cases) were inappropriate for addressing key urban issues, and development coherent policy and program interventions.

The main objective in CRITICAL was to apply the concepts of a knowledge, or learning, society within the context of city regions, in order to assess how knowledge and learning can be utilised by cities within integrated strategies for their future development. It was anticipated that such an approach would need to be able to incorporate holistic approaches to collective learning, competitiveness, sustainability and cohesion.

The underlying framework for the understanding of processes of urban change and the regional role of major cities was developed particularly to understand changes and policy challenges in regional capitals as opposed to global cities, notably in city-regions of between 1 and 3 million population (Charles et al 1999). The framework had an explicitly city-region perspective, and identified five main elements or challenges to be addressed in policy:

Knowledge and economic competitiveness
Image and cosmopolitanism
Social cohesion
Sustainability
Governance
Each of these elements was seen to be inter-related and had to be addressed at the city-region level if the city was to be successful in meeting the challenges facing it, and ensuring coherence in policy. Each of the elements has also been subject to considerable policy innovation in recent years at city-region and at micro scales within cities, and each is subject to considerable opportunities for the application of new technologies, especially ICTs. The problem for city administrations is to disentangle what works successfully and to see how a coherent and integrated strategy can be developed.

**The Port Phillip Drugs Round Table (DRT)**

This network had its origins in community development work initiated by a local government worker in the early 1990s. This was focused on developing a municipal Public Health Plan in St Kilda, perhaps the area best known for sex work and illicit drug use in Melbourne. The process brought together local community organisation workers (health, housing, drug and alcohol, psychiatric disability) with each other and with local business people, other municipal workers, police and professionals from larger organisations (such as hospitals). This prompted a phase of energetic encounter and robust debate, which led to some quite different health intervention programs being developed.

In 2001, the Victorian Government, faced with evidence of a dramatic increase in the use of illicit drugs, and particularly of street-based injecting users, identified the municipality of Port Phillip as one of Melbourne’s ‘hot spots’, and granted a substantial sum of money for primary health services for street-based drug users. In Port Phillip, the funding was shared amongst a number of organisations, through the Drugs Round Table, facilitated by the municipality. Alongside the Round Table, a larger and more informal Drugs and Community Partnerships Forum was established, with a particular role in community education and the ‘de-stigmatising’ of sex workers and illicit drug users.

Learning in this network was shaped strongly by a shared perspective that collaboration was integral to the design of an effective service system, that social inclusion was a core element of a successful service approach, and that in affirming this approach, political and normative differences would have to be made explicit and addressed. While substantial effort went into a process of information sharing, this was less of a priority itself, as laying a foundation for ‘double loop’ learning (see Argyris and Schon 1996), in which a new framework of understanding about sex workers and illicit drug users could underpin the overall service strategy. Much of the ‘double loop’ learning resulted from and was generated through activities which encouraged artistic expression and communication. The sense of identity with a larger group associated with the drugs strategy was an important condition for engaging people in learning processes, and dynamic smaller groups within the larger network generated considerable intensity, at least for a period of time.

In a second project, the PASCAL International Observatory has initiated an international project, PASCAL Universities and Regional Engagement (PURE) project, to investigate how universities contribute effectively to regional engagement. As one of the participating regions, under the auspice of the office of Knowledge Capital, Melbourne has undertaken a series of case studies of regionally-significant initiatives in which higher education institutions (HEIs) have been engaged. The purpose of the case studies has been to understand better the conditions and the factors which shape effective engagement by HEIs with key stakeholders in the Melbourne region. Each case study has been chosen because it contributes to a larger theme which has been identified as a key priority for Melbourne: regional innovation systems; ‘green’ jobs’; and social inclusion and active citizenship.
The South East Melbourne Innovation Precinct (SEMIP) is in its early days. An initiative supported by the Victorian State Government’s Department of Innovation, Industry and Regional Development, SEMIP is seeking to prompt greater economic activity through developing closer networks amongst the small and medium enterprises and two of Australia’s premier research institutions, Monash University and CSIRO, in the south eastern corridor between Clayton and Dandenong. It began with a meeting between representatives of the Australian Synchrotron, Monash University and CSIRO (Clayton campus) to explore opportunities. This precinct area has 40 per cent of Victoria’s manufacturing activities, and the aim is to grow stronger clusters and connections across the precinct, and to spread greater understanding about the knowledge assets which are available, so that small and medium enterprises (SMEs) in particular will begin to use them.

The early part of the process has been somewhat organic, getting people together around the table to commence talking about possibilities. A context report was commissioned by the group involving interviews of the various stakeholders. This report led to the development of a draft strategic plan to enable the region to become a leading destination for learning, working, living and investing; providing ongoing opportunities for businesses and researchers to share knowledge and explore ideas and new applications. Alongside this initiative, the Victorian Department of Innovation, Industry and Regional Development is expanding its Dandenong office to 20 people, providing a more localised approach to engaging with business in the region and to understand better the supply chains in the region. This offers an opportunity also for closer collaboration with the Federally-funded Enterprise Connect.

In October 2009, SEMIP was launched formally by the Victorian Minister for Innovation, who signed a Memorandum of Understanding with the other key partners involved in the initiative.

In the longer term, the ambition is for SEMIP to be recognised globally as the “innovation business and knowledge capital of the Asia-Pacific”. It will be recognised as an exciting place to live and work, and will showcase the resource as a means of attracting further investment. The key technologies will include chemicals, polymers, machinery and equipment with applications in transport, health, construction and the environment.

The SEMIP Steering Committee includes senior representatives of the Australian Synchrotron, Monash University, CSIRO, the Small Technologies Cluster with four local government authorities; Greater Dandenong, Knox, Kingston and Monash and the state government, working in consultation with industry and federal government representatives. The state government has provided initial facilitation and administrative support. In the longer term, it is envisaged that industry will become the major membership and the key driver of SEMIP.

Early funding has come through small contributions from the partner organisations together with some grant funding. Significant in-kind support has come from all of the partner organisations.

The principal achievement to date has been establishing a forum in which the different kinds of stakeholders are continuing to collaborate. The cultural differences exist, but the parties are beginning to fund areas of common interest and potential. While it has taken some time to get to this point, this initiative is also more ambitious than earlier efforts.

Local government has been very supportive and has become a key driver for network development. Their capacity to connect with a wide range of stakeholders means that they
can play a crucial role with this kind of development, helping to clarify agendas and to build linkages. As part of this, they can help to identify the real strengths of a cluster.

To date, the Steering Committee has developed a Strategic Plan that has identified the potential for significant long-term job growth for the Victorian and Australian economy. The next step is to begin to marshall the educational resources of the knowledge centres in conversation with industry. Consequently, SEMIP is introducing two types of Knowledge Clubs as interactive events for discussing business innovation issues and exploring new knowledge and technologies. The first is a series for key regional leaders focused on business innovations, seeking to develop a group of people who can exercise regional leadership beyond the circumstances of their particular organisation. The second is for technical specialists or managers to explore issues related to innovation capability, providing a forum for companies and researchers to share resources as a basis for applying ‘clever’ ideas. It is seen as an opportunity to brief people on new ideas and developments, as well as on new applications of existing knowledge or technology available in the South East region. Outcomes of these industry pilot events will also inform the priority of future SEMIP activities.

6 Policy settings

The case studies raise a number of issues which were pertinent to the broader agenda. Apart from providing empirical evidence about the forms of knowledge and learning which are found in the arenas, they illustrated strategies which can enhance learning and knowledge generation in city-regions, and highlight obstacles which can undermine the capacity of city-region institutions to intervene in arenas to enhance learning.

6.1 ‘Regionality’ in Australia

Undertaking research on regionally-bounded issues in Australia is complicated from the outset by poor definition of the concept of the ‘region’. There is a poor matching of formal regional structures, as determined by each of the levels of Government, federal, state or local. While local government boundaries are used widely as a means of collecting and aggregating data, the level of disaggregation is typically rather general, and rarely reflected in decisions by the Victorian Government about its regional structures. Consequently, regional administrative boundaries vary from government department to government department (health and education, for example), and usually bear little relationship to cultural, economic or social patterns. Local government boundaries have been redefined with relatively little reference to the natural patterning of neighbourhoods or community relationships.

This means that problematic governance issues are very real in Melbourne. There are many examples of new kinds of arrangements, mostly informal, emerging to deal with underlying governance issues. There are three layers of examples which need to be distinguished:

- Australia is a highly urbanised country, and a sharp divide has emerged between metropolitan and regional/rural areas over how to address economic and social issues. After the Labor Party surprisingly won Government in Victoria in 1999, it was apparent that this had been achieved because a large proportion of rural voters who voted typically for conservative parties, had swung to support Labor. Subsequently, the Government worked hard to sustain this new constituency in rural areas. However, in the absence of an established or formal mechanism, the
Victorian Treasurer arranged to meet regularly and informally with key regional local government authorities, to discuss emerging policy and resource issues;

- it is difficult to define a clear boundary to the Melbourne city-region. Sprawling and diffuse links exist between city and semi-rural areas. *Melbourne 2030*, a strategy for managing the growth of Melbourne through systematic planning guidelines, was adopted in 2002. However, the implementation of the strategy requires cooperation from a wide variety of interest groups, not least a significant number of government authorities, all with relevant lawful powers, and not all of whom would see their interests being shared in the same way. Formal advisory committees to the Victorian Government have been established, including representatives of the private sector and of community organisations. However, the effective operation of these kinds of governance arrangements requires a level of trust (and confidentiality) that is difficult to engender and to sustain.

- the current local government boundaries in Melbourne encompass diverse neighbourhoods, and in some respects cut across natural and historical linkages. This can mean fractured relationships with community and related organisations, and lack of fit with economic activities and stakeholders. This can problematic particularly when new issues or industries are emerging, and it is unclear which layer of local or regional government is accountable; in these cases, there is either inaction, partial action, or a new informal governance arrangement is established to manage the development of an appropriate policy response. This can make concerted government action at the regional level very difficult, especially when resources are limited. In frustration, a less formal and ‘interests-based’ forum might be established to overcome the governance ‘deficit’. One example is the formation of the Committee of Melbourne, which has sponsored a range of projects designed to enhance Melbourne’s overall infrastructure and policy environment. While it has close relationships with local government, government agencies and politicians, it operates outside a democratic or popularly accountable framework.

### 6.2 Networking, locality and local government

The case studies suggest that networks or clusters form in response to specific constraints and possibilities, often framed formally or otherwise in a relatively defined spatial context. They can be a very significant intervention to stimulate initiatives which would otherwise not have been possible. At one level, this might simply reflect the lack of resources of any one stakeholder to act on the scale necessary (investment in new technologies, for example) to begin to establish the conditions for achieving the outcomes which are sought. However, just as frequently, it seems that the networks open up possibilities which might not have even been considered.

Local government, either alone or with others, can be very important in supporting regionally-based networks of organisations and residents who share interests in a particular issue or sector. Networks do not form easily, and can be very demanding of time and resources. Local government has made a significant contribution to the viability of networking, and to supporting its contribution to policy development, and to facilitating grounded action to implement new initiatives, including sponsoring new innovations. Given the importance of personal relationships and less formal aspects of networks, it is not surprising that local government can play such an important role.

While networks can be structured quite differently, there does not appear to be an argument to suggest that one type of structure or another is likely to be more effective.
Rather, the phase of development, the nature of the sector, the level of public support and accountability expectations will all affect the nature and dynamic of network formation. So, a hub and spoke model might be more appropriate in the early developmental phase, while a more collective and shared framework will emerge when a network has consolidated and its members have developed a clearer understanding of their relative merits and possible contributions.

6.3 Learning in networks

It is real, and it operates at a number of levels. The interesting question is not so much whether learning occurs or is reflected in different kinds of practices, but whether we can understand its part in processes of innovation. In each of the Melbourne networks, a considerable part of the explicit learning is driven by formal information sharing (referred to earlier as ‘single loop’ learning). This is valued by many participants, at least in the early phase of network development. However, it seems also that this kind of learning is not linked so much with innovation, but with diffusion; in other words, it is related to the increasing adoption of ‘better practice’ than it is to the generation of new knowledge and to innovation (possibly seen as ‘double loop’ learning).

The latter kind of learning does occur also, and in these case studies, it is linked closely with the development of a different kind of relationship in the networks. Wenger’s concept of communities of practice (Wenger, 1999) is helpful in identifying the kinds of relationship which are most likely to foster knowledge generation; trust, a sense of shared purpose, and a commonly understood means of validation, for example. However, other approaches also provide insights into the critical processes which enable sharing of experience and perspective to evolve so that they contribute to the generation of new knowledge and to innovation (see Argyris and Schon 1996, OECD 2001).

A question remains about the significance of the city-region (or sub-region) in shaping both the impetus for and the character of learning which occurs in networks. Learning occurs also in distributed networks, where spatial connection is not important. In the Melbourne case studies, there was a close identification of the network with a specific spatial context, whether formal or informal. The size and scale of the sub-region within the larger city-region varied from network to network, but the relationship with a defined area does seem important. It points perhaps to the significance of being able to engage in face-to-face interaction and to the complexities and unstated aspects of relationship which are integral to the ‘risky’ learning which leads to new knowledge and innovation. Food was important in at least three of these networks, as a focus around which formal activities are structured (breakfast meetings, for example), as a means of facilitating the social interaction when people met informally, and as an acknowledgement of the specific contributions which some people were making.

In the PURE project particularly, the formal networks have begun with one or two key people seeing an opportunity, and then enlisting other organisations and stakeholders in the initial development phase. Their aims have focused on economic, environmental and social action without any specific mention of innovation, yet there has been a clear desire, even hunger, for knowledge transfer and skills development. As the initiatives have developed, more formal agreements and Memoranda of Understanding embracing governments, industry and HEI's have been essential to overcoming divergent views.

The critical success factors across the case studies, taken together, include:

- Strong and persistent champions, with strong local networks;
• A holistic approach to strategy;
• Bringing government, industry and education together;
• A consistent emphasis on sharing knowledge about broad regional issues, and learning about technology;
• Sufficient resources for the tangible outcomes which they have set themselves to achieve (the absence of both volunteer time and funding are significant restraints); and
• Supporting networking and collaboration as a foundation for ongoing activity.

Each of the regional organisations is at a different stage in its development, sense of identity and influence. Notwithstanding these differences, the case studies have demonstrated that each has a clear role in relation to an identifiable regional innovation system, albeit recognising that these local systems are open and very much connected to and influenced by broader national and international economic, cultural and political dynamics.

7 Opportunities and challenges

The case studies have confirmed that there continue to be many opportunities for HEIs to contribute to regional innovation systems, if the challenges can be addressed. This will not be easy as the current policy environment poses potentially contradictory expectations on the higher education sector. The stronger orientation of researchers towards publication in esteemed international journals, rather than cross-sectoral collaboration and industry problem-solving is a key example of this tension.

Other general opportunities include:
• The development of models and resources to support effective Interaction between HEIs with the small and medium enterprise (SME) sector is an ongoing challenge. Where successful examples have emerged, the relationship has depended on a couple of individual efforts rather than systemic arrangements;
• Resourcing mechanisms which help to address the persistent difference in the timeframes expected by industry, and that required typically for formal research. This is necessary for industry to be able to deliver quick responses to rapidly changing technologies, yet also altering the sense for academics that they would be punished for not publishing straight away;
• The development of more explicit yet adaptable models of multidisciplinary cross-sectoral engagement with representatives throughout the supply chain, to identify critical design, production and distribution issues which can be enhanced by learning and knowledge exchange. This would help to deliver appropriate and effective approaches and skills for problem-solving; and
• The development of a clear model for the secondment of academic staff to economic development bodies. Current examples have had varying success rates; full secondment under one employer agreement appears to be the most viable option.

More specific ideas and examples emerge in the different examples. At present each of the four regional organisations operate with little awareness of the orientation and activities of the others. There might be some value in general, and particularly for HEIs with campuses which link across different regions, for some kind of an intervention which facilitates sharing of learning amongst regional organisations that share broadly similar objectives.
While the focus of this analysis has been very much on regional activities and collaboration, as indicated earlier, the regional innovation systems are open and are heavily dependent on state, national and international economic systems. Greater sharing of perspectives across the regional entities might be a useful foundation for policy advice to state and national governments.

Similarly, given the presence of some HEIs with campuses in quite distinct regional settings, there might be useful lessons from bringing together the perspectives of regional innovation organisations to review more general systems and collaboration arrangements. In Australia and beyond, the search for effective arrangements that maximise the contribution of HEIs to their regions continues.

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Enterprising academics and the knowledge capital: towards PASCAL universities for a modern renaissance

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Structured Abstract

Purpose – This paper portrays an innovative approach developed by a consortium of universities for new ways of their working and knowledge sharing with external colleagues from business, industry and civic society. Known as ‘PASCAL Universities for a Modern Renaissance’, or PUMR, it is now being developed under the auspices of the PASCAL International Observatory for place management, social capital and learning regions and has become a major thrust of its future work with Universities across the globe. In short, PUMR refers to:

Universities harnessing global imagination and unlocking the talents of all people, throughout the world, to co-identify, co-create and co-produce flourishing futures with external partners from business, industry, civil and voluntary services.

The Approach – PUMR is based on detailed observations of the success of over 200 examples of creative university outreach across the world to business and the community; these cases can be observed at www.upbeat.eu.com

Originality/value – The paper presents a unique understanding for the development of universities who want to flourish in a Knowledge Capital and its supporting region. It shows the diversity of engagement strategies universities are adopting in developing their own relationships with business and the community. It then introduces the reason for a new overarching university strategy for this area of concern, the basic principles that lie behind it and then compares it with what would have occurred in the ‘old’ renaissance to aid clarity of understanding.

Practical implications – PASCAL hopes the document will encourage like minded universities to become part of a growing PUMR network and to take part in a deep and meaningful discussion in order to develop programmes of joint working and knowledge...
sharing with business and the community. The immediate desire, through the
development of a focused social networking site, is to get Universities to reveal their best
practices in deep collaborations for real improvement and lasting impact. In order to show
their capabilities to the full, each university would produce representative case studies
illustrating their ‘virtuous’ knowledge sharing, leading to mutual benefits for itself and its
partners, sustained improvements and significant impacts for all. An effective formative
assessment and evaluation strategy, known as UPBEAT, is offered to undertake these
cases, based on 200 ‘benchmarked’ case studies of successful university engagement with
society.

**Keywords** – knowledge-sharing, modern renaissance, university, business, community

**Paper type** – Academic Research (Policy) Paper

1 Introduction

Nearly a decade ago, Will Hutton of the Work Foundation proposed that Manchester
in the UK had all the attributes to become an ‘Ideopolis’ – a 21st Century City with the
capability, talent and facilities enabling it to flourish in the global knowledge economy.
His idea was honed and developed into a working entity by a powerful team of senior
Manchester leaders into what has become known as Manchester: Knowledge Capital – a
name invented by the three CONTACT Universities of Greater Manchester under the
Chairmanship of the current author and endorsed by the Deputy Prime Minister of the
day, John Prescott (now Lord Prescott).

Key in this development, and in other Knowledge Capitals throughout the world, has
been the role universities must play in driving necessary cultural change and more
relevant innovation which is fit-for-purpose enabling sustainable and wealth creating
modern futures. For, as Garlick suggests (2010) ‘there is no doubt that, after decades of
indecisiveness in policy circles, there is a mood amongst HEIs for an approach to
knowledge creation and distributions that better reflects their purpose’; this would be in
the fashion that John Dewey, Ernest Boyer and others have aspired for many years, but
their views may now be more timely. ‘This perspective is very different to the dominant
paradigm presently forced on academic institutions through neoliberal funding agencies.
In many ways, “the university of today” has unfortunately become a ‘Taylorist factory’.

Garlick is also not sure that Burton Clarke’s (2003) seminal work on the
entrepreneurial university has helped things improve in terms of beneficial outreach.
However, he does go on to propose that the ‘approach suggested in the present PUMR²
paper does ‘enable a more enlightened and creative approach that connects HEIs to the
big issues of the planet’, connecting them properly with their communities, in order to
build ‘meaningful and ethical partnerships, and to see their students and staff as a hugely
valuable tool for concerted action beyond publication and the curriculum, and still remain
as economically viable as it would be under other less connected approaches’.

Not only are universities now thinking differently about their role(s). Society
increasingly expects the universities it funds to work with citizens and communities to
enable them to flourish. They further believe this should occur through the creation of

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² Previous versions of this document used the abbreviation UfMR instead of UMR for the
underlying abbreviation. This has been shortened to UMR because ‘Uf’ in internet jargon means U
= You and f = a swear word beginning with ‘f…’; ‘P’ was added as a prefix to ‘UMR’ when it was
adopted by PASCAL as its own programme.
improvements for a knowledge economy that has huge economic, social and environmental problems; some see the universities as central to the development of truly forward looking and workable processes. So, in the past, in order to understand the complexities, uncertainties and often ‘wickedness’ of difficult problems, academics were able to retreat to their ‘ivory towers’ and develop ‘private frames of reference’ to enable theory building and high level discussion. No longer, academics now need, and maybe even demanded, to use their deep and rigorously acquired understandings of the world for the common good. And they must do this by developing new ways of working and knowledge sharing that enable them to make a real difference in the real world through co-identifying worthy problems and co-designing sustainable solutions with external colleagues from business, industry, the civil and voluntary services and the community.

As a result, Universities are reaching out to all their partners, in interesting and novel ways in an attempt to play what they each see as their role in coping with today’s global crises, major societal challenges and to help citizens flourish. At least on paper, they are becoming more enterprising and deeply engaging with such communities:

- Enterprising in the way they develop leading edge opportunities, with high academic values – becoming involved in solving real world issues and problems
- Engaging with Strategic Partners who bring their own expertise and imagination to co-create with them > universities and their partners realise they can’t do it separately if they want to develop innovations fit for the Knowledge Economy

However, does this rhetoric translate to actuality, implementation and real ‘impact’. As a recent key Innovation and Productivity Report (Abrue et al., 2009) reveals, the objectives of Industry and Academia are still often distinctly different:

- What industry and the community (my italics) want from academia are ‘ideas and talent, rather than a cheap way of outsourcing R&D activities’. They want to meet the experts and to hear about what they are doing and then figure out how something that they learn may be of use to them. Firms value the direct assistance in problem solving, as well as access to skilled experts.
- Academics, on the other hand, still tend to pursue objectives from their own discipline with their studies ‘underpinned by research-oriented rationales, rather than by the desire to commercialise technology’ or create impact or improvement to the real world; their primary outputs are typically seen as knowledge, learning, trained minds, and some consultancy. For the most part, people in academic institutions seek to follow a career in academia.

In the past, industry/community often saw academics talking another language. Some also refer to the rising tide of red tape in academe - administration and regulations – as universities seeks to gain financial returns to support their other insufficiently rewarded activities. Issues of confidentiality, ownership and value of IP, also seem to further limit collaboration between universities and their external partners, since a key criteria of the successful traditional academic is ‘publish or be damned’.

Nevertheless, in an attempt to form better relationships with external partners, universities are engaging in a diversity of ways which typically reflect local contexts and
circumstances and the major academic thrusts each university holds dear. Furthermore, reach-out or outreach, activity, as it is often called, looks different from traditional academic working, with the added contributions of partners combining their skills, so the sum of the parts is worth more than the parts taken individually.

PASCAL recognises this growing trend as a result of its comprehensive ‘PURE’ benchmarking explorations with city regions across the world (Duke, 2010 – see www.pascalobservatory.org and especially the section on ‘PURE’). It is therefore looking to improve its members understanding of what works well and how universities can play a fuller role for effective change. In this respect, the concept of ‘Universities for a Modern Renaissance or PUMR’, defined at the start of this provocations, appears to be a unifying notion to bring together the very different kinds of university engagement process used across the globe. The future searching, innovation centred and co-design based stance of PUMR also seemed to catch the imagination of PASCAL members attending a recent international conferences (PASCAL, 2009) and was adopted as one of their key drivers of its own developments with universities to help explain constructive University change for the future.

2 The growing diversity of University Outreach to business and the community – some examples of good practices

In terms of outreach to business and the community, the ‘land grant’ universities in the USA, through the way they were founded, have always had a strong relationship with local communities in the richest sense of that word. As a result, Universities like Michigan State (MSU) act as a beacon to the rest of the world of the kinds of best practices in developing, sharing and applying knowledge for the public good. So, for instance, since its inception in 1855, and then its renaming to Michigan State in 1964, MSU has increased its connections with south-eastern Michigan, putting major investment into community partnerships designed to help create the human and social capital necessary to ensure transformation of its region. By 2008, MSU’s aim had become to be an exemplary “engaged university”, transforming and strengthening outreach partnerships to address key local state needs and developing broadly applicable models; with its academics’ outreach activities to external organisations and communities alike, being for ‘reciprocal learning’ that increased both the external partners’ capacity to address issues and the academic staff’s capacity to produce scholarship that better reflects the realities outside the laboratory or the library. Their recent Guidance Handbook (Fitzgerald, H. E., Burack, C., & Seifer, S. [2011]) stands testimony to how much they have developed and shared workable and worth ideas and processes with their community – such guidance will undoubtedly improve the quality of all engagements by those University academics who wish to work actively with their local communities.

Similarly, but taking the ideas to the next stage, Arizona State University (ASU) now talks about itself as being a new (model) American University. Eight design aspirations guide ASU’s transformation

- Leverage Our Place
- Transform Society
- Value Entrepreneurship
- Conduct Use-Inspired Research
- Enable Student Success
- Fuse Intellectual Disciplines
- Be Socially Embedded
Engage Globally

ASU has lots to aspire to, but is truly transformational in the way it is leading its development for improved engagements with its local business and the community.

In Canada, the University of Victoria in British Columbia has also had a clear focus toward the social, cultural and economic advancement of the communities it serves close to home and around the world runs deep. It similarly tries to build strong partnerships with community organizations and actively engaging citizens, from all walks of life, is fundamental to their approach. Its **community services** are a key component in its type of engagement and these take many forms, from joint research projects or educational programs that address community needs and supplying expert speakers to schools, seniors groups and community organizations, to partnering with businesses to explore the commercial potential of the latest campus discoveries and applying student knowledge and energy to organizational challenges.

In a similar, but more collective vein, back in the spring of 2001 (Coldstream, 2001 & 2003), the Association of Commonwealth Universities initiated a debate among its 500 members which led to the major conclusion that ‘engagement should be a core value for all universities’ (a phrase later expanded in other papers to read ‘**engagement with wider society as a core value**…’). Even as recently as 2001, this was still seen to juxtapose to the stance of traditional universities as being ‘ivory towered, where aloofness was still ‘defended as a necessary condition both of undisturbed contemplation and of disinterested objectivity of judgment’. Just one result of this, alongside growing interest in Australian outreach, was the setting up of AUCEA – the Australian Universities Community Engagement Alliance – with its strong endorsement from 34 Australian universities at least, of profound ‘**engagement**’, **beyond the trivial**, especially with external stakeholders outside academe, for mutual benefit.

Over the years AUCEA (2010) has developed powerful ways and means of engaged working with the community, benchmarking progress to ensure universities from this Australian consortium sensitively, caringly and effectively engage with communities to the greatest effect and for the highest impact. It defines the following principles as applying to the Engaged University:

- University community engagement is based upon a mutually beneficial exchange of knowledge and expertise between universities and communities;
- The university produces graduates who are ethical and engaged citizens;
- The university engages with its communities to create a more accessible, outward reaching and inclusive society;
- The university identifies its communities by acknowledging community values, culture, knowledge and skills, and works with those communities to develop a mutually beneficial agenda;
- Engaged research is designed, managed and disseminated as a partnership that addresses both academic and community priorities;
- Engaged learning and teaching programmes respond to individual and community needs and opportunities and links to specific learning goals and experiences for students. Programmes are
designed and managed in partnership with communities, and are socially inclusive and globally and locally relevant;

- Community Engagement is embedded in the governance, operations, budget, curricula, plans, policies and life of the university;

- Engaged Universities articulate their mission, culture and values for the community, and regularly reflect on these in the context of community conditions and partnerships;

- The university and the community work together to monitor partnerships, measure impacts, evaluate outcomes, and make improvements to their shared activities.

Turning to a more business focused engagement, NESTA (Stewart, 2009) use the not dissimilar term, of ‘connected university’, for those British universities that are driving for innovative growth in the UK business economy. NESTA believes that such universities enable business, industry and the community to flourish, especially economically, by putting the following at the heart of its strategy:

- Recognition of the importance of building strategic partnerships with local firms, nurturing local clusters, creating national and international connections;

- The recruitment, development and promotion of intermediaries or ‘boundary spanners’ who build active and intelligent links between public and private sectors through a deep knowledge and experience of both partners;

- Monitoring of the benefits of university-business-industry interactions and using key performance measures to improve their effectiveness.

Continuing with this more business focus, Professor Tim Wilson (2009), the Vice Chancellor of University of Hertfordshire believes his university is in the vanguard of a new type of emerging university – those that are business-like and business-facing. As a leading ‘business-facing university’ in the UK, Hertfordshire is focused on developing new and creative approaches to learning, teaching and research with a commitment to adding value to employers, enterprise and regional, national and international economies. According to Wilson, ‘his is an ambitious and entrepreneurial university with an international vision, putting students at the heart of everything it does. The university encourages a constant interchange between businesses, academics and students. Many university staff members spend a proportion of their time working in industry, running their own businesses, keeping their knowledge up to date and help to develop students’ business skills. Hertfordshire has a wide range of facilities, services and skills available for industry and its proven expertise and commitment means that, whatever they are looking for, employers know it will deliver. For instance, they are the only university in the UK to have acquired its local business support agency – ‘Exemplas’. Exemplas is the primary mechanism for identifying and tapping into latent demand for our products and services, and works to provide personnel and skills solutions to business’. A business-facing university has a revolving door with business - not just an interface or a portal, but a true interaction. Employers know that the university will deliver - whether it be high-level skills, applied research, knowledge exchange or process improvement, short courses for their staff or expert consultancy services.

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Moving the diversity discussion on to another example of engagement, John Goddard (September, 2009) argues more generally, more directly, and again convincingly for ‘all public-funded universities in the UK to have a civic duty to engage with wider society on local, national and global issues. He is similarly keen for this to be done in a manner which links the social to the economic spheres’. So, he believes that in the context of the severe recession, global warming, aging populations and major social challenges right across the globe, we need to re-invent the ‘civic university’ that served us so well in its earlier manifestations. Indeed, citing his own university – Newcastle – as an exemplar, Goddard believes that ‘globally competitive and locally engaged civic universities can contribute to attracting inward investing companies to specific locations, providing local business with world wide connections and attracting the mobile elite to an area thereby adding to its cultural diversity and pool of entrepreneurial talent’.

The new Aalto University has developed a the idea still further by developing a new generation innovation agenda for its relationship with the community. It aims to channel academic knowledge to create innovative solutions helping to tackle societal challenges. An international Aalto Camp for Societal Innovation (ACSI) arranged in the summer of 2010 piloted a concept that methodologically integrated research, education and innovation activities to solve concrete problems on social issues. The camp served as a stepping stone for creating a global networking culture that links operators at the forefront of the development to innovative collaboration and operated in a multi-disciplinary, communal and dialogue-oriented way. The participants collaborated in teams supported by a steering process, and material, to promote their selected programmes. They tackled six concrete problems and challenges chosen from Helsinki and other nearby municipalities. Teams got to know these challenges on location during the camp, building on their preparation process before they arrived, which led to a clear follow-through after the camp. The solutions were showcased in an exhibition on the last day of the camp. ACSI was more than a conference: it was an innovative operating mode that will be applied in annual conferences, but also regularly within University operations. The themes covered in ACSI will be maintained and further developed. Innovations will be monitored and followed up in future camps both in terms of practical applications and research. To keep in touch with progress on this please refer to www.ACSI2010.com

Plymouth (Purcell, 2009) - another British University – is already deeply engaged with its regional communities. Based on a detailed study of its capabilities, it also aims to become the enterprise university: like Hertfordshire it is also truly "business-engaging”, delivering outstanding economic, social and cultural benefits from its intellectual capital to its region; like Newcastle it has ‘reinvented the civic university’ for how it sees the 21st century; like Aalto it has a strong societal innovation theme. However, it goes further than these three aforementioned by striving to be enterprising in everything it does. To Professor Wendy Purcell, its Vice Chancellor, Enterprise has a very clear definition, meaning a "boldness or readiness in undertaking; adventurous spirit; ingenuity" and she is working to make her university ‘pivotal in a city acknowledged as the enterprise capital of the south west of England. This is based on the firm belief that

A university must be at the heart of its community and must drive economic, social and environmental change. A university does this through the creation of new knowledge, an innovative approach to partnership working and a group of staff and students that act as a power for positive change.
Plymouth has set up the policies to enable this vision and is presently implementing university wide processes to quickly and effectively enable the appropriate external impact to happen.

Similarly such an approach formed the basis of my own university’s – Salford’s – attempt at a more encompassing innovative engagement with business and the community as their third strand of all its university activity. However, Salford has also now gone further than many others, and it not only engages as well as it can, it has now conceived of making ‘academic enterprise’ an overarching principle to all its outreach relationships where teaching & learning, research and innovation and engagement, all seek to ‘develop academic opportunities beyond means currently employed with business and community to the highest academic standards and for the mutual benefit of the university and its external partners’ (Powell, 2007, 2008 and 2009a, b & c and Hall, 2010). It has also developed its own benchmarking tool, UPBEAT – see Appendix I, now used by many other universities, to coach academics on the leadership and development of creative teams capable of successful collaborative partnerships with a range of external partners.

What is perfectly clear from all these developments and aspirations, are that many universities now see themselves at the heart of their city region’s growth and want to make a real difference in the real world, thereby having a real impact and real improvements for their citizens. Unfortunately, you will see that most of my examples are mostly presently British, this is only by default since I am not fully conversant with models of engagement across the globe; Over the next year, I will be extending my understanding of other examples of success in creating better relationships between universities and their city regional partners through the world and indeed in Melbourne while I am attending the World Forum; any help those reading this paper can give to extend my understanding, or to correct any misunderstandings, will be most welcome – please communicate information to j.a.powell@salford.ac.uk or directly to the author during the forum.

I am taking the trouble to introduce this PUMR concept at the moment because Members of the PASCAL International Advisory Board feel it to be timely, extremely relevant and absolutely necessary. Especially, since the world is now in such a precarious economic state. As Matthews, Garlick and Smith (2009) so rightly say, Universities may be one of the few societal organisations who can provide the sort of “unique innovation structure, and relative independence, for leading the way towards sustainable and creative futures based on engaged knowledge generation, ethical and moral principles and enterprising action. This is an increasingly rare capability in an ‘institutionally thick’, self-regulated, neoliberal economy and society where entity-based managerialism and risk aversion predominate and institutional discussion invariably centres on monetary cost and profit rather than wider social and environmental benefit”.

As a finale to this Reach-out diversity discussion, I also want to draw your attention of these last Australian authors ideas of building on their earlier notions of engagement, connectiveness, academic enterprise, civic responsibility, business focus and enterprise. They are now taking even more ethical stance and have focused their attention on using all these different externally facing academic skills to ensure the world meets its ‘triple bottom line’ obligations, with respect to social, environmental and economic issues. The do this by proposing an ‘ecoversity’ approach with a strong focus towards sustainability. Indeed, I would go further by saying this is just the sort of direction I would like PASCAL itself to take with respect to ‘triple bottom line’ with respect to all sustainability issues.
I applaud all the above mentioned approach, especially the last one, for if we fail to achieve a truly sustainable world then we are all doomed. Universities have the capabilities, the skills, the facilities and the ‘know how’ to make the changes to make a truly sustainable difference. However, I would wish to add to such a more proactive, interactive and integrating approach, one last, but major, component - how can universities do this in a co-creating way with others in society to ensure beauty, elegance and joy in a socially inclusive way? In other words, Universities should ‘not to do it for their citizens, businesses and communities, but rather do it with them in co-creation’. So, the true essence of Universities who strive for a Modern Renaissance should be, in my mind, that they work in collaboration with others, using increasingly systemic explorations of the world problems, leading to outputs and outcomes which create socially inclusive improvement for real impact.

3 Moving towards the idea of universities for a modern renaissance

The present proposal clearly recognizes the needs and demands expressed by the aforementioned Coldstream, NESTA, Matthews, Garlick, Smith, Powell, Wilson, Purcell and Goddard, by encompass all their underlying principles, but goes one step further, by seeking to work with others in society to

‘co-identify real problems worth of collective solution, the co-creation of solutions systemically fit-for-purpose in the global knowledge economy, the co-production of those solutions and their stage management into the real world, and further in ensuring the continuous improvement of all such solution to reach more people with more constructive effect’.

The approach has strong links with, and is underpinned by, system science, where academic researchers truly try to relate their knowledge and ‘know-how’ to real problems, helping working businesses and communities who are unable to address difficult issues by themselves to do it better. The problems and issues all of us now have to consider are invariably complex, are often not easy to understand and may often be contextualised in a number of conflicting ways. So, as Erik Willan (2010) so rightly says, ‘one of the key issues for PUMR type projects is that on the one hand “content is king”, but on the other hand “context is kingdom”. Unfortunately, ‘much of traditional university research is uni-disciplinary and context free’. Therefore, in theory, any new ways of working should be general in outlook and applicable to any case. But, the sort of ‘wicked problems encountered in the real world (Rittel, 1997) are multi-disciplinary in nature and require creative solution by trans-disciplinary teams. So, for instance, most regional problems are contextually founded and are richly systemic. As a result University projects in the region should be true partnerships in both the selection of the problem to be explored and the way they are tackled. Unfortunately, while universities really now want to help local businesses and communities, most of them do not have good organisational processes or the right collaborative mechanisms to really engage in such issues in a deep and sustainable way.

So, the PASCAL approach with respect to PUMR is to underpin its regional, and other constructive interactions, with real world issues, using a deeply systemic approach using the best principles of both systems and soft systems science. Furthermore, as in the ‘Scottish Enlightenment’ (George ‘Elder’ Davie, 1990), the nature of the PUMR engagements with all societies problems would be dynamic, fast-acting, highly conversational and innovative in their systemic outlook. And, universities would
deliberately seek creative ways of team-working in a co-designerly way with business, industry, the civil and voluntary services and the community.

4 The origins of the PUMR and some key outcome definitions

The original idea for PUMR was conceived by a consortium of seven Universities of like mind, working under the auspices of the European Universities Association. The ‘EUA UMR Seven’, as they were called, explored their own creative ways of achieving success in their own relationships with local businesses and communities which they found worked best. Holistic and co-creating team-working seemed to work well when they followed a ‘virtuous knowledge sharing’ cycle with their external partner.

For this cycle to work, academics and their external team partners collaborated to define a worthy problem – worthy for all partners - and find an imaginative solution through real world and practice based research. The team (of academics and the wider partnership) would then work together to implement the solution in the real world – mutually coaching each other to success. In the context of real world problem solving, ‘coaching’ is more important than professing to external partners, for professionals and policy decision makers very quickly lose patience and interest in what appears to them to be irrelevant to their. These developing and co-creating teams also need to learn from their experience by evaluating and identifying best practice. To do this project members need to step outside of the project and think about whether all their aims and objectives have been met.

They also had to think about how effective their project had been, and, whether, if the project were repeated, they would need, or want, to change anything. The teams should strive to make any project they work on, just the first of many and then seek ‘repeat business’ so they could continue to improve in their co-identification of future worthy problems, co-creation and co-design and ideally co-production of the solution and its marketing into the real world. Summarised below are some of the key factors that need to be borne in mind when developing any PUMR (some of the above has been repeated for
completeness and to reinforce major notions) and along with the enterprise partnerships they demand:

- Forming meaningful, wealth creating, sustainable and socially inclusive partnerships between academic on the one hand and industry, business, the civil and voluntary services and the community on the other;

- Enabling the co-identification of ‘real problems for solutions’, increasingly fit for purpose for the knowledge economy from as broad a range of stakeholders as is possible;

- Searching for academic opportunities beyond means currently employed with business and community to the highest academic standards and for the mutual benefit of the university and its external partners;

- Unlocking the talents of all citizens working together with their university partners in co-creation, co-design and co-production;

- Developing beyond the traditional academic (critical, scholarly, research and science based) roles into ‘action enabling’ developments for the ‘greater good’ which deliver real world improvements;

- Requiring sharing of different kinds of knowledge and ‘know-how’, in mutually useful ways, by forming relevant strategic alliances;

- Making available professional and practice relevant education and problem based learning for future generations to ensure sustainability;

- Universities will adapt not from just giving information to the students in terms of ‘tell and show’, but will have to interact with them and act in other more conversational ways. The whole demography of Life Long Learning will be different;

- Developing ‘practical wisdom’ (Tekada, 2009) through creative and ‘virtuous knowledge sharing’ with local businesses, social groups and all citizens for mutual benefit;

- Focusing key components of university activities on Higher Academic Enterprise – sometimes called Reach-out, outreach or ‘third stream’, not separated from normal academic activities, but an integral part of them;

- Harnessing the imagination, reason and daring from all City Region talent, including the skills of the university itself, leading to improvements for all

- Helping all society to cost effectively meet the ‘triple bottom line’ with respect to environmental, economic and social concerns, while also enabling them to flourish, grow and be creative – the essence of the human condition.

- Reaching out world-wide - to develop deeper conversations with relevant stakeholders to enable developments fit for purpose in the global knowledge economy
Helping build confidence and capability in all citizens (in business, industry, the civil and voluntary services, and the community) and developing more appropriate work life balance for the modern world

Universities not just be involved in knowledge production and creation of IP, but opening themselves up to co-design and co-production to enable the City Region to cope with complexity, uncertainty and the challenges of all future problems

These notion of ‘PASCAL Universities for Modern Renaissance’ developed from the discussions of an EUA consortium who tried to conceptualise their unique ways of working, as they reached out to local businesses and the community in creative and constructive ways. They were based on reported case studies undertaken to understand their own good UMR practices which then led to the use of the phrase of UMR, and now the extended phrase PUMR. They believed these cases simply showed the richness of their activities, the kind of foresight they used, their co-creation and co-production with partners and the resulting innovation.

Other words used often to describe universities like themselves, such as engaged, civic or regeneration, or phrases like community enterprise - did not do justice to their creative, dynamic and co-creating activities. Rather, ‘Universities for a Modern Renaissance’ succinctly expressed their pro-active, progressive, collaborative and developmental ways in which they engaged with business and the community. The PASCAL Advisory Board similarly welcomed the phrase and its intention, and its Chairman considered it would ‘put new life, motivation and interest into its own developments for, and with, its University members’. For, at this time, PASCAL might still not be delivering what its University members could rightly expect from it. According to Bengtsson (2010) ‘PUMR is something that could be ‘this something’. There is also something more philosophical about PUMR. It points to something deep that is presently happening in our society. So in PUMR you can start to see a necessary paradigm shift, in Thomas Kuhn's terms, but we should be aware, like Thomas Kuhn alerted us to 40 years ago, that when there is a paradigm shift the two paradigms exist in parallel for a while. A paradigm shift can take a decade to embed, so we must be aware of this and the relevant time perspective; we must be aware of this during the change process they will inevitably follow when we try to introduce PUMR to the real world of university life'.

PUMR must be developed carefully to enable academically enterprising relationships with business and the community to create real impact while not debasing high academic values and sound research findings. As Doyle, so rightly says, “a lot of academics who become involved with in outside agencies and industry etc, worry that their own work will get ‘watered down’. She thinks it is very important that we make it clear that this is not what PASCAL will develop with respect to PUMR and other aspects of its work. What we are more about is developing a new language to talk about what we are doing” – a language that promotes a real conversation and open knowledge sharing. And she has found the professionals she has recently dealt with, and other people in situations when they are very tied up deeply in their own particular jobs, “are very pleased to have an opportunity to discuss philosophical matters, deep theory and to consider their own work in relation to a much wider perspective”. Most people want to have a broader and wider thinking, reflecting global perspectives, but one relevant to satisfying their personal needs/demands. However, as David Campbell (2010) reminds us, “such discussions have
to be in a common language properly relating sound academic endeavour and high values to real government, business and industry needs”; something we believe probably did occur, but in a fairly limited and narrow way, in the original Renaissance. As Sheppard (2010) suggests such a maturing of the conversation between all parties might be facilitated by increased ‘mobility’ between sectors, where “know how” is shared rather than just the exchange of facts. Sheppard feels that presently you don't ‘find people moving between business, industry and social services or academe’. To repeat because of its importance in the present context and in relation to key questions, there is also a need to establish a common understanding of the wholistic nature of the “problem”, where the role of practical wisdom is acknowledged as well as theoretical understanding. Whatever else, there must be an effective communication and a maturing conversation.

So a cultural shift is needed in order that peoples’ “know how” banks – that which they remember to use in anger in their real world living, work and leisure - can be improved’. Here, engagement is a two way conversation, not a one way broadcast, and is also both systematic and systemic. This improved conversation must be between all parties including academics and their external partners. All must learn a new ways of talking and listening, new modes of conversation, having quality conversation understandable by all in society, but informed by high academic values. The discussions must still be profound, but properly coordinated to enable an appropriate discourse. PUMR should build on PASCAL’s PURE project, but be distinct from it. It should show Universities new ways of thinking, listening, working and especially ‘doing’ - can help and support others be imaginative and creative. It should be part of paradigm shift. So in the modern Renaissance, PASCAL needs to work towards setting up conversations where we can all work together to co-identify a worthy problem, understand the systemic nature of that problem, and then co-create and co-design solutions that are workable for those for whom the solutions are intended.

Turning to more specifically to the regional agenda which is core to the work of the PASCAL International Observatory: the regional development focus on the ‘knowledge economy’, according to Garlick (2010), has so far ‘failed to deliver imaginative real outcomes in the form of sustainable enterprises and employment with the result that many regions outside the largest Metropolitan Centres are suffering a loss of human capital through unemployment, underemployment, 'brain drain' and retirement. Universities are often presently a part of this problem, having been party to such so-called knowledge transfer mechanisms as business clusters, science parks, 'creative milieu', social capital, etc’. So, as John Tibbitt’s (2009) recent explorations reveal, at the very least an ‘Engagement Gap’ exist between Universities and true regional needs. So a PUMR approach would start with the development of a better understanding of what regional expectations are, and especially in terms of PASCAL’s offer, what universities might do to help their regions creatively and constructively?

PUMR could also lead to better ways of analysing existing problems, especially wholistically and from a trans-disciplinary perspective, and to better understand what the ‘engagement gap’ really is. In discussing this issue further Tibbitt (2009) was put in mind of ‘much writing about social policy with attempts at trying to encourage collaboration between different services and the delivery of shared goals. So PUMRs must attempt to codify what the collaborative relationship might be and to specify different kinds of relationship from the mere formal information sharing at one end of the spectrum, right through to a more sophisticated conversational process, to ultimately a merger between organisations - where people share their objectives, accountabilities and joint action’. And
Tibbitt (2009) also wonders whether PASCAL’s PUMR approach could also ‘develop the kind of successful thinking and engagement relationships there might be; we might also attempt to generate a better mapping of what could be the necessary engagement. I would personally support this stance, but go further, and agree with Garlick (2009) that the “regional development agenda needs to go beyond knowledge generation and transmission, becoming ‘enterprising’ co-creation (my words in italics). By ‘enterprising’ Garlick uses the term with the ‘same characteristics of the key words of ‘opportunity’ and ‘advantage’ used by Sen (2009) with respect to the development of human capability’. Such an approach emphasises individual ‘ambition’ and ‘opportunity’, rather than institutionally defined, competency-oriented, and path dependency learning to meet specified commodity objectives.

Sen (2009) also emphasises the relevance of the capability approach for communities as they can shape and be shaped by an individual’s broad capability (cognitive and non-cognitive). The suggested PUMR processes for project managing improved academic enterprises is discussed more fully in Appendix I. Discussion at the PASCAL Board and at the meeting on 14th December 2009 also saw the modern renaissance university strongly connected to all other learning sectors and furthermore that they must all be connected to real world practical experience to ensure an individual's capability (cognitive and non-cognitive) is given an ‘enterprising’ perspective.

To conclude this section and relating PUMR to current concerns, especially with the way the global economy has taken a dip, especially in the American and European economies, there is a need to rebuild finances very differently. And as Chris Sheppard says, “we are going to have to re-invent many of our work processes and look at what's really important. Perhaps look at some of the things afresh, with others we will have to abandon. And the public sector, in particular, is going to seek help to do this. And if Universities, as part of the Modern Renaissance, support improved processes to move society on”, he thinks that is going to be an ‘enormous opportunity for PASCAL, and for the collective of universities who will finally sign up to this’. Just as the Medici’s developed a Bond Market to successfully get Italy out of a huge former financial crisis, we need PUMR academics to create a more thoughtful, meaningful and workable way of handling future global economic affairs.

5 Comparing the old with the modern renaissance

When trying to describe the phrase ‘PASCAL Universities for a Modern Renaissance’ to others we have found it can best be understood by comparing our current proposal for Modern Renaissance with descriptions of the ‘Old Renaissance’ or how others have felt the traditional Renaissance came to be the way it was. So the table next compares the old with the modern to reveal that our aspirations for the future borrow from the past in constructive ways, but try to take into account the new dimensions and meanings of what a Modern Renaissance could mean in current parlance; interestingly as an aside the City of Manchester has as one of its marketing drivers the notion of ‘Original Modern’, perhaps PUMR could also be ‘Universities for an Original Modern Renaissance’. The first phrase in each of the following pairings relates to one simple aspect of the ‘old renaissance’, with the second phrase re-contextualising Renaissance into a current context and very different drivers.
The phrases below in the matrix are not exhaustive, but try to illuminate what a Modern Renaissance would become against the previous original Renaissance through a simple comparison.

<table>
<thead>
<tr>
<th>Renaissance OLD</th>
<th>Renaissance NEW</th>
</tr>
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<tbody>
<tr>
<td>In the main, creative developments were undertaken by those with confirmed talent which was recognized by patrons and sponsors</td>
<td>It is now recognized that the development of ‘creatives’, the core of a modern renaissance, has to start early, as the younger you start learning to be innovative and systemic the greater return on the investment in the realization of human capability terms (Heckman et al) So, in terms of knowledge acquisition, transmission and sharing, especially with universities, it is never too early in life to start or indeed too late to start as wisdom is also a key component of UMR. So a UMR has a responsibility to reach out right across the learning system and pull individuals up and through the human capital pyramid by connecting themselves up to all other sectors of learning by creating the right pathways. At each stage in the human development process connecting individuals up to real world experience (including in the region) enables the practical dimensions of their capabilities to be experimented with to ensure the abilities are there to bring ideas to practical reality. In this way profound and imaginative academic thinking will lead to real outcomes and real impact.</td>
</tr>
<tr>
<td>Only a small part of society concerned, mainly individuals</td>
<td>Large part of society concerned with all involved in designing, developing and producing new futures; universities acting as leaders helping as many individuals as possible to aspire to play their unique role in the “knowledge society”. Engagement is profound with institution wide commitment.</td>
</tr>
<tr>
<td>Natural sciences not centrally important (declining after early rise in 13th century and before rising again in early 17th century)</td>
<td>Strong evidence based research and development with natural sciences of central importance for future change; academic reason, knowledge and ‘know-how’ having high visibility, with universities feeling they have a ‘civic duty of care’ to engage with wider society on the local, national and international scale, and to do so in a manner which strongly links the social, economic, environmental, ‘designerly’ and artistic prowess of society.</td>
</tr>
<tr>
<td>Concepts of knowledge refers to common canonical body of knowledge, common sources, dream of a commonly held world view.</td>
<td>Encompassing diversified sources of information, which typically defy the possibility of creating common body of knowledge: systematising knowledge has become increasingly difficult and growing specialisation has created different knowledge cultures and niches. The idea of mass customization needs exploration, but conflict ought to encourage all to explore richer challenges. Systemic awareness for all, i.e. everyone is coached to understand their own position in the system. The engaged or connected university.</td>
</tr>
<tr>
<td>One religion reviewed &amp; adapted but still upheld as common ultimate reference frame – a single religious, cultural and intellectual order</td>
<td>Many religions and many agnostics. Religious beliefs seem to have become rigidified into fundamentalisms and there is a need to dissolve in the conflicting issues into a common reference frame. We need to develop a ‘dignity of difference’ and live with these irreducible differences between cultures and ideologies. This will require a ‘Covenant of collective development through global conversation’.</td>
</tr>
<tr>
<td>Mono-disciplinary design and creation with knowledge often concentrated in narrow areas and by single individuals</td>
<td>We need to work towards ‘trans-disciplinary working’ and a pluralism of ways, stop trying to systematize for ease of operation but recognize the need to encompass more collaborative ways of working and living; Liberation of knowledge production from institution; Liberating the individual, rebirth in the ownership, living with diversity. This must lead to co-identification of worthy problems capable of socially inclusive and sustainable wealth creation and then appropriate co-creation, co-production</td>
</tr>
<tr>
<td>Sustainability and environmental issues not seen to be a problem.</td>
<td>The ‘triple bottom line’ of truly caring for environmental, economic and social sustainability is seen to be a key goal in everything we do – the ‘ecoversity’ — where universities create powerful team working relationships with business and the community to contribute to the delivery of sustainability goals that their researchers know much about, thereby creating real improvements and true impact</td>
</tr>
</tbody>
</table>
Renaissance OLD (continued) | Renaissance NEW (continued)
---|---
Individual humans as central motor of innovation and heart of creativity | Talented individuals co-creating in teams as central motor of innovation and heart of creativity – the ‘civic university’

Human capital (including university students) is key in terms of the notion of ‘competency’, elegance and quality of individual creative performance; in higher education terms this also relates to ‘curriculum’ and where students are sometimes seen as the material input that generates institutional revenue, rather than something much more.

Human capital is seen in terms of the broader notion of ‘creative capability’ which embraces a range of lived experiences beyond the formal coursework in a university and should be seen in the form of opportunity realisation, rather than being a simple input that may, or may not, meet a known narrow market need. In this sense we might take this further and use the term ‘human capability’ as opposed to ‘human capital’ which carries a market clearing connotation with it.

Human talent seen collectively as ‘social capital’, ‘creative capital’, etc.

‘Social capability’ and ‘creative capability’ sit above notions of markets and more towards the common good and that human capability might be seen as more than what is typically portrayed in the human capital pyramid”.

The dream of human possibilities being far greater than any believe possible

Dream of human possibilities beginning to be within the scope of realization – the original modern idea of a new relevance of classical knowledge: applying human values and concepts of antiquity to 15th/16th Century urban society

Ideas of new relevance of all formal university knowledge which increases its scope by closer working relationships with business & the community – a new discourse and frame of reference. Social networks making extended use of the virtual networking and media conversation. The beginning of truly ‘virtuous knowledge sharing’.

The beginning of theory into practice

New thrust of theory into practice, will to link scientific theories with urban (political and economic) practice

Rise of individual creative arts and designers

Rise of co-creating teams led by creative leaders. Enhancement of quality and scope of collaborative creative arts, design, etc. Rise of engineering, with innovation important for urban economic and social welfare, proliferation/embedding of engineering know-how in all domains of daily life. Co-creation and co-production

New heightened status/acceptance of scholar or artist (who then ‘ate at the table of nobility’)

New status of creative knowledge workers and creative teams (university professors, researchers, experts working with intermediaries and other ‘creatives’ in creative teams)

<table>
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<tr>
<th>6 Exemplary cases showing the range of PUMR activity</th>
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In aggregate, the cases suggested a common approach for successful university engagement with partners. They all seemed to engender deep conversations with their partners in which team members need to step outside of their specific project and think reflectively about whether all their aims and objectives have been met. These cases are shown in some detail in www.upbeat.eu.com and for further, more general background information please see www.ac.salford.ac.uk/james-powell/ or in future the growing PASCAL web-site www.pascalobservatory.org. The following paragraph shows the breadth of the kinds of cases that PUMR will be involved in. For those wishing to understand the depth of the engagement please turn to www.upbeat.eu.com:

The following short paragraphs give the reader a feel of the range of possible activities of those already striving to become PUMRs:
o the University of Victoria in British Columbia, Canada is engaging the ‘Binners’ of its City and also in Sao Paulo in powerful, cost effective and sustainable waste management developments for the benefit of all;
o Using a sustainable ‘Community Land Trust’ development pioneered in the USA, Community Finance Solution, of Salford University, UK, has enabled a range of community groups to successfully develop and run a number of ‘Community-directed Affordable Housing Schemes’ for disadvantaged citizens in the UK;
o Peoples Voice Media, a social enterprise working closely with two Greater Manchester Universities is coaching a thousand ‘Community Reporter’ in a constructive development known as ‘Reuters for the Community’; using sensible, sensitive and cost-effective social media networking this project could enable the sort of ‘Media Conversation’ the BBC is looking to promote in the UK when it moves to Manchester;
o The University of British Columbia is working with local citizens to empower them to ‘do-it-yourself’ in retrofitting their homes to become carbon zero and highly sustainable.
o The UN Global Cities programme, led by RMIT in Melbourne Australia, works across the world to ensure smart city futures enabling citizens and communities to gain confidence to flourish in the global knowledge economy;
o The Aalto University’s Camp for Social Innovation is using the skills of University expertise through the world to work with citizens in Helsinki to empower them to help solve six major local problems in their city; key in this is to use ‘Flip-video’ technology linked to powerful social media networks to continuously improve prospective solutions;
o ‘Contraception: the Board Game’ was developed by Barbara Asatorian-Hastings of Salford University, to effectively help young people learn about the correct use of contraception in a happy learning environment; this has cut down the number of unwanted pregnancies through the world and made its university inventor one of the top ‘Women Inventors in Europe’
o Digital City is a concept developed by Janice Webster of Teesside University to put its city, Middlesbrough at the centre of the modern knowledge economy revolution.

These, and other case studies in the PUMR’s knowledge base, emphasize the following key factors.

• University partnerships need to be socially inclusive in order to achieve sustainable success, working for the ‘common good’. This focuses member universities on engaging all the communities within their regions, and on all the communities within their own colleges and universities, to work collaboratively with them, in co-creation, to help them transform their own lives and enable all categories of citizen to flourish.
• Regional engagements build value through such co-creation. Value comes from working together with partners to co-identify problems, co-design solutions, and then co-produce outcomes that address shared, important priority concerns.
• This helps them drive towards socially inclusive economic prosperity and wealth creation (in the richest and broadest senses of these phrases).
• Such engagement can co-create many different types of value. Even though today’s political climate and economic circumstances may place greater emphasis on creating economic value, a truly modern regional renaissance
needs to co-produce a more balance approach based on co-producing many different types of value.

- The concept of ‘eco-versity’ is one helpful way to provide this more ‘balanced scorecard’ approach for assessing university engagements. This uses a ‘triple bottom line’ of environmental, economic and social sustainability is key to what PUMR members are seeking to do, but we need better metrics.
- Enterprising academics must be prepared to reach out, aggressively if need be, to add value because non-academic partners often find it hard to build sustainable relationships with higher academic institutions.
- Co-creating value with regional partners also co-creates opportunities for high quality research and learning for faculty and students because real solutions blend interdisciplinary points of view with the full complexity of social, cultural and economic settings.

7 Conclusion and lesson learned

The aggregated cases also revealed other more detailed actions which if taken by universities would lead improved and creative co-creation with society. So, the following four key factors give the reader a sense of what universities need to be bear in mind when developing the approach advocated by Universities for a Modern Renaissance.

1) Forming meaningful, wealth creating, sustainable and socially inclusive partnerships between academic on the one hand and industry, business, the civil and voluntary services and the community on the other.
2) Enabling the co-identification of ‘real problems for solutions’, increasingly fit for purpose for the knowledge economy from as broad a range of stakeholders as is possible.
3) Searching for academic opportunities beyond means currently employed with business and community to the highest academic standards and for the mutual benefit of the university and its external partners.
4) Unlocking the talents of diverse groups of citizens working together with their university partners in co-creation, co-design and co-production.

8 A call to action

A highly community-enabled conference was run in Manchester in July 2009, www.smartcityfutures.co.uk, which proposed a ‘Call for Action’ for universities that wished to take a fuller part in Universities for Modern Renaissance. There has been much interest in being part of this new consortium and international network to develop this initiative. The PASCAL International Observatory has recognised the power of the suggested processes, and how they are reflected its comprehensive PURE benchmarking explorations with city regions across the world. PASCAL is now looking to improve its members understanding of what works well and how universities can play a fuller role in supporting the knowledge economy. The concept of ‘PASCAL Universities for a Modern Renaissance’ is seen by its Advisory Board (of international standing) as a unifying notion capable of bringing together the very different engagement processes used across the globe under a common heading. At a global, physical and virtual, discussion on 14th December 2009, PASCAL embraced the future-searching, innovation-centred and co-
design-based stance embedded in Universities for a Modern Renaissance and has adopted its principles as its own key driver for explaining constructive university change for the future.

9 Towards a proposal for PASCAL implementing ‘PASCAL universities for a modern renaissance’

The basic and overarching principles for PUMR have now been agreed by PASCAL and so we must now move towards greater detail, with a portfolio of processes or tools to enable those already acting on its principles to show how well their approaches are impacting for the good of their local businesses and communities; this is also critical to convince government of the impact UMR universities are thus creating. For those who still wish to become a University for Modern Renaissance but don’t know how, PASCAL is looking to create a new shared space between industry/business/the community and universities, so that each can bring their strengths to it and learn to have a deep conversation with each other where they are presently not using the same language; in this way the relevant parts of society might make the most of what is currently on offer. In doing this, as Lesley Doyle (2010) so rightly says on the basis of her own detailed studies in this area, “you must make sure you're not asking any interested party to undermine itself with respect to its present understanding or offer, but rather to strengthen itself in co-negotiation, co-discussion and conversation with others. So, it's a question of drawing on everybody's strengths” and she further believes there must be a way of approaching this so that this is made clear; in my terms this specifically relates to a maturing conversation and the ability for ‘mutual coaching’. In any set of tools developed by PASCAL, there must never be notion that any side of a potential working arrangement is criticising the other, thus making discussion more difficult or generating unnecessary conflict. Furthermore, an environment must be generated where all arguments are shown in the best light possible. PASCAL must therefore work hard to become a broker or intermediary between academe and its external partners for any local contexts, cities and/or regions. It must therefore work with all partners to develop and deliver a conversation which firstly helps them truly understand each other and then work together in creative collaboration. So as far as business, industry and universities are concerned, it's about looking at what the difference contradictions might be and, within the shared space developed by PASCAL, resolve those conflicts and differences until all are thinking through issues together in a collective, constructive and productive way. Unfortunately, at the moment according to Doyle (2101), ‘there is a persistent dialogue in universities of showing impact, impact, impact, and not much else. We are not even terribly clear what impact means. If PASCAL can develop a sensible or sensitive situation of negotiation, discussion and conversation with industry we would benefit a great deal.

So my proposal is to build on the successful approach developed in PURE by offering a combination of human formative evaluation and coaching, but undertaken against benchmarking criteria developed specifically for PUMR. To begin with, such benchmarking would make use of the successful UPBEAT evaluatory protocol and matrix, shown in www.upbeat.eu.com, with an even greater focus towards: the co-identification of real problems worth of collective solution with external partners; the co-creation of solutions systemically fit-for-purpose in the global knowledge economy; the co-production of those solutions and their stage management into the real world; and further in ensuring the continuous improvement of all such solution to reach more people
with more constructive effect’; see Appendix I for a brief discussion of the assessment approach.

My own knowledge sharing with a consortium of like minded Universities and senior academics has led me to believe there is a more innovative way of universities co-creating with their external partners. In the presentation at the Summit the principles behind PUMR will be detailed and examples of best practice revealed from the early adopters. In short in a ‘University for Modern Renaissance’, enterprising academics will:

**Look where every one is looking**

See what no one else can see

Do what no one else can do

uniquely by

**Co-identifying worthy problems**

**Co-designing their systemic solution**

**Co-producing sustainable outputs and outcomes**

which are fit-for-purpose for

**All in the knowledge Economy**

Enabling socially inclusive Wealth Creation

And the highest impact for real improvement

The PUMR is a global attempt to go beyond simply reaching out to society. It is proposing new ways of working and improved processes for the co-identification of problems felt worthy by society, and co-creation and co-design of sustainable solutions fit for the knowledge economy. The PASCAL International Observatory is interested in working with any University that has a ‘coincidence of purpose’ with this forward looking approach. ON behalf of PASCAL would particularly like to get into ‘virtuous knowledge sharing’ and a maturing conversation with anyone attending the World Summit of like mind especially if they are constructively critical, and look forward to any responses to this abstract. PASCAL believes the PUMR approach it is suggesting is the perfect basis for universities who wish to play the fullest role in an Knowledge Capital.

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Appendix I – Extract of Paper from Powell and Cooper (2010) UPBEAT as a tool for Assessing PUMR

‘PASCAL Universities for a Modern Renaissance’ is a tool developed, under significant funding from the Higher Education Funding Council for England to assess University Reach-out. It is written up in detail and can be accessed at http://www.upbeat.eu.com. This website describes the tool, presents a range of short case studies showing the types of partners universities involved in its development, and provides ten detailed ‘success stories’ showcasing use of the tool. UPBEAT can be used to identify a range of activities and their outcomes across four key skill themes for academic enterprise: solution enabling, individual talent, partnering and new business enabling. These are seen to be critical components for effective engagement activity by academically-driven enterprise projects. Each of these skills is assessed across a range of factors to allow teams to reflect on how they have addressed different elements of engagements and how they may, ultimately, try to improve the quality and level of their engagement. A further 150 cases studies have been undertaken of successful university outreach activity across British universities working with the same tool (Powell, 2008 and 2009). A short downloadable video, illustrating the UPBEAT approach to academic enterprise can viewed at http://www.upbeat.eu.com/downloads/real_world.wmv. The UPBEAT tool is organized around four underlying skills that are needed to fertilise an idea in order to make it flower in the knowledge economy, see Figure 1.

- New Business Acumen - recognising a demand and setting up a viable business to meet it with a product or service.
- Talent Improvement - empowering individuals within an enterprise by developing their skills and encouraging them to be innovative, recognizing that people have their own personal ambitions and can achieve them whilst working intensely for the overall project.
• Intelligent Partnering - team building and knowledge sharing, both internally amongst staff and externally with partners and potential partners, on an informal and formal basis to pursue common goals, recognizing the importance of communication skills.
• Solution Enabling Skills - standing back from day-to-day running of the project, evaluating, setting goals, identifying problems and needs, understanding the environmental and cultural environment in which the enterprise is developing.

Figure 1. UPBEAT’s four underlying skills

Figure 2. The format of the current UPBEAT Evaluatory Matrix
Two of these skills, New Business Acumen and Talent Improvement are traditionally seen as essential to make a company tick. The other two skills, Intelligent Partnering and Solution Enabling Skills, have been added because they are seen critical to success in today’s global economy.

In the UPBEAT Matrix, each of these four 'critical human success factors' has six levels – from Awareness as the first level, to Professional Competence at Level 3, through to Global Stewardship at Level 6, see Figure 2. The higher up the levels a project goes in all four human skills, the more successful the project is judged to be.

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<tr>
<td>New Business Acumen</td>
<td>Understanding actual customer, client and end user DEMANDS</td>
<td>Building Business Capability, especially Opportunity Management &amp; calculated risk taking</td>
<td>Enterprise having Competence in its key &amp; necessary Business skills</td>
<td>Achieving economic viability for Enterprise &amp; sustainable exploitation of new ideas</td>
<td>Significant financial profits or other rewards</td>
<td>International Award Winning Enterprise; creating a Premier League Enterprise Economy</td>
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<td>Intelligent Partnering</td>
<td>Awareness that the scale of the enterprise warrants collective working; developing communities of practice</td>
<td>Striving to become a Learning Organisation with suitable Governance structures, developing trans-disciplinary teams and creating an enterprise culture</td>
<td>Recognised as a Learning Organisation with Growing National &amp; Global Links. Team-working initiated</td>
<td>Purposefully developing sustained partnerships.</td>
<td>Developing Creative interdisciplinary team working.</td>
<td>Strategic partnering excellence at a global scale</td>
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<tr>
<td>Talent Improvement</td>
<td>Sufficient individuals wanting to enhance their own performance</td>
<td>Total commitment to become involved in sustained personal, development of management and leadership skills</td>
<td>Individuals achieving Disciplinary Professional Competence and Confidence. Educating for Leadership</td>
<td>Significant Self-efficacy &amp; Coaching for a difference in Others.</td>
<td>Developing Creative Leadership and Enterprise Champions</td>
<td>Distributed global leadership</td>
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<tr>
<td>Solution Enabling</td>
<td>Imaginative identification of Real NEEDS, and Desires &gt;&gt; Proposing Creative Solution</td>
<td>Developing Real world/practice based research to a deep conceptual level focusing on actual outcomes and real improvements for constructive change</td>
<td>Clearly focused Action Planning having Empathy with customers and sponsors</td>
<td>Developing useful working dialogues for mutual benefit &amp; foresight development.</td>
<td>Striving for step change improvements for all enterprise processes to ensure leading edge developments</td>
<td>Creative Stewardship with respect to Foresight Implementation &amp; creating a Knowledge Economy</td>
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Figure 3. The UPBEAT Matrix criteria employed to summarise 11 universities’ use of the tool to drive improvements in their Academic Enterprise. PUMR’s Knowledge Pool

Using the evaluatory matrix gives enterprise project leaders a template for staff development and a step by step project management guide to any academic enterprise project. It also helps any individual academic learn how to improve their own individual enterprising skills, as well as enabling them to recognise what needs to be done to maximise the overall performance of the team. Our evidence on hundreds of cases shows the UPBEAT approach drives improved academics enterprise, both quickly and effectively. An UPBEAT analysis can be done quickly and easily, in a fairly comprehensive way, often in less than 2/3 hours to begin with and then in a matter of minutes for any upgrade. Then, such an analysis can be used regularly as a project management tool to drive the next stage of improvement of any individual project and indeed it really does lead to continuous project improvement. The tool can also be used
to compare the progress of several projects and to aid enterprise project assessment, development and management. We hope this enabling process will help any university efficiently see the current state of any enterprise project quickly and effectively enable them to evaluate projects against each other and make sure they develop enterprises conforming to the highest ‘triple bottom line’.

To date, well over 200 case studies of good working practices have been assembled from over 30 universities across the globe, www.upbeat.eu.com. These illustrate, see Figure 4, how ‘virtuous knowledge sharing’, by collaborative trans-disciplinary teams of academics working cooperatively with end-users, clients, other professionals and external partners, have led to real and sustainable improvements, mutual benefits and significant impact for all partners. Those higher education establishments that wish to co-create with external partners, through powerful and deep conversations, and related working practices, can now elect to do so by becoming PASCAL Universities for Modern Renaissance (PUMR).

![Figure 4. The Virtuous Knowledge Sharing Cycle (Powell, 2003, adapted 2007)](image-url)
Managing creativity and its challenges: case of the film industry

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Structured Abstract

Purpose - The purpose of this paper is to illustrate the various types of paradoxes underlying the nature of creativity, which in turn affect the foundations of organizations and organization change in the 21st century. The film industry best illustrate the interaction of such paradoxes, creativity and organizational change. This paper examines how small and medium-sized firms in the emerging Singapore film industry stay competitive by managing or not managing these paradoxes.

Design / methodology / approach - The study reported in this paper explores the opinions, attitudes and experiences of key decision-makers in the Singaporean film industry.

Originality / value - The value of this paper lies in the knowledge that paradox considerations are becoming significant in understanding pluralism and the processes of organizational change in the 21st century.

Practical implications - The findings indicate that managers need practical tools that will enable them to comprehend and better manage these emerging contradictions and fully understand the implications of paradoxical situations and organizational change.

Keywords - creativity, paradox, organizational change, creative industries, film industry

Paper type – Academic Research Paper

1 Introduction

Modern economies are seen as increasingly dependent on knowledge (e.g. Nonaka, 1991; Kogut & Zander, 1992). At the same time, creativity, which is closely related to knowledge (Leonard & Sensiper, 1998; Weisberg, 1999), is seen as an important organisational capability (Amabile, 1998; Mumford, 2000). In many cases, creativity is also viewed as a possible source of organisational effectiveness (Woodman et al., 1993) and a source of competitive advantage (Leonard & Straus, 1997) in the economy marked by a gradual shift towards an informational, knowledge and symbolic form of production (Banks et al., 2000). Creativity is central to the creative industries as it plays the equivalent role in these industries to that of innovation in other sectors of the economy (Towse, 2001). The work environment and context are key influences in developing or inhibiting creativity in the workplace (Banks et al., 2000). The work environment includes the interactions of managers and employees in the organization.
The emergence and profile of the creative industries has been raised due to the economic value attached to cultural and creative products, which were to form the commercializable applications of creativity (Hartley, 2004). They have taken centre stage in recent years and have become one of the biggest employers for both creative & non-creative people in many advanced economies, showing annual growth rates of between 5 to 20% (Caves, 2000; Creative Clusters, 2004; DCA, 1994; Gibson, 1999; Throsby, 1998).

The film industry is one of 13 sectors that make up the creative industries (DCMS, 1998) and is closely associated with the new economy in the 21st century in that it has a project-based nature, largely organised as networks of knowledge and creativity-based teams and individuals (DeFillippi & Arthur, 1998). Firms or production houses in this industry compete in an external environment marked by extreme uncertainty and unpredictability (De Vany, 2004) and creativity is regarded as a viable competency which helps firms adapt to a changing environment (Wernerfelt and Karnani, 1987). Thus, it cannot be easily substituted or imitated providing a source of sustainable advantage for those firms who possess it (Barney, 1991; Mahoney and Pandian, 1992).

There has been a global trend towards viewing the role of cultural products as leader and catalyst with the capacity to enhance economic and social wealth and the pervasive belief that cultural and creative industries should engage in economic, developmental and strategic planning toward self-sufficiency (Craik, J., McAllister, L & Davis G., 2003). There is a certain paradox associated with the increased convergence of cultural products (often imbued with imaginative aesthetic and semiotic content) with economics, which subject these products to the discipline of profitability criteria and market signals (Scott, 2000, p.30). Inherent in the nature of these cultural products are various types of paradoxes that affect the foundations of organizations and organization change in the 21st century. This has great implications for managerial and organizational development of firms in the cultural economy.

For years, the labor services in the creative industries have taken on Karl Marx ‘s arguments of viewing labor services as “inalienable”, of having a value that goes beyond a clear price mechanism and one that encompasses a social or psychological component (Bourdieu, 1977). However, the creative industries are no longer perceived as an autonomous, indirect contributor to the growth of the economy. Research in sociology, urban geography and cultural studies has increasingly pointed out the convergence of culture and the global market place and the term ‘late capitalism’ was used (Fry, 1998; Negus, 2002; Soar, 2002).

This paper adopts a pluralistic approach to analyze the various challenging considerations inherent in the creative industries where creativity flourishes. The film industry illustrates very well the interaction of such challenges which in turn affect the foundations of organisations and organizational change. This paper examines how small and medium-sized firms in the emerging Singapore film industry stay competitive by managing or not managing these challenges which surface as paradoxes in the industry.

First, we outline the methodology used in gathering the findings for this study. Second, we discuss the relationship between creativity and paradox in the light of organisational change. Third, we provide a backdrop to the Singapore film industry and analyze the key paradoxes of creativity using findings from the Singapore film industry as the context to draw implications for organizations and organizational change. Finally, we look at implications for organisational practices and develop propositions for further research.
2 Design/methodology/approach

The study reported in this paper explores the opinions, attitudes and experiences of key decision-makers in the Singaporean film industry: local and foreign feature filmmakers, independent filmmakers, animation filmmakers, government funding bodies and cultural institutions, private cultural institutions, film distributors and suppliers, and film training schools.

Data were collected from 34 representatives of major film production houses, government representatives and multinational firms. While the subject matter did not require the use of a methodology that leads to generalisable and quantifiable outcomes, three main tools were used to produce meaningful research outcomes from qualitative research, namely:

1. In-depth interviews with major film production houses as well government representatives

2. An online questionnaire with a mix of closed and open-ended questions

Secondary data collection of published commentary and analysis linked to the production houses and film industry in Singapore. Sources include archival material, such as newspapers (online), press releases from government agencies and ministries, trade magazines, book publications, web sites of production houses and relevant agencies and institutions in Singapore.

3 Creativity, paradox and organizational change

The importance of ‘creativity’ as a key resource in the knowledge economy has been the interest of current research on geography, urban and regional planning. Creativity forms the basis of technological and social innovation as it has the potential for wealth and job creation through the generation and exploitation of intellectual property (DCMS, 1998). John Howkins (2001) postulates that people with ideas and those who own them have become more powerful than people who work or own machines (p.ix). He asserts the creative economy will be the dominant economic form in the 21st century. According to Florida (2002), creativity is now the decisive source of competitive advantage in the knowledge economy and the significance lies in attracting creative people and talents to the industry. The bottom line is no longer about productivity (Krugman, 1996) nor Porter’s determinants or the availability of resources and skills necessary for competitive advantage in an industry (1990).

Data gathered by various agencies in different countries suggests that sectors which produce symbolic (cultural) products and services contribute remarkably to overall economic output, and provide employment to a growing number of people (European Commission, 2005). Most often these sectors are called ‘creative industries’ (Jurisson, 2007).

Paradox can be defined as “contradictory yet interrelated elements – elements that seem logical in isolation but absurd and irrational when appearing simultaneously” (Lewis, 2000, p.760). These oppositional tendencies are brought into recognizable proximity through self or social reflection or interaction that reveals the seemingly absurd and irrational coexistence of opposites (Fored & Backoff, 1988; Lewis, 2000). Traditionally arts have always been valued for art’s sake. In the modern economy, there seems to be a certain paradox associated with the increased convergence of creative
products (often imbued with imaginative aesthetic and semiotic content) with economics, which subject these products to the discipline of profitability criteria and market signals (Scott, 2000, p.30). Beech, Burns, Caetecker, MacIntosh & Maclean (2004) argue that living with paradox is not necessarily the worst option. They see paradox as a positive way of confronting problematic change situations and regard paradox as an invitation to act rather than seeking to ‘think oneself out of the problem’ (p.1329). Eisenhardt and Westcott (1988, p.170) substantiates that “the contribution of paradox to management thinking is the recognition of its power to generate creative insight and change.”

In organizational studies, some researchers define paradox as contradictions embedded within a statement (e.g. Murnighan & Conlon, 1991), human emotions (e.g. Vince & Broussine, 1996) or organizational practices (e.g. Eisenhardt & Westcott, 1988). Understanding creativity and its paradoxes are fundamental to organizations and organizational change in the 21st century where the economy is marked by a gradual shift towards an informational, knowledge and symbolic form of production (Banks et al., 2000). In so doing, conceptual tensions and paradoxes play an important role in helping the management discipline to mature (Fabian, 2000). Cameron and Quinn (1988) contend that paradox offers a potentially powerful framework for examining the impacts of plurality and change, aiding understanding of divergent perspectives and disruptive experiences. All these researchers have examined how contradictions both hamper and encourage organizational development (Lewis, 2000, p.760).

The purpose of this paper is to analyse the key paradoxes that creativity helps accelerate, and the implications for organizations and organizational change.

4 The Singapore film industry

Singapore had a ‘golden age of cinema’ in the 50s and 60s especially in Malay films (Uhde et al., 2000). The period after Singapore’s independence in 1965 saw a decline in film production. The next twenty years saw the Singapore government focusing on economic development and the challenge of changing the country’s status from a developing country to that of a newly industrialized one. As a result, Singapore was probably the only country in South-east Asia without a filmmaking industry of its own in the 70s and the 80s.

In the late 20th century, policy makers in Singapore responding to global developments in the creative industries saw the movie industry as a motor of economic development and seeks to rebrand Singapore’s image from a conservative society to a ‘new Asian creative hub’ (ERC Report, September 2002, p.8). The Government acknowledged the need to forge an environment that is conducive to innovation, new discoveries and the creation of new knowledge and one that harnesses intangibles such as ideas, knowledge and expertise to add value and create new value in the knowledge economy (Ministry of the Arts and Information, Renaissance City Report, 2000). Government’s efforts to expand the services sector included identifying filmmaking as a service industry and a potential economic growth area. The Singapore government was keen to use content and creativity to enter the next wave of development.

Due to the focus given to the media sector in the last decade, Singapore has successfully attracted firms to the creative sector. The latest directory of MDA has a listing of about 294 media firms in Singapore consisting of film, animation and games production houses whose portfolios include features for television programs, documentaries, dramas, commercials, special effects, animation and feature film
production, and postproduction work (MDA Website). A total of 53 foreign media companies have also set up regional headquarters or hubs in Singapore since 2003, providing job opportunities in Singapore’s creative sector (MICA Press Release, August 28, 2007). Many of the film production houses in Singapore are small to medium-sized firms ranging from independent producers to firms that have less than twenty permanent staff members. The numbers of employed personnel tend to increase during production times. Due to the small size of the local market, quite a number of the production houses are involved with both feature film and animation film production and increasingly use digital technology in their production and postproduction work. Their diverse portfolios include features for television programs, documentaries, dramas, commercials, special effects, animation and feature film production, and postproduction work.

Film has the characteristics of both a service and an experiential product. Its value is primarily dependent upon the perceptions of the end users and their key buying criteria as much as on the creation of original content (Bilton & Leary, 2002). To be sustainable, firms in the industry have to display capabilities such as knowledge, skill, experience which reflect the types of knowledge-based resources that are likely to contribute most in an uncertain, changing and unpredictable environment (Miller & Shamsie, 1996) such as the film industry. These intangible resources play a key role in organisations as they draw on innovation, creativity, flexibility and responsiveness, qualities indicative of the cultural and creative industries (O’Connor, 2006).

The role of knowledge in value generation has long been recognised (Hayek, 1945) especially in creative industries and value creation in the creative industries is based on intellectual content in the form of texts, music, media and script et cetera (Caves, 2000; Scott, 2000). The data collected from the Singapore film industry illustrates that there is a wealth of knowledge embedded in creative resources such as creativity, experience and reputation which represent the creative inputs seen as crucial in creating a good product in the film industry - in this case, a good script for filmmaking. Knowledge transfer is seen as the key in helping to transform the Singaporean film industry from its marginal status in the global circuit of film production and distribution to that of a regional hub for international film production and distribution with state-of-the art media production and postproduction facilities (Tan et al., 2003).

The data suggests that filmmaking involves making creative calls, which translates into sometimes subjective, spontaneous and even arbitrary decisions. At the firm level, creativity can be influenced by external and internal structures. At the industry level, external stimuli, such as the environment, Internet and the mass media, can stimulate creative ideas. According to one of the interviewees, creativity is seen as a competitive element as clients will seek out creative persons, who are usually the most mobile in the industry.

Creativity is very important because there are people who know the craft but if they are not creative enough to do different things, then they will always stay in the same spot.- FF5

Creativity is a competitive thing. When I first started, the industry was not so much creative as it was technical. But I was always trying to outdo the other.

1 According to Eliashberg & Shugan (1997), films are intangible objects consumed for pleasure rather than for the maximization of an economic profit. That is, movie consuming may be induced not by financial profits or utility, but by experiential profits or utility.
guys by working faster or do something cleverer and do something more interesting with the machine. There was always this internal competition because you want to be talked of and be the one that the clients are fighting for. Generally the people who are good in their job are the ones who ended up going somewhere else to work. – FFA9

While the interviewees acknowledged the need to cultivate and develop a competency like creativity, the various paradoxes inherent in creativity pose certain challenges to organisational development and change in the firms. We examine four of these paradoxes in turn.

**Paradox 1: Self-Sufficiency versus interdependency**

Traditionally, creativity is thought of as an attribute of an artist or the arts. This has been endorsed by the definition given of the creative industries by the UK Creative Industries Taskforce (DCMS, 1998) to refer to ‘activities which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property’. A significant literature on careers in creative industries recognizes the role played by mavericks (Becker, 1982) and independent creative artists (Caves, 2000) who desire individual identity, reputation and control over their creative products.

Creativity comes from within – my experiences, exposure and the things I see around me, read about and the way I see it, where I see it, my point of view and my interpretation. Why is one story different from the other even though it is the same subject done by two different people? This is because no one person sees two things the same way. The movie to me is about perspective. - FF2

Yet, in many instances, the finished products in the cultural economy are the results of a collaborative process involving networks of different individuals with interdependent skills, roles and specialized operations (Negus, 1996; Becker, 1982). The finished products in the film industry in the form of a design, script, and video or software application are the results of a collaborative process that involves many different individuals and specialized operations. The network element is an important part of the creative process as a shared pool of talents and knowledge is brought together to bring about idea generation. It is not uncommon that tacit knowledge and ideas are shared among firms such that they can build on their accumulated memories and experiences (Bilton, 2007). Another reason that accounts for such intensive social networking is due to the contractual and transactional nature of production such that employment is often on a part-time, temporary or freelance nature (Scott, 2004). This tends to create instabilities and results in skilled creative workers staying in touch with one another in order to keep abreast of current labour market trends and opportunities (Scott, 1998, Christopherson, 2002).

A film is a complex project that requires the coordination and integration of a wide range of different specialized skills (Robins 1993; Miller and Shamsie 1996). Thus the competences and the knowledge of the team members are fundamental for the movie’s success. Strategic alliances in the form of co-production and international joint ventures have now accounted for a significant part of film activity in many countries as the way to acquire such creative resources. This suggests that film production is increasingly not taking place within a cluster and a national context but is the result of joint efforts among producers from different countries (Morawetz et al. 2007).

There is no way for an industry like ours to depend totally on the local talents especially the kind of products that we put up that will be sufficiently attractive
for big markets to do business with. We need the global mindset. That is why we always collaborate with people from other cities around the world. – FFA5

The fact that two brains are better than one, probably you are able to come out with a product that is going to appeal to the international market and a lot of these partners are veterans and well known companies in their countries, the animation and film markets. Collaboration means bringing resources together means that you are able to get the products out faster leveraging on the competitive edge of both parties. Such collaboration can bring up the credential and credibility of the Singapore industry. There will be knowledge transfer at the end of the day as both partners will benefit from the knowledge that each of them has - Government Agency 1

To understand the creative process, there is a need to unfold this tension between the individual needs and the collective demands of the final output. Embedded in this paradox lies another paradox that is particular to the small competitive environment of the film industry in Singapore. The interviews with the local producers unveiled that while there was a great need to seek cooperation with foreign partners to leverage on their knowledge and skills of film production, there was a lot of secrecy shrouded around local producers because of the need to compete for funding from various sources. As a result, local filmmakers were very reluctant to talk to each other beyond superficial things for fear that someone else might steal their idea and therefore get the funding for the project.

Singaporean producers tend to be very individual in their approach. The industry players are very guarded about what they know. For instance if they are launching something, everything will be all wrapped up until when the whole project is completed. There is not much transparency about what each of us is doing in the industry. – AFM5

Whereas in Singapore, because the funding sources are so small and the stakes are so high, film makers are very reluctant to talk to each other beyond superficial things as in if someone else might steal your idea and therefore get the funding for the project. – IFM1

The above discussion demonstrates the social process that creativity is situated and one that can be stimulated, fostered, orchestrated or hampered by specific organizational contexts (Amabile, 1988). The close association between creative products and their social conditions of production, where modern cultural-economic systems take the form of complex inter and intra-firm networks, and where many different hands and interests are involved in the process from conception to the finished products (Scott, 2000) accounts for the complexity in the management of creativity. At times, policies and technology can present challenges to the fine balance between self-sufficiency and interdependency amongst players in the same industry.

Your creativity is constrained by the expectations of the authorities in that the content produced is very much sheltered. – AF2

In that regard, creativity has become a broad, fundamental notion that encompasses innovation, entrepreneurship and expression and connotes both the art of giving birth to new ideas and the discipline of sharing and applying those ideas to the stage of realized value” (Collaborative Economics, 2001, p.4). This has fundamental implications for organizational change.

**Paradox 2: Individual versus collective identity/Local versus global influence**

This second paradox presents double jeopardy in that on the one hand, there is a need to reconcile tensions between work ethos & identity of creative workers and the dilemma over the need to stay both local and global (Landry, 2004). The struggle to balance
individual needs and collective demands also calls into question whether to retain an individual or collective career within organizational contexts in the 21st century.

The creative workers share a common creative ethos that values creativity, individuality, differences and merit (Florida, 2002). Yet value contribution of cultural industries is closely linked to relationships & networks that enable and sustain the creative process such that the product value of creative industries is socially & institutionally defined.

There are studies done to support that individual careers in creative industries are built through gatekeepers of talent (agents), reputation (critics) (Giuffre, 1999; Kapsis, 1989; Lang & Lang, 1988) and commercial distributors of creative work (Zuckerman, Kim, Ukanwa & von Rittman, 2003). In the Singapore film scene, many production houses engage highly skilled freelancers whose next job depends on their reputation and who rely on a network of connections. This is a process in which trust is an essential element. The unpredictability and uncertainty of the industry further enforces the role of connections in building such a reputation:

This industry, like Hollywood, is all about connections and relationships—who you know, when you can get opportunities and what names you can use to back you up. – AF4

When we mention Nelvana, everybody sits up and notices as Nelvana is a very recognized leader in this industry. So this kind of relationship and networks do draw you this kind of attention—meaning that if you can work with Nelvana, you are good enough to work with anyone – AF9

Yet, the sense of place and geography remain a strong attraction for the creative workers to reflect upon various influences, energise themselves and remain open to connect with possibilities (Storper & Venables, 2004, p.34). Jacobs (1969) argues that urban diversity is central to certain kinds of economic creativity because of the specific advantages of unplanned and haphazard, inter-network contact.

Creative workers look for places that provide a good buzz and a variety of ways to be creative. Such ‘buzz’ places are often associated with globalization, because they are important nodes of highly developed international business and culture networks, with high levels of international travel-and-meeting activity, and high concentrations of both high-skilled and low-skilled immigrants (Storper & Venables, 2004, p.366). These workers are caught in a dilemma of wanting to be in the world but not of the world, in the sense of being connected to the outside yet have boundaries and borders to ground and anchor their identity (Landry, 2004). The dilemma for the creative workers arises over the need to be porous to new influences as well as to retain their own individual identities, the need to stay both local and global (Landry, 2004) and whether to retain an individual or collective career within organizational contexts in the 21st century. Organizations of the 21st century will need to change and adapt taking into account such complex effects among workers and organizations.

In the Singapore film context, this dilemma is most apparent in co-production when a local firm teams up with a foreign partner such that the creative inputs are not necessarily equitable and failure to gain access to partner knowledge and expertise results in unequal benefits accruing out of such collaboration. In the process, the Singapore firm loses its own identity and subsumes under a dominant partner’s identity or takes on a collective identity.
There is also a lack of a distinctive culture that we can call our own such that there is no identity associated with a Singapore-made film. Often when we collaborate with a foreign partner, our creative inputs are not necessarily sought after compared to our technical expertise. - AF 6

**Paradox 3: Tangible versus intangible competitive advantage**

The modern day commodification of cultural production in the market-based exchange means that while these products become increasingly invested with symbolic value (Scott, 2000), they also assume economic value taking the form of tangibles such as a written script, a film made and box office returns. In the abstract system of perfect information and frictionless exchange used in many economics and marketing models, there is no need to identify the actors within market-based exchange. The assumption is that the content or value of the product or service is tangible, thus there is no uncertainty. Transaction costs can be ignored or taken as standard and hence the value and tangible quality of the product or service being exchanged will determine the nature of the relationship (Choi, Millar & Wong, 2005). In this sense, there is no social aspect to the relationship.

However the creative industries are dominated by the complexities of imperfect competition and exchange based on social structures, personal contacts and relationships. Like in the knowledge-based service industries, such social capital, structure and relational effects (Spender, 1996) are equally important in the creative industries. Signals and cues from the environment hone the sensibilities of the key actors and they are integrated into the relational context necessary to maintain their competitiveness (Storper, 1997, p.243).

The common denominator of all the creative industries is the aesthetic and symbolic attributes, which are the decisive elements of product and service differentiation and value. Such form of encoded knowledge (Blacker, 1995) resides not only in the arts or media but is a central & increasingly important input into all sectors where design and content form the basis of competitive advantage in the global markets (Flew, 2002). Signals and cues from the environment hone the sensibilities of the key actors and they are integrated into the relational context necessary to maintain their competitiveness (Storper, 1997, p.243). Hence the economic value of cultural goods does not always coincide with the quality of symbolic value which may not be appreciated by the markets. This paradox was addressed by Bourdieu (1993) when he described the emergence of cultural industries and the process of autonomization of the field of arts.

The symbolic and relational aspects associated with the cultural products subject them to a high element of risk, which has become an increasingly endogenous property of the economic system (Storper, 1997). Such endogenous properties of the production system (Scott, 2000) can no longer be subjected to the conventional ‘gate keeping’ models (Hirsch, 1972) which act as a filtering device in the production system and where some kinds of (exogenously-given) novelties are allowed to pass while others are rejected along the way (Scott, 2000, p.34).

Because of the high risks involved, very few do a project all by themselves. We look for different partners. A lot is based on opportunities and who you know in the industry that can do the kind of work you want get done. One has to look at the capabilities and then balance them up with the business consideration. This is how parties look out for people. Maybe this is the reason why they say that the media industry is a relationship industry. You have to know who can do what, when and where and you have to have a lot of referrals. – AF 4
The expanding literature on service industries (Kelliher & Riley, 2003; Caruana, Pitt & Ewing, 2003) has raised the importance of such ‘inalienable’ or ‘intangible’ assets in the success of organizations. There are also other related issues like the high uncertainty about the demand of these products, the artists caring about (and thus continue to produce) their work independent of its commercial value; and the durability and replicability of cultural goods and property rights (Caves, 2000).

**Paradox 4: Market versus non-market value**

As analyzed by Jacobson (1992), dynamic frameworks of competition such as those advocated by the Austrian school of inter-firm competition, have placed a greater emphasis on intangible, invisible assets and the role of unobservable factors. Competition in the creative and cultural industries, broadly speaking has shifted from the "use-value" of products to the "sign-value" of brands and luxury goods (Lash and Urry 1994: 122; du Gay 1997). There is also the question of the generation of economic value and knowledge dissemination within and outside of the industry (DeFillippi & Arthur, 1998). The market regulatory regime, which previously governs competition, accountability and other facets of market operation, would have its limits especially in terms of the risk element (Christopherson, 2002). Very few arts products make money or break even, including products of Hollywood or Broadway, publishers and bookstores, art galleries and design firms (Arthurs & Hodsoll, 1998). Most are funded through grants, gifts and in-kind contributions from the community.

Success in the creative economy is very much based on audience appeal and to the ‘name recognition’ of the artist or product (Arthurs & Hodsoll, 1998). In that regard, reputation is a fundamental resource that is associated with having a good track record in terms of quality films produced. Having a good reputation carries a lot of weight in attracting good people to the industry and, in many instances, securing funding for the production houses. Therefore, reputation is linked to a good product either in the form of a good script and/or a good director, producer or well-known actor:

- This industry revolves around people, and you are judged by your end products. You are as good as your last work, your last film. Definitely reputation and successes lead to clout effects like Stephen Spielberg and Coppola. Star power is therefore the appealing factor because one has the reputation. If you have a reputation, people would watch out for your products. – FFA2

The nebulous and intangible nature of these industries demands different marketing strategies, away from the industrial marketing of the Fordist era. For example, in the film industry, motion picture production has become vertically disintegrated and horizontally (inter-sectorally) integrated, with studios and sub-contractors diversifying into related entertainment and multimedia industries elsewhere in the city, in the process generating powerful agglomeration economies (Scott, 2000). The ‘market-place’ needs to be redefined as the web of networks and institutions that create the milieu in which firms work in, evolve and change (Pratt & Gornostaeva, 2005).

The industry is all about marketing. If you have a good marketing strategy, the distributors would come to you. Basically you go to a distributor and start a bidding lob between distributors – this is sure sign that something good is in the making. They usually would pick up the tab where marketing is concerned. Once the distributor is keen to pick up the film, then the marketing part is taken care of. For us, it is creating movies that are easily marketable – FF5

Because of the high risks involved, very few do a project all by themselves. We look for different partners. A lot is based on opportunities and whom you know
in the industry that can do the kind of work you want to get done. This is the reason why they say that the media industry is a relationship industry. —FFA 2

5 Implications for organizational practices

The above creativity paradoxes demonstrate the incongruity of organizational practices adopted by the creative and cultural industries in which creativity has to be managed. Why then is it important to effectively conceptualize paradoxical phenomena and situations in the creative economies? The fact that the creative and cultural industries are expanding and will continue to play a vital role in the economic agenda of countries marks a discernible but not an absolute change in priorities and practices of different players in the economy. In particular, the revelation of these various paradoxes will help us better understand the creative process and how to attract creative workforce to the industry. Paradox considerations are becoming significant in understanding pluralism and the processes of organizational change (Eisenhardt, 2000; Poole & Van de Ven, 1989). Creativity generates transcendence of differences and hence much value in pluralism, where “a state of society exists in which members of diverse ethnic, racial, religious, or social groups maintain an autonomous participation in and development of their traditional culture or special interest within the confines of a common civilization.” (Merriam-Webster website).

On the firm level, the above analysis brought forth questions pertaining to organizational capability in tackling human resource practices, organizational form and structure. For instance, there is a need to cater to specific needs of creative workers yet looking after the needs of business operations oriented workers. The bottom line is not just about productivity and profits. Often artists care about their work independent of its commercial value (Caves, 2000) and the value of the product is attributed to symbolic and relational aspects associated with the cultural products. Hence rewards and motivational systems have to take into account the intrinsic needs of the creative workers. Enhancing innovation has to do with how performance is rewarded (Sutton, 2002). Sutton (2002) argues that instead of just rewarding success and punishing failure, the organization should reward both. This is a dramatic departure from the management practices of most organizations and could be viewed as a new paradigm shift as organizations and policy makers would have to think about how to attract and retain creative workforce in the industry.

The nebulous nature of the creative industries with its ‘nobody knows’ (Caves, 2000) characteristic belies the risky and uncertain work environment that creative workers have to work in to succeed in their career. This implies that creative workers will be concerned about job opportunities and career tactics (O’Mahoney & Berchky, 2006) and how to identify their strategic resources and enact their environment (Weick, 1995). This has implications for human resource practices in relation to recruitment, maintenance and retention policies that will cater to the needs of creative workers in the workforce.

To manoeuver the risky and uncertain environment of the creative industries, there is a need to adopt an adaptive and organic boundaryless structure characterized by an acceptance of impermanence, an absence of hierarchy, greater empowerment of team members, wide spans of control, more personal coordination, a minimum of bureaucratic features, open divisions of labor and technology use(Campling et al., 2008). Internally, teamwork and intense communication replace formal lines of authority and externally,
there will be a mix of outsourcing contracts and operating alliances that form and disband with changing circumstances (Campling et al., 2008).

The nebulous and intangible nature of these industries demands different marketing strategies, away from the industrial marketing of the Fordist era. For example, in the film industry, motion picture production has become vertically disintegrated and horizontally (inter-sectorally) integrated, with studios and sub-contractors diversifying into related entertainment and multimedia industries elsewhere in the city, in the process generating powerful agglomeration economies (Scott, 2000). The ‘market-place’ needs to be redefined as the web of networks and institutions that create the milieu in which firms work, evolve, and change (Pratt & Gornostaeva, 2005).

Apart from organizations and institutions, social networks will be a prominent feature of modern day economics. Hozic (2001) perceives that in the film industry, there will be a shift from producer-oriented censorship issues to buyer, or consumer-oriented marketing and issues such as copyright, royalties, and residuals extending from ancillary broadcasting, merchandising or licensing of actors’ images or brand names, scripts and screenplays, films and film libraries. The application of business strategy principles and tools would have to adapt to the amorphous nature of the industry in a more complex, dynamic, uncertain environment. There are implications for international business strategies especially in the area of marketing and strategy.

At a macro-level, the analysis hinges on issues of governance, business strategy principles and tools needed to adapt to the amorphous nature of the creative and cultural industries. These have implications for policy-makers and international business strategies especially in the area of marketing and strategy. For instance, cultural policy direction worldwide has been influenced by trends and development in the creative and cultural economy. There is a growing preference for supporting industry through infrastructure than through funding programs for small products. Industries are expected to flourish without restrictive regulations, to be internationally competitive and self-sustaining financially (Craik et al., 2003, p. 30). As a result, policy makers are caught in the dilemma of sticking to traditional policy commitments and the realization that an economic logic does not always work in matters cultural (Craik et al., 2003, p.30). The institutional and relational network structure of the cultural industries calls for a redefinition of the market and market place. There will be a shift from producer-oriented issues to distribution and consumer-oriented marketing issues such as copyrights, royalties and merchandising of images or brand names (Hozic, 2001).

6 Conclusion

The paradox/creativity lenses used above in evaluating the film industry in Singapore highlight the need for managers to have practical tools to enable them to comprehend and better manage the emerging contradictions and to better fully understand the implications of paradoxical situations (Ofori & Julian, 2004). The value of this paper however lies in the knowledge that paradox considerations are becoming significant in understanding pluralism and the processes of organizational change in the creative and cultural industries.

Organizational and human resource practices have to adapt to the changing workplace and its dynamism without having to ‘inhibit cultural and managerial dynamism’ (Adams, 1988, p.19). Managers need to have a mind shift in facilitating the organizational context and conditions under which creativity or creative activity thrives.
The distinctive nature of the Singaporean firms means that certain paradoxical considerations examined may be more or less significant in the film industry in other countries. The local setting may limit the generalisability of the findings in a global sense. The trend towards transnational cooperation implies that cultural specificities, along with other mediating factors are unavoidable and at times enabling factors for international success in peripheral countries' export activity (Sinclair et al., 1996, p.20).

The role of technology in the evolution of the industry will become increasingly significant as technology can serve as both an enabler and a threat. The increasing digitization of the film industry will impact on the way firms manage their organization development and change. This might involve the development of differentiation strategies and customer-driven marketing strategies in order to compete for ‘eyeballs’ in the industry.

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2 This is a term used by industry people to denote the people who go to the cinema to watch a film.


Applying the open innovation system concept to infrastructure projects

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Structured Abstract

**Purpose** - The goal of this conceptual paper is to provide tools to help maximise the value delivered by infrastructure projects, by developing methods to increase adoption of innovative products during construction.

**Methods** - The role of knowledge flows in determining innovation adoption rates is conceptually examined. A promising new approach is developed. Open innovation system theory is extended, by reviewing the role of three frameworks: (1) knowledge intermediaries, (2) absorptive capacity and (3) governance arrangements.

**Originality** - We develop a novel open innovation system model to guide further research in the area of adoption of innovation on infrastructure projects. The open innovation system model currently lacks definition of core concepts, especially with regard to the impact of different degrees and types of openness. The three frameworks address this issue and add substance to the open innovation system model, addressing widespread criticism that it is underdeveloped.
The novelty of our model is in the combination of the three frameworks to explore the system. These frameworks promise new insights into system dynamics and facilitate the development of new methods to optimise the diffusion of innovation.

**Practical Implications** - The framework will help to reveal gaps in knowledge flows that impede the uptake of innovations. In the past, identifying these gaps has been difficult given the lack of nuance in existing theory. The knowledge maps proposed will enable informed policy advice to effectively harness the power of knowledge networks, increase innovation diffusion and improve the performance of infrastructure projects. The models developed in this paper will be used in planned empirical research into innovation on large scale infrastructure projects in the Australian built environment.

**Keywords** - innovation, absorptive capacity, infrastructure projects, construction industry, built environment

**Paper type** – Academic Research Paper

1 **Introduction**

This is a conceptual paper that discusses tools that might usefully be employed to enhance the performance of large scale infrastructure projects, as a means of improving returns on investment in establishing a more effective built environment. The paper focuses on the role of innovation in supporting improved project outcomes. In this respect it is important to consider both innovation typologies and innovation processes. Models of both are developed here. It is intended that these models be employed in understanding innovation on infrastructure projects. It is expected that their use will result in more effective policy advice, than that which more piecemeal approaches would yield. Planned future empirical research will test their practical value.

Interest in the subjects described above has been driven by the poor state of civil infrastructure in Australia’s built environment.

2 **Empirical background**

After more than 20 years of underspending, Australia’s infrastructure is considered to be in crisis. A landmark report by CEDA (Committee for Economic Development of Australia) identified problems across many infrastructure types, including land transport, sea and air ports, energy and water (CEDA, 2005). Deficiencies have also been identified in social infrastructure such as hospitals and schools (Argy, 2008). The aging of existing infrastructure is a key issue constraining Australia’s potential economic growth (CEDA, 2005; BCA, 2007; Coombs & Roberts, 2007). The CEDA report diagnosed a ‘deep seated infrastructure delivery problem’ stemming from declining real infrastructure investment nationally since the 1980s. Economic production is compromised by these problems, as infrastructure is the foundation for other productive processes. Infrastructure reduces transaction costs and enhances the opportunities for access and exchange.

Acknowledging the problems, some governments have launched large infrastructure building programs, particularly in those states impacted by spiralling resource exports, Queensland and Western Australia. International comparisons rank Australian investment fourth highest in the world, by the value of construction deals at all project stages (Infrastructure Journal Online, 2008). According to major investor ABN Ambro, $380-455 billion worth of investment is needed over the next decade (Hepworth & Connors, 2008). Although current economic uncertainties may slow government plans, in the long run significant infrastructure investment cannot be avoided, as it is the basis of all
productive activity. Certainly policies developed prior to the current financial crisis indicate massive investment (NSW Treasury, 2008; Qld Government, 2008; Rudd, 2008; Vic Government, 2008; WA Government 2008), and as infrastructure investment is often employed counter-cyclically to promote economic growth, investment may grow rather than fall. In any event, the scale of projected infrastructure investment over the next 20 years is unprecedented in Australia’s history, and is presenting significant delivery challenges. The framework presented here responds to these challenges. It will be used in later research to address infrastructure delivery problems, largely related to limited capacity and underperformance on projects with regard to time, cost, quality and environment. The framework responds to these industry concerns, by providing the means to deliver information on which to base strategies to (1) increase the efficiency of infrastructure projects (2) improve project outcomes and (3) improve the capacity of the construction industry.

Innovation in the operation and delivery of infrastructure projects can add considerable value to government investments.

3 Conceptual background

This section discusses innovation typologies and innovation processes, as background to interpreting an optimal approach for assessing such knowledge and packaging it in a way that will result in useful policy guidance within the infrastructure development space.

4 Innovation typologies

The literature reveals increasing sophistication in the characterisation of different types of innovation, from simple distinctions between product and process innovation to more detailed categories along an expanding set of dimensions. New typologies categorise innovations based on implementer’s control, output class, degree of novelty, knowledge characteristics, system linkages, decision making, and source of idea (Teece, 1986; W. Powell, 1991; Rothwell, 1994; Winch, 1998; Mitropoulos & Tatum, 1999; Slaughter, 2000; Gopalakrishnan & Bierly, 2001; Harty, 2005; Organisation for Economic Cooperation and Development OECD/Eurostat, 2005). Table 1 summarises key innovation typologies in the literature.

Table 1. Key innovation typologies

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<tr>
<th>Author(s)</th>
<th>Based on …</th>
<th>Categories</th>
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<tbody>
<tr>
<td>Harty (2005)</td>
<td>Implementer’s control</td>
<td>Bounded – innovation implementation can be contained within a single sphere of influence Unbounded – innovation implementation takes place in more contested domains</td>
</tr>
<tr>
<td>OECD (2005)</td>
<td>Output class</td>
<td>Product – good or service Process – production or delivery method Marketing – packaging, placement, pricing Organisational – internal business practices The intention is that these OECD categories are mutually exclusive and that they cover all possible types of innovation output by firms. Product and process innovation tends to be technical/technological in character.</td>
</tr>
<tr>
<td>OECD (2005)</td>
<td>Degree of novelty</td>
<td>New to the firm – lowest degree of novelty – innovation adopted from within the industry</td>
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### Understanding Innovation Characteristics

Understanding innovation characteristics along these dimensions has the potential to assist policy making to improve innovation adoption on infrastructure projects. Figure 1 summarises the above information in the form of a model.

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<th>Author(s)</th>
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| Gopalakrishman and Bierly (2001) | Knowledge characteristics | **New to the industry** – innovation adopted from another industry  
**New to the world** – highest degree of novelty – previously unseen innovation – likely to be patented if technological in nature |
| Slaughter (2000) | Change in knowledge and change in system linkages (System linkages first addressed by Teece 1986) | **Tacit/Explicit** – codifiability, teachability, observability, articulateness  
**Systemic/Autonomous** – extent to which knowledge components are linked with other components  
**Complex/Simple** – sophistication of knowledge [last two dimensions reflect Slaughter 2000] |
| Mitropoulos and Tatum (1999) | Decision making (Similar to Winch 1998) | **Incremental** – small change in knowledge and small system impact  
**Architectural** – small change in knowledge and large system impact  
**Modular** – large change in knowledge and small system impact  
**System** – large change in knowledge from a combined set of innovations and large system impact  
**Radical** – large change in knowledge and new system |
| Winch (1998) | Source of idea | **Strategic** – continuous monitoring of ideas, thorough evaluation of options, top management participation, seeking to maximise benefits [proactive innovation]  
**Project** – solution driven innovation, limited evaluation of available options, seeking to minimise consequences of failure [reactive innovation] |
| Teece (1986) | System linkages | **Top down** – new idea adopted by firms’ managers and implemented on projects [proactive innovation]  
**Bottom up** – new idea is the result of problem-solving on construction sites, which may be later learned by the firm [reactive innovation] |

**Source:** (K. Manley, 2008b)

**Figure 1. A model defining innovation type**
It is useful for policy makers to understand the different types of innovations that may be employed on infrastructure projects. This knowledge helps frame understanding of the conditions necessary for innovation. Even more information is given in this respect by considering the dynamic processes underlying innovation. Hence, at a broader level of analysis, there is another vast set of literature focused on interactive innovation processes.

5 Innovation processes

Technological and social advancements have resulted in the need for new forms of organisation for successful innovation. In the past, innovation processes may have been effectively managed by individual firms, however this is no longer true. Successful innovation is increasingly seen to be the result of a team effort between a collective of industry players. Interactive innovation processes lie at the heart of business success in the new economic circumstances. As the Bureau of Industry Economics noted as early as 1991 (p. 7):

For some time, studies of the innovation process have stressed the importance of networks to successful innovation, over-turning the traditional model which characterises innovation as a linear sequence running from basic research, through product development, to production and marketing. Innovation is now seen as an interactive process requiring intense traffic in facts, ideas and reputational information within and beyond the firm.

It is now clear that innovating firms ‘cannot be analysed in isolation: innovation capability depends in fact also on the amount of information that each firm is able to receive from the environment in which it operates’ (Antonelli, 1996, p. 284). This interactive view of innovation is the basis for many conceptual elaborations of the innovation process, all of which emphasise the increasing complexity of successful innovation and the importance of external knowledge sources. There has been considerable activity in developing new approaches to understanding contemporary innovation processes. However, the breadth of alternatives can be bewildering for entrepreneurs and policy makers seeking practical guidance. In response, the literature was reviewed with the intention of identifying common themes (K. Manley, 2003). Four key approaches to understanding interactive innovation processes were found: systems (Freeman, 1987; Nelson, 1993; Edquist, 2005; Lundvall, 2007), networks (DeBresson & Amesse, 1991; Freeman, 1991; W. Powell, Grodal, S., 2005), value-chains (Von Hippel, 1988; Normann & Ramirez, 1993; Marceau, 1995; Jacobides, 2006) and clusters (Porter, 1998; Tan, 2006).

These frameworks are the most distinctive and have the highest profile in the academic and business literature. Encompassing these four, the idea of open innovation systems has emerged over the last few years. This concept is being referenced in the literature with increasing frequency. As an overarching model, it very usefully draws attention to the key feature of modern innovation processes – their openness to external ideas. Yet, as will be shown, the open innovation system concept can be made more useful still, by integrating its use with three related models that focus more specifically on crucial aspects of open innovation systems. These three models explicate these aspects in a dedicated and comprehensive fashion. The models pertain to (1) knowledge intermediation, (2) absorptive capacity and (3) governance arrangements. These models address the emphasis within open innovation systems on the ease of knowledge flows,
and the role of the absorptive capacity of stakeholders in adding value to such knowledge, mediated by the governance context in which those stakeholders operate.

6 The open innovation system model

The open innovation system concept has grown out of the work of authors such as Rothwell (1994), Chesbrough (2003) and Gassmann (2006). Policy makers have been using it over the past five years to promote greater collaboration between firms (Dahlander & Gann, 2008). The concept is simple to understand and persuasive in its call for greater openness to external ideas, in the name of creativity, innovation and growth (K. Manley, 2001a). It is a highly appropriate model for examination of knowledge flows in large scale infrastructure projects. The open innovation system concept has mostly been applied to high-technology sectors. As an extension to the current knowledge base, future empirical work by the authors will apply an enhanced version of the concept to a more mature sector – the construction industry, in an examination of the infrastructure delivery phase of urban development.

A review of the literature on open innovation systems shows that the three crucial aspects of its operation pertain to knowledge intermediation, absorptive capacity and governance arrangements. Development of these aspects will provide new insights into system dynamics and facilitate new methods to optimise the diffusion of innovation. The three frameworks add substance to the open innovation system concept, addressing widespread criticism that it is underdeveloped (Gassmann, 2006; Dahlander & Gann, 2008; Dodgson & Steen, 2008).

7 Knowledge intermediation

Knowledge intermediation occurs when there are knowledge flows from knowledge production organisations (including manufacturers) to knowledge users (including project-based firms). The organizations that facilitate these flows, the knowledge intermediaries, are an essential component of knowledge networks (Mowery & Shane, 2002). Intermediaries provide a search function to identify technology and knowledge solutions, matching knowledge suppliers and users (Howells, 2006: 216-217). Intermediaries are particularly important in facilitating market-pull knowledge transfer (Markman, Phan, Balkin, & Gianiodis, 2004), an aspect that is important in the context of infrastructure projects. Project-based forms of organization are increasingly prominent, but have been neglected in research. The planned empirical work will be the first substantive study of knowledge intermediation in a project-based context.

8 Absorptive capacity

Absorptive capacity is the ability of an economic actor to absorb ideas from its environment. It has been usefully conceptualised as a dynamic capability relating to knowledge creation and utilisation (Zahra & George, 2002). Absorptive capacity is a ubiquitous concept in the general management literature, yet it has only guided one previous study in the construction industry context (D. Gann, 2001). Given the promise of the framework (Wesley Cohen & Levinthal, 1989; W. Cohen & Levinthal, 1990), it is time to apply it more extensively to this context. The planned empirical work on infrastructure projects will examine three primary components of absorptive capacity (1)
exploratory learning (2) transformative learning and (3) exploitative learning (Lane, et al., 2006).

A recent authoritative review of absorptive capacity theory (Lane, et al., 2006) has called for research in a few target areas, many of which will be addressed in the planned study of infrastructure projects: (1) More substantive investigations of absorptive capacity – absorptive capacity is a key aspect of the planned study, (2) Tests of absorptive capacity in non R&D intensive contexts – the planned study explores absorptive capacity in the construction industry context, which is a relatively low-technology sector, (3) Metrics that capture the individual components of absorptive capacity – the planned study will assess the status of the three components across different actor types, and (4) Exploration of associated processes – the planned study will look at how knowledge intermediation and governance arrangements shape absorptive capacity over time.

9 Governance arrangements

Governance arrangements affect innovation by influencing the way economic actors coordinate decision making and share knowledge (Ring, Bigley, D’Aunno, & Khanna, 2005). Recent work shows that governance models vary on two key dimensions (Parker, 2008). The first is the institutional context of economic decision making; the second is the way economic activity is structured by incentives/disincentives to motivate economic behaviours, such as knowledge sharing and collaboration. Networks, rather than hierarchies, are emphasised in the governance literature, recognising that decentralised decision-making processes are required to cope with rapid social change, societal complexity and instability (Castells, 1996; Williamson, 1996; Jessop, 2002). The planned empirical study will extend existing research by applying general management insights on governance to project-based production, in the large scale infrastructure context. The theoretical approach described above and shown in Figure 2 will be used in future empirical work to guide data collection and analysis to map the open innovation system for infrastructure delivery in the Australian built environment sector. The models developed in this paper potentially have much broader applicability and can be applied to multi-level qualitative studies, covering firms, sectors, states and overall systems.

Figure 2. A model extending the open innovation system concept

THE PLANNED EMPIRICAL STUDY

A team of researchers from Australian universities have won funding from the Australian Research Council to apply the above models to a large scale study of new product adoption on large scale road and bridge projects. The study will run from 2010 to 2013. The goal of the study is to maximise the value of Australia’s infrastructure
investment plans, by developing methods to increase adoption of innovative products during construction. The study address a costly practical problem – inadequate uptake of innovation on infrastructure projects – and a constraining theoretical problem – the absence of integrated construction/general management approaches to infrastructure project delivery. There are three key research questions:

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<th>Research Question 2</th>
<th>Research Question 3</th>
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<tr>
<td>How do knowledge intermediaries link innovative products to infrastructure projects?</td>
<td>How are the three components of absorptive capacity – exploratory, transformative and exploitative learning – distributed among the six construction sectors?</td>
<td>How is the level and distribution of project absorptive capacity influenced by different governance arrangements?</td>
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The study will be significant because the topic has not been explored before. Manufacturers are a key source of product innovation on building and construction projects (M. Bowley, 1960; M. Bowley, 1966; D. Gann, 2001; Larsson, Sundqvist, & Emmitt, 2006). Yet apart from previous work by Manley (K. Manley & Marceau, 2002; K. Manley, 2008a), there has been no significant empirical study exploring the role of knowledge flows in enabling greater adoption of innovative products. Existing literature on pre-assembly systems (Barlow, et al., 2003; Blismas, et al., 2006) and supply-chain integration (Hinze, 1994; D. M. Gann & Salter, 2000; London, 2001) provides input to the planned study, but does not address the problem of inadequate adoption of new products on infrastructure projects.

10 Conclusion

The models developed in this paper are significant because they extend disciplinary knowledge in general management and in construction management, by arming the open innovation system concept with the teeth to really investigate real world issues, such as that described above. The integrated open innovation system model developed here will help to reveal gaps in knowledge flows that impede the uptake of innovations. In the past, identifying these gaps has been difficult given the lack of nuance in existing theory. The knowledge maps generated by the new model will enable informed policy advice to effectively harness the power of knowledge networks, increase innovation diffusion and improve the performance of infrastructure projects. The model is expected to have greater diagnostic power than those currently in use, advancing the theory of innovation and construction innovation. Further, with national economic development dependent on infrastructure projects of increasing size and complexity, there is an imperative to apply these conceptual innovations to maximise the potential for adoption of construction innovations in this new context.

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26
Scientific activities imbedded in the regional culture heritage as model for innovation knowledge region

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Abstract
The goal of the educational activity in the Galilee is to foster a scientific learning culture that is friendlier to students and bring them closer to scientists, enables data analysis, and is connected to regional innovative activity. The important role of holistic education, more scientific understanding and entrepreneurial attitudes in students is now widely recognised at the regional level.

The objective of this activity is to spread the use of more innovative (and enjoyable) science education methods in both the classes and Science-Centres. It aims at generating experience, knowledge and know-how for science education based on PBL (Project Based Learning) and IBSE (Inquiry Based Science Education) approaches combined with "hands-on" actions at laboratories and the fields. It emphasises especially the analysis of the results obtained by the students, under the supervision of researchers. The project developed a network of experts involving scientists and practitioners, who work with a new innovative didactic concept for science teaching, whereby establishing closer links between the students (and their families), teachers and the scientists (as role models), using special approach to learn through experimental work and using computers and the Internet for data analysis of the combined results and for communication. The approach of combining pleasure of the whole family with many "hands-on" activities (in Science Centres), some lectures, many site-visits and distance learning follow-up with mentored teachers, through a Network system, could be implemented in all scientific subjects. It is in accordance with the Rocard Report and is demanding inquiry-based approach. The connection between the cultural heritages of a specific region involved with the modern local scientific activities could lead to more involvement of the students and a shift in their approach to learn sciences. The continuation of the process through the schools, with computer distance learning, and the demonstration of science at a simple way will be combined to a practical science teaching methodology.

In the future we foreseen activities based on the following steps: Survey of the existing knowledge, as well as develop ideas based on the discussions through the study-tours; Developing the Methodologies and also of several "sample-programmes" for local and international research activities; Develop the Software and the systems (including use of Wearable PC and sensors) to do experimental work that is meaningful for data analysis and International Activities; Develop the Mentoring systems for teachers as well as for long-distance mentoring of students; Implementing the developed methodologies and
programmes at schools and the Science-Centres with a follow-up system at homes, schools and internationally; Evaluating the concept and the results of the activities; Develop the Strategy, including Economic Considerations, and a Preliminary programme how it will work at schools, to be discussed with key-players and officials at the Ministries, Science-Centres and Universities.

Paper type – Practical Paper

1 Introduction

In order to develop the Galilee Region there is a need to stimulate the creativity, inquiry ability, analysis of information and entrepreneurial mindsets of young people and encourage innovative approach to science education, by using the most sophisticated and interdisciplinary setups available today. Data currently available in the EU show that the share of young people who have completed upper-secondary education has only slightly improved (by 1.5 percentage points) since 2000. We anticipated that the reason for this anticlimax is the dull and not interesting current curriculum and the way Science is taught at schools.

There is a need to foster a culture that is friendlier to students in their cultural heritage and to the environment surrounding the student. The important role of holistic education in promoting more scientific understanding, entrepreneurial attitudes and behaviours in students is now widely recognised. Entrepreneurship refers to an individual’s ability to turn ideas into action and is therefore a key competence for all, helping young people to be more creative and self-confident in whatever they undertake.

The European Molecular Biology organization (EMBO) published in 2007 a document that addresses the representation of some key areas of modern molecular biology in curricula and teaching. It also attempts to tackle the question of the degree to which knowledge, understanding and skills should be taught in areas that are considered to be on the secondary education horizon. They summarised that "students will perform well in biology if they are simply interested in and enjoy the subject - regardless of the particular topic used to engage them. The learning of established knowledge must be complemented by the development of skills and the cultivation of curiosity, particularly for students who plan further study". We think it is true for other Sciences as well.

There is an increasing recognition that professionally developed programmes are needed to spread the implementation of exciting reforms in the education system. At the dawn of the 21st Century, the world is becoming more aware of the growing economic, ecological, agricultural, technological and even political and cultural interdependence of the world's population. At the same time, the Information Age has made international learning and international education a real possibility.

The dynamics of the education process rest on three essential components: Resources, Communication and Motivation. Information technology which is based on "hands-on" activities and embedded in the cultural heritage of the students can enhance science understanding, can help transform conventional pedagogical models, and can raise student motivation. The purpose of the activity in the Galilee is a) To develop methodologies and propose strategies detailing how this may be done; b) To discuss a case study, involving over 10 countries; c) To present relevant policy guidelines and recommendations.

We already live in an information age in which “learning to learn”, communication, collaboration and using technology to access information for the creation of new
knowledge are rapidly becoming the new “basic skills”. Developing individual creativity is at the heart of continuous innovation, and encouraging students to use this skill in shaping their lives and the world should thus be among the foremost goals of science education today. It feedback to the idea of “School of the mind”, which encourage the new type of student and educator, who know how collaborative work enhance learning. All creative work requires the ability to transform that which is given and familiar into something new and original. This ability can be taught. Project-based learning (PBL) combined with Inquiry-Based Science Education (IBSE) is an effective pedagogical approach that focuses on such creative thinking and problem-solving, in a context of active, social engagement of students with their peers, their families and others, in creating and using new knowledge. PBL-IBSE actively engages students in understanding and solving real world problems, and reflects the natural social and technological complexity of dealing with these situations. When combined with multimedia and Internet tools, as well as experimental work and demonstration of scientist "at work" in their region for the collaborative design, production, and communication of knowledge products, PBL-IBSE can enable students to understand subject matter better, simultaneously learning scientific and technological skills that are highly valued in higher education, business, industry, and the community at large. The proposed system can further enhance and expand the scope of student learning by facilitating the development of a new kind of global, lifelong learning community - one in which students, teachers, professionals and other members of their families all participate in creating, sharing and using new knowledge.

Teachers form one of the most important interfaces between society and individuals. The quality of their work is a key determinant in the educational success of students. The quality of teaching staff thus has implications for the Galilee Region’s economic and social development.

Economic and social changes in the Galilee are making increasingly complex demands on the teaching profession. The current emphasis on lifelong learning and on “learning at the centre” (Council of the European Union, 2008) requires that teachers become more “research practitioners”. Teachers are expected to teach effectively in classes that are culturally and linguistically increasingly heterogeneous, to adapt their teaching to the needs of each individual, to be sensitive to culture and gender issues, to promote tolerance and social cohesion, to respond effectively to disadvantaged pupils and pupils with learning or behavioural problems, to use new technologies and to keep pace with rapidly developing fields of knowledge and approaches to student assessment.

In a recent OECD survey (OCDE, 2005), almost every country reported a shortfall in teaching skills and difficulties in updating teachers’ skills, especially a lack of competence to deal with new developments in education (including individualised learning, preparing pupils for autonomous learning, dealing with heterogeneous classrooms, preparing learners to make the most of ICT and so on). PISA 2006 reported that 14% of pupils in the EU were in schools where instruction was hindered by the lack of qualified teachers. Traditional teaching shares the aim of stimulating inventive thought, but its success has been severely limited. The flaw in the traditional hierarchy of learning, leading from basic knowledge to the realm of pure invention, is resulting that only the very gifted students ever fulfil their potential. The majority of students are left struggling through lesson after lesson, often developing a dislike of learning in the process. Focus is needed on both creativity and collaboration. In order for “Science Education” to be
successful, this focus must be placed on the creative work of small groups, working in collaboration on specific joint projects, in the right scientific atmosphere. Emerging Wearable PC, multimedia and telecommunications technologies can make a significant contribution to this change.

Activities by the students at their familiar surrounding (and sometimes with their family) in a place that is supervised by researchers and gives the special atmosphere of scientific work, could raise their motivation on the one hand and develop their analytical thinking and curiosity on the other hand. The importance of studying in small groups and creating a "Community" is well known, but not yet used for teaching Sciences.

Telecommunications in educational settings also offers motivational and social benefits, by making it possible to cross difficult physical and social boundaries, to reach minorities, high risk learners and the handicapped, and to overcome the traditional educational obstacles of distance and the single-paced study of frontal teaching, thereby equalizing opportunities for the students.

However, a global, educational network infrastructure for widespread collaborative learning and work involves much more than high bandwidth telecommunications lines. It involves human competencies as well as technology, and both must be carefully incorporated into the education system. The strategy proposed in the Galilee is designed to achieve these goals.

2 Aims of the project

We present an innovative model and plan for developing a network-based learning community environment, through a process of leveraging, and producing a learning synergy by integrating a number of separate curricula with interdisciplinary teaching, emphasizing comprehension and the application of information as well as taking the cultural heritage into consideration. This proposed “Quantum Leap” in education is based on developing and expanding the project-based learning and inquiry-based science education environment, creating and enhancing methods, systems and scientific role models for interactive education between classrooms from different countries, using the Internet as the medium and advance technologies. This exposes the students to science and technology and asks them to use study as a tool to help develop their ability to learn and think creatively. It encourages their involvement in society (in this project - mainly in their local cultural heritage) in order to develop the sort of high quality scientists needed by their country for the future. Within the framework of the proposed strategy, which not only approaches the students but the family and the society as a whole, we propose ways to change the role of the teacher in the classroom, together with appropriate instruments for its use. We added an important Centre outside the school which motivates students (in a special environment – particularly in this project in Science and Environmental Studies) to do research. The strategy aims to propose ways to provide "Science Education" to students, and to give teachers the backing needed for interdisciplinary, innovative science education for the 21st Century.

3 The S&T objectives

- To develop a new learning environment for holistic education and a concurrent change in the curriculum, as a model for Science Education.
- To promote effective learning processes, using technology and telecomputing, and make this environment an integral part of the curriculum; to incorporate "best
practices” and accumulated experience to enhance both classroom and informal learning.

➢ To propose and experiment new integrated and interactive approaches to teaching and learning, through active research programs, carried out with the aid of MIGAL’s scientists as supervisors, academic researchers and professional practitioners.

➢ To develop interdisciplinary approaches to curricula in PBL & IBSE, involving the integration of the fields of science and technology with other areas of study, as well as involving students directly in real-world research and knowledge-handling practices.

➢ To enable students to gain experience in investigating problems in their immediate environment and carry out a personal project with the help of scientists, peers and other members of the community.

➢ To develop individual ability through direct, active experience, in using the higher level thinking skills associated with invention, design and creative problem-solving.

➢ To foster individual and group motivation, through a sense of fulfilment and pleasure from meeting challenges and “improving the world”, in a special amusing atmosphere.

➢ To foster the growth and development of study and innovation communities, by encouraging both collaborative team work and leadership ability. To use the Internet and related multimedia and technology tools as the medium for carrying out collaborative, interactive PBL & IBSE between classrooms from different countries. This medium will be integrated with a design structure and system that avoid the pitfalls and shortcomings of many traditional classroom teacher-student interactions.

➢ To enable synergy of simultaneous experimental work in science, and a sense of involvement, including the transfer and collaborative analysis of data through international networks, in order to develop scientific thinking and the active involvement of all students in their own community.

➢ To introduce to schools and the Science-Centres (and Extension farms when dealing with Environmental Sciences and Agriculture) experiments, technologies of wearable computers, software and instruments for research which will motivate students to do research projects in collaboration with others and under the supervision of researchers.

4 A description of the proposed programme

Introduction: A new approach to Network-based education for the classroom

In the past decade, a global economy has emerged from the information and knowledge revolution which is taking place in business, industry, communications, medicine, transportation, labour & social relations, entertainment, and the military and even in our homes. It has had a major impact on almost all aspects of our lives - except on the teaching methods and the way most of our schools are organized and run. Individual, isolated experiments in using technology to improve education have been tried with local success, and a considerable body of new research knowledge has been acquired about the nature of everyday learning and how to make teaching more effective. But while some of these experiments have resulted in some additions to the learning process or incremental improvements in the education system, the basic, essential structure of schooling has not changed.

Curricula in sciences and technology currently used in most schools are not suited to the needs of a knowledge and communications-based economy, and our system of formal
education is not adequately preparing today's students for the world of tomorrow. The growing global economy is one based on “knowledge work”, one in which vast stores of information are constantly created, modified and accumulated, with information's value having a shorter and shorter "half-life", in a society in which the creation of new knowledge is the new "intellectual capital" for innovation, and the management of this knowledge, in a culture of continuous change, is the norm. Thus, flexibility, adaptability and mobility - and most importantly, the ability to "learn how to learn" - will be required. Students must therefore be prepared to use technology to help them examine and analyze the many aspects of multi-disciplinary systems, as well as to be able to work collaboratively in teams. This new world of work will require students to have critical thinking skills, to enable them to analyze and synthesize information from multiple sources, social skills, to working together with others (often from different backgrounds and cultures) and entrepreneurial skills, to fuel continuous innovation (Kahn, 1997).

All EU Member States have more than 90% of the schools connected to the internet. As a consequence, interest has shifted from connectivity to the use of computers in schools. Data are, however, still scarce on ICT use in schools. SITES (Law, N. et al., 2008), a study carried out by IEA in 22 educational systems, provides some information for 9 Member States on computer use in schools. In the EU countries for which data are available - around 72% of students use computers at home almost every day, while this is the case for only 8% at school.

The student’s level of scientific and creative thinking and understanding must be upgraded. A mass “Quantum Leap” of this sort can only occur through the use of the new digital technologies developed: the computer and its associated software, telecomputing and multimedia communications, and the use of sophisticated equipment for experiments in science and technology.

Today, we stand at a crossroad where a number of developments meet: democratization in education, an ever-growing increase in information and ideas, and the rapid appearance (and disappearance) of new technologies. Over 50 years ago, the visionary Vannevar Bush predicted that our capabilities to generate information and create new knowledge would outstrip our abilities to assimilate and utilize this knowledge in coping with constant change, unless we developed new kinds of information technologies to store, access, and augment our collective knowledge and intelligence. Information has since expanded so fast in the world that its volume is doubling every two years (or less). This phenomenon should have an immediate effect on how formal education in our schools is structured, and particularly, on what both teachers and students need to know and do, in order to live in this information age.

The existing educational system was created nearly a century ago, with the best intentions, to prepare young people for work in an industrial age. Following directions, providing standardised responses to repetitive tasks and learning rote information were all skills that were needed to work in an economy dominated by large scale, mass manufacturing. This age is now rapidly vanishing, however. In view of the vast changes that are taking place in our lives, these same educational practices are not the same basic skills needed to respond to the challenges of our time. There is a need to find new methods to replace the educational system, before we reach the second decade of the 21st Century. Technological developments are now available to make this possible, and they can help us to create the “Quantum Leap” proposed.

There is a need for science and technology education to be grounded in both adult world practices and in the world of the student. Learning is a fundamental human activity,
one which takes place all the time and not just in classrooms. Increasing research shows that all learning is “situated” in multiple social and environmental contexts (Lave & Wenger, 1991; IRL, 1992). To be effective, education must thus understand and incorporate what we know about how effective, everyday and informal learning occurs. This means education must acknowledge and incorporate students' own life experiences, the needs of their local communities and of society in general, and to be fully inclusive of the uniqueness and diversity of their ethnicities and cultures. It is thus of utmost importance to develop skills, attitudes and values, as well as the appropriate use of technology, that are aligned with these understandings in the pursuit of new knowledge and learning communities. The current process of rethinking the goals of science and technology education can - and should - draw on the growing research and demonstration projects about the nature of multiple intelligences (Gardner, 1993), the role of projects as a context for integrating multiple kinds of knowledge and skills, new concepts of the role of teaching, and the importance of the fundamental social and cultural aspects of learning.

The programme aims to create 21st Century science & technology-based learning, through a globally networked telecomputing system, combined with experimental “active research” work. Today, with the computer as a central tool of industry, commerce and research, students must be made familiar with its real-world uses and benefits, and not merely as a means of “drill and practice” or in structured page-turning tutorials driven by the traditional curriculum. There is a need for a special learning environment for active exploratory and experimental technological and scientific work, one which is adaptable and dynamic, and capable of linking students to the world outside the classroom. There is a need to develop a process of widening study through active discovery and collaboration. It is important to understand that the immediacy of feedback and communications from around the globe that is provided by such an environment, coupled with a revised pedagogy, which focuses on learning how to do science, rather than learning about science, creates an entirely new basis for lifelong education, both socially and organizationally.

The easy and free access to diversified and pluralistic information is not enough in itself to develop the ability to think critically and creatively. Access to information is very important, because without it the competence of individuals to participate in a communicative action will be limited to formal thinking. However, information alone is not the same as creating knowledge, meaning, and wisdom. Students must also learn to use technology and social interaction to develop other essential skills and competencies in learning, to interact in different communicative, social contexts and to use their skills to help build sustainable, vibrant communities.

Initial work already experienced in many schools in the EU, USA, Israel and several other countries, have demonstrated the high potential of this approach to science education. These experiments have especially highlighted how this approach can stimulate the interest and active involvement of students in many subjects, through use of computers and networking activities. The concept of this kind of integrated, active approach to collaborative exploration and study in such interdisciplinary areas as Environmental Science, now needs to be further analyzed, developed and expanded, in order to make it a real tool for teachers as an everyday classroom activity.

In addition, some successful programmes of science education are affiliated with museums and institutes of science which serve the function of providing general educational exploration displays and programmes for the public at large, but bring
students into their spaces for intensive courses and have mobile science education vans and labs and demonstrations which they take out to the schools.

5 Special features of the network activity
- Direct connection between students from different countries throughout the globe.
- Science is learned by conducting actual experiments with many replications.
- Under diverse conditions.
- Using software to analyze data.
- Using software to present data graphically.
- Studying science through the eyes of a designer.
- Studying science in a way that is enjoyable.
- Integrating experimental results with the search for information in databases and simulation activities.
- Motivation is greater.
- Researchers and scientists can contribute interactively to student ideas, thinking processes, and experimentation.
- An infrastructure for future uses of computer-connected experimentation for science education.
- A single programme integrates science, industry and education.

"Basic education" takes on new meaning against the background of drastic changes in technology, business and society, in the emerging Information Age. What must a student learn, in order to survive in this rapidly changing world of global market competition, automation, increasing democratization and instability, increasing population and limited, fragile natural resources?

There is no single, universal computer-supported system of learning. An educator will need to be armed with information that will help students visualize a feasible, but very different future, to assess their situation, review their needs and resources, and to develop their own vision of the future. For students to develop their views, they must be taught to originate ideas, things and systems - to compare their designs to existing ones, and to put their designs into a context. They will need to learn to think like scientists, rather than imitate and replicate experiments of scientists. The new technology may help students fit solutions to their own specific needs and interests. Effective use of technology will allow teachers to reach more students, provide access to databanks, permit distance teachers to collaborate and complement each other’s strengths, and enable on-line discussions which will include wider viewpoints and the participation of experts. All these benefits are especially important in countries with a limited supply of qualified teachers.

Success in introducing educational technologies can help students to design a learning environment that resonates with the values of the community and the interest of the users. In schools, success depends on appealing to the self-interest of teachers and administrators, often downplaying at first the empowerment of students. Even in the schools where computer technology has been most effectively integrated into instruction and the curriculum, it is hard to find statistical proof that the technology is responsible for producing superior outcomes on standardized tests, compared with schools using traditional methods. The use of education technology was found to add new dimensions to the learning and teaching processes, beyond the ones usually tested. It is not correct, and deceptive, to measure new educational technology with the old tools of standardized tests. It was found (Kahn, 1997) that teacher, given time and enough equipment, gradually changed of his/her own accord to a more student-centred style that emphasized
learning how to learn independently, on the one hand, and learning together, on the other - the greatest strength of technology.

6 Uses of wearable computers in science education

The market for wearable PCs (WPC) is now acknowledged and understood by several commercial companies. With the pioneering efforts of phase one in place, the risks have been dramatically lowered for the implementation phases, with even greater prospects for high returns. Since 1995, the WPC Industry has invested millions to develop and validate the market for WPCs in phase one. The computer has radically changed the way that businesses, Science and homes are run, first in mainframes, then in distributed computers, desktop PCs and notebook PCs. It changed only slightly the way schools are run and the education system. The Internet, computing and communications has been successively brought closer to the user, both in terms of physical proximity and ease of use. It created new markets that allowed companies with vision to step in to take advantage of these changes.

The Wearable Computer Industry sees the WPC at the crossroads of convergence as a platform to meet wireless communications and computing needs. While there will be a large use for wireless “readers” to obtain text transmissions such as e-mails and stock quotes, it is believed that there will be a far larger use in education that will require the wireless ability to obtain, process and transmit graphical and pictorial information. The most important factor will be the interactivity of the system. This requires the full capabilities of a desktop PC in a wearable form factor that will allow the user to tap into the Internet, intranets and communications links on an “anytime, anywhere” basis. For environmental studies, medicine, agriculture, chemistry and "group-learning" in other Sciences it could developed into a very powerful tool for education.

WPC solutions save their users time and money as well as create significant competitive advantages. There are three main sources of savings for users of WPC solutions. First, there are “time and motion” savings from having the materials needed to perform a task anytime, anywhere without the need to put down tools and/or operate a keyboard. Second, the ability to provide “just in time” training, and expert assistance stored on the system, or available by live wireless video communications, means that needed tasks can get done correctly on time without having to interrupt the work to obtain assistance. Third, results of the task are logged on-site in a digital medium and can be reviewed for accuracy immediately, rather than wait for someone to input the results hours, days or weeks later with a large potential for input errors and potential productivity losses. Once this information is digitized, notes, observations, pictures, etc., can also be transmitted anywhere in the world.

There is, therefore, an advantage for the Science Education system to use WPC. Some uses (or potential uses) for Science education are:

- In Denmark and other countries a central regional system for agricultural education and pest control, based on telephones, computers and distance learning, already exists. This system can be upgraded by using wearable computers' systems.
- The need for pest control, in which accurate determination of the pest (still hands are needed for the work), quick information and guidance, crossing information with other places and supervising the region is needed.
- The system will be probably used by pest controllers and experts, but can also be used by farmers.
- A special databank and information on techniques of treatments is needed.
An education system can be adjusted for that purpose.

7 Why connect our classrooms

The dynamics of the educational process rest on two essential components: communication and resources. Information technologies can enhance classroom communications and resources and can transform conventional pedagogical models. The possibility to enable science education's students to use their hands while acquiring data and analyzing it, in order to do a project or "work" on a plant or a model, is a completely different method of education.

All members of the educational community must answer these pressing questions:

- Why use computer mediated communication (CMC) in classrooms?
- Why teach in a collaborative method?
- What are its advantages?

The first response is often that CMC permits classrooms to access widely-distributed electronic resources. Students, even in the most isolated schools and communities, can access a wealth of resources through the Internet and Commercial networks. Electronic networks and other advanced information technologies enable students and teachers to share resources and ideas quickly and easily over long distances and can help reduce the isolation associated with teaching. In addition, telecommunication networks can support social, collegial, and professional development activities among educators. Their use of the medium for student activities was expected, but many of the teachers reported that it was equally important for them to “make the students do and not only surface the Internet”.

The WPC computer can make the educational process available to everyone, regardless of geographical or socio-economic circumstances and his/her performance on the keyboard. It enables communities of learners to collaborate and share resources. It can enrich the authenticity of the learning environment by providing students with access to data of a variety of features and integrate it with the students’ activities. It can provide close contact with experts - scientists, professors, astronauts, and eyewitnesses. WPC can broaden the educational community to include parents and local communities by activating them.

8 Four unique characteristics

There are characteristics of WPC that can enhance the classroom learning environment and introduce powerful new teaching practices. Key characteristics include the ability to virtually bring the world into the classroom, engage students in collaborative processes, enable them to access experts worldwide, and to make each student an active member of the international community.

**Teachable moments**

The students are able to ask each other questions and relate to what is happening. Students can begin studying local environmental hazards and share it with data and experts while they are doing their experimental work. Students will come up with environmental and ecological questions and share information. This opportunity to investigate and take advantage of a "teachable" event is possible because WPC brings information directly to the students. The communication is interactive and relevant to all the students because it originated from their peers and is connected to what they actually do.
Collaborative experiences

We could be moving toward what Dewey described as a “learning society” where education becomes the purpose of living rather than the preparation for it. Classrooms can become learning collaborative where students are encouraged to pose the questions that drive the construction of their own knowledge. Furthermore, students can discuss and debate with each other how to gather, sort, and understand data of all kinds while they see it or touch it.

Chalkboard in the sky

Students have all tried to share information or reach a consensus with several other people. If they post their thought on an electronic bulletin board, all involved parties could see what they posted and respond to it. This might be thought of as an electronic post-it board or the “chalkboard in the sky”.

The effectiveness of laboratory activity can be increased due to the WPC integration into the project’s curricular framework. Students, while measuring, monitoring, and evaluating the environmental health of their local environments, will discuss data and compared their findings via WPC with their peers worldwide. The curriculum will lead students through the entire process of conducting authentic science experiments, from selecting an object of study, to qualitatively and quantitatively assessing it, and finally collaboratively developing research plans and conducting peer review. At each point in the curriculum, telecommunications is an essential component that empowered students to place their local environments into a global context.

International Connections

Although it may sound cliché to say that we live in a "global village," it is true. What happens in any part of the world can impact all of our lives, and students are growing up with this perception of interconnectedness. We are less likely to misunderstand somebody with whom we have had a conversation. We can now demonstrate to our students that complex problems are not solved in isolation, but require mutual respect and cooperation. Environmental and agricultural problems do not stop at state or national borders, and it is vital that all those affected participate in related discussions and solutions. Real world problems cannot be solved with either simplistic or unilateral actions.

9 The Educational Game - in stages of development

10 Principles

- The game is based on active involvement of the students in the environment with wearable computers and equipment.
- The game is the main “tool” for learning Science & Ecology and most of the learning is designed in the field.
- The activity is based on the availability of telecomputing by wireless connection to a near-by server.
- The activity is based on developing the game in stages, every step goes deeper into the scientific studies with additional comparison component.
- The activity is designed for a class in each country to work locally (planned for the local conditions and to a specific site chosen by the teacher) with a component between the countries.
- The activity is based on the use of equipment connected to the wearable computer: sensors, “Kits” and digital camera or TV camera.
The activity is based on the use of software (some specific and some general) [GPS for instant] by the students and the development of the courseware suitable for activating the students and teachers.

The game is built on “surprises”, ”search for data”, collecting data on-line and analyzing it and more.

The game has an important component of “pushing” information from the management of the game, to which the students will react.

11 Methods

The proposed activities are based on solving questions that are presented to the students as riddles; films; pictures; hidden papers on-site (sometimes in pieces in different places which the students have to find etc.). The information can be presented by: Pictures; Definitions; GPS information; Information that the students will find on the Net by collecting materials “hidden” in the sites of the other groups which only together give a full picture; Based on a “sudden scenario” that will pop-out and ask for information in remote resources, which by putting the puzzle together will bring to a “result”; Ideas for activities: Simple puzzles on plants (defined by the teacher according to the site) and their location. (For instant: According to their use as food, as herbs; materials extracted from them; folklore stories about the plants; etc.); Questions on the soil (examination of limestone by HCl; sulphur); Puzzles on fish and animals (according to tracks; environmental conditions, temperature; etc.); Putting notes in different places that will pop out from the GPS system and the students will have to build a full picture of the information; Seeding and planting vegetation (simultaneously and similar plants in the different countries, if possible) and examine growth rates, life-cycle; grazing by the animals etc. The graphs of growth rates and the information will be sent to a central web-page for comparison in the different countries.

12 Designing for best results

Designing an intervention for a “meaningful” project begins with assessing needs and resources. Starting to use information technology for science education is NOT about buying computers. It is about changing the learning environment in the classroom or outside the classroom, helping students to communicate with peers, identify and solve problems and learn to analyze data, related to subjects in the student’s surroundings, and learn with higher motivation. Therefore any learning system must be customized, not imported. It must be content-oriented and not equipment-centred.

In the proposed strategy for education, the actual project design, based on the assessment of needs and resources, should include steps for building awareness, by establishing models of “good” practice (pilot activities) and using them to show others how technology can help. It is vital to identify and appeal to the self-interest of the students and teachers, based on their cultural heritage and understanding their environment. Promoting the vision should be part of the project design and built into the programme. For sustainability, the design needs to include training of students and “hand-holding” during the initial stages of development. It also must include scientific supervision, to avoid deviation from the local needs and interests, and developing additional content and activities, in order to keep maintaining the interest of students in the project. The international activities, “on-line” conferences and dialogues will enable the teachers to examine their activities and have a measurable scale for the students’
development and understanding. An on-line certificate programme for teachers could grow out of this approach.

All these considerations argue for a modular approach, with some flexibility and opportunities for course correction built into it. The investment which creates the greatest benefit in the long term is the training of people, because they continue to grow, once launched on a path that promotes self-education.

Perhaps most cost-effective strategy would be to train people who would otherwise be most likely to resist change, i.e., powerful people in the community and their children, principals of schools and administrators who can learn how to benefit from the Information Age systems. The transformation of any group, dispersed or concentrated, into a computer-using community is likely to take several years. This progression requires much guidance and a structured system, some with on-line guidance and some with direct “hand-holding” by personal contact. If we could start activities through Museum and Tourist-Centres in which the family is active together, we may have a path to success. Small-scale pilot projects, even if not sustainable on their own, can make a big impression if they are very successful and activate the right people. Such pilot projects can also provide a model - a reference point as others develop.

Any educational system deal with three basics: people (i.e. teachers, students and their families), methods, and programmes. We propose a gradual changeover from the regular school method, whereby a number of children are grouped together in a classroom and fed information frontally, at a single pace for the whole class, to a decentralized method that allows the effort of learning to be individualized. A decentralized method mirrors the Internet - is ubiquitous; and students must become comfortable and fluent in a situation when information, resources and opportunities are everywhere at once. The implementation of such a system will require several years, but it will bring us into the 21st Century equipped with more suitable educational tools than the current ones to prepare the young generation for its future.

The proposal concentrates on the cognitive basis of education and the development of the art of teaching. It includes within its scope the syllabus itself, development of the personality, education to values and the social function of the educational institution, the ability to learn independently, design thinking and those higher level thinking skills associated with creative thinking. The educational and social implications are likely to go beyond the processes that the cognitive basis of education involves.

Learning is the essence of education. The educator (instead of “teacher”) can lead students to suitable sources of information, aid them in the analysis and understanding of complicated problems, awaken their enthusiasm for intellectual and moral achievements, but only with the active cooperation of the students themselves. The process of individual learning is thoroughly organized within the framework of the strategy we propose. The student has to perform defined tasks, but at a rate of progress that can vary from student to student.

In order to bring about this change, the proposed strategy, in cooperation with local research and education institutes, as well as the teachers and educators, will develop an adaptable system for the classroom and prepare guidelines for the students and methods for the educators.

The learning system arises out of the effort to reconcile two basic demands in education:

- The need to provide mass education at a high level;
- The need to nurture the educational development and talents of each individual.
Schools, in their present form, are unable to answer both these challenges at the same time. In order to achieve general recognition of this fact, it is necessary first to overcome the entrenched conservativism in education. There is nothing more difficult than to change existing arrangements: to do so involves confronting approaches that have long been deeply rooted in the existing system, overcoming the apathy of the public, and dealing with a complex of social, political and economic difficulties. At the same time, the need for change is essential. Individual learning represents an educational approach that recognizes the existence of differences in capacity and learning ability between different children, but also recognizes the potential contributions of individuals to the group and to society. On the basis of this hypothesis, individual learning operates on a number of levels:

**Diagnosis**

The educator finds out the needs, abilities and areas of interest of the individual student, while during the process the student also determine its abilities and areas of interest in sciences.

**Tailoring learning activity**

The educator adapts learning activities to suit the ability of each student, according to the basic diagnosis made while the educator is meeting with the student and discussing with him scientific matters. This is a process that takes place with those students who are planning to do a project, by themselves or in collaboration with students from other countries.

**Context**

The information to be taught is placed into a context (e.g., in a project on Environmental Studies – water or pollution; in Chemistry – fermentation to produce biogas and biodiesel or changes in the soil as a result of changes in the chemical structures during the years; in Agriculture - the context would be some local crops developed during the history and examining the results of up to date research; in the case of trees, the orchards; In Medicine – some new approaches for Molecular aspects in biomedical research).

**Assessment**

The educator continually assesses the student, according to his achievements and his mental, emotional and social behavior. This could be followed up through the Internet system.

13 The Process

In the Galilee Science Oriented Centre, we have created the specific infrastructure to enable students, teachers and families to perform "hands-on" activities in science, as well as visiting agricultural Extension Farms and do experiential work or see scientists at work. At MIGAL we have experience in bring classes and guiding students in Sciences, but also in supervising students doing research work. Many of the students who passed this process said that this was their most influential study that drives them to proceed in Science. They emphasised that doing a research project, supervised by a scientist, was more meaningful that most hours at schools.

In schools, the project prepared guides for the students in agricultural sciences and work pages for the educators. Schools are equipped with a Network system, and therefore most of the exercises and practice, exact assessment of the student's progress, location of
points of difficulty and proposals to the teacher were performed through the computer system. Students were thought to employ “backwards thinking” (Nelson; 1982) as a method for creating original resources and proposals to issues being studied. They were organize in small study groups, and carried out their projects and the tasks suggested to them under the guidance of the scientist, educators and counsellors. They searched for data from databanks, read suitable material in their study booklets or ordinary textbooks and got information from TV or even interviews. They were exposed to various technological study aids at their disposal. When they have completed their task, their written work was transferred to the educators.

A student, or group of students, who run into difficulties, turned to the educator for help and guidance, or to an expert through the Network system.

In the course of study, the educators introduced, at regular intervals, guidance lectures for the entire class or all the study groups, offered individual help to each student and encourage talks and discussions between students.

14 The student

Under the present system of study, all students in a class work towards the same educational goals, with some of them forging ahead and others are dropping behind. Under individual learning, every student progresses at his own pace, according to his individual capacity. The less gifted and the slower students require more time to complete their educational task, but will not be marked by the stigma of failure, as it is understood today.

This does not mean a single model for learning for all children at all ages, since each age and each stage has its own appropriate method. For example, children in the lower grades need more personal and social guidance than those in the higher grades. The sort of problems that arise among kindergarten children, schoolchildren and college students are very different. The involvement of the family and the community’s Science-centre could be key to advancing students in a more suitable atmosphere.

The dynamics of the educational process rest on two essential components: communication and resources. Information technologies can enhance classroom communications and resources and can transform conventional pedagogical models. The following paragraphs will discuss the benefits of integrating telecommunications into the teaching and learning process of Science.

A schematic representation of a New Learning System in which many "individual" parts are building the holistic approach and the more meaningful understanding of Science is:
The students' level of scientific thinking, their understanding and their critical faculties must be upgraded. New educational programmes - not those narrowly restricted to specific disciplines, but rather programmes based on the integration of many fields and professions - are needed, to create a significant increase in the scope of students' knowledge. This is a precondition to ensuring that the contribution of future students will fundamentally increase the scientific and technological capacity of their country, as well as ensuring them a satisfactory income. Central to the new programme is the horizontal integration of the subjects taught. Almost all subjects (chemistry, physics, biology, mathematics, technology) will be taught in an integrated fashion, during the same academic year, to provide the student with a comprehensive view of the full panorama of science. The same holds true for the humanities (English, language and grammar, writing and composition, geography, history, etc.). All studies will be linked wherever possible. The main axis of the integrated programme is along the activity of the student. All the students participating in the proposed project will be required to prepare a personal project during the course of the year, through which they will choose their personal path of specialized studies.

A teaching programme based on the computer and the technologies of the coming years will be prepared. The student will draw a great proportion of his/her information from databanks, specially prepared for the purpose. The role of the teacher is that of coach, facilitator, guide and resource; and not someone who simply crams knowledge down the throats of his students. The new role requires careful preparation of teachers for their new task, and the establishment of a different method of instruction. In the new system, students and teachers interact at many levels, within the country and abroad, and with researchers and experts on specific subjects.

The activities described, when performed in the company of other students in work teams, will stimulate social intercourse and encourage mutual responsibility. Various
activities at the project level will also permit the introduction of technological subjects and increase the student understands of the world around him/her.

The process must be carried out by a team or a family that works to solve problems, that brainstorm together and resolves contradictions.

Here are some examples of topics that we already experienced with schools and students in different countries (including schools outside of the EU) and got very good responses, but which must be further developed and put into a concept and curricula methodology:

1. **Fermentation and Biogas production as "Green energy"**

   It is defined that: “Fermentation is any process during which microorganisms use an external food source to obtain energy, chemically changing the medium”. The term fermentor is defined as a vessel used to cultivate microorganisms for fermentation. The earliest fermentors, used in hot climates, included such 'vessels' as stomachs removed from goats, filled with milk and hung up to produce fermented foods such as kefir. A ball of dough can also be considered as a fermentor.

   The requirements in modern industrial fermentors are of course very different and the discussion of such fermentors should emphasize the need to maintain a variety of factors within close limits; these may include oxygen, carbon dioxide, pH and the concentration of nutrients. In this way, optimum conditions for metabolism and reproduction of a specific microorganism are provided.

   Reasons for the paramount importance of aseptic precautions, including initial sterilization of fermentors and of nutrients, should be appreciated in terms of avoiding both competition and contamination of the product. Some form of agitation, either by mechanical stirring or by means of air jets, is also necessary. All these aspects could and would be discussed between classes in different places. Students will develop experiments in these fields and examine together different conditions and effects, trying to come to conclusions about some specific biotechnological process. Students will be required to distinguish between open and closed fermentors - continuous and batch processes, conditions for the processes, growth rates and other parameters.

   Researchers in the field of fermentation and biological processes will supervise the programs and work. An attempt will be made to get the students acquainted with the industry as well.

   The experimental system of laboratory digesters is built from a vessel in a water bath in which the temperature is controlled, with an outlet at its top through which the Biogas flows to a cylindrical vessel in another water bath (temp. not controlled). The gas that is generated displaces the water in the cylinder and the pressure lifts the cylinder up. Based on the scales marked on the cylinder the produced Biogas is measured. In order to mix the slurry in the digesters it is suggested putting them in a shaker with temperature controller. Not all schools have this system and the digesters can be mixed by hand, once or twice a day.

   In addition: To determine the dry materials and the organic fraction in it the materials are out first in an oven at 60-65°C for a few hours and then at 105°C over night. After the change in weight is determined, the dry matter is put at 600°C furnace for 5 hours and the difference in weight determines the ash and organic matter. Not all schools have these equipment, but most do have it.

   Parameters that could be examined:
Kind of wastes or energy-crops; Ratio of C/N in the raw materials to be digested; Different ratio of added inoculums; The concentration of the solids in the digestion system (or dilution of solids); Dimensions of the particles digested (cutting the materials or blending it); The temperature of the digestion (ambient, mesophilic or thermophilic); Is mixing needed? Examine the pH of the digestion system; etc.

In many cases we would like to follow the changes by sensors connected directly to a computer system. In case we will use wearable computers, on-line discussions between students on changes and comparison of results could be done.

2. Medical Plants as Cancer Drug Treatment

Plant species have served as a source of medicines for people in many countries for millennia. Many medical practitioners with training in pharmacology are well aware of the number of modern therapeutic agents that have been derived from plant species. In fact, over 120 pharmaceutical products currently in use are plant-derived, and examining the use of these plants in traditional medicine discovered approximately 75% of them. Yet while many modern medicines are plant-derived, the origins of these pharmaceutical agents and their relationship to the knowledge of the indigenous people in nature are usually omitted.

The most challenging issues which could be studied are how do indigenous and local people, themselves, define benefits, and through what mechanisms can individuals and organizations working with these groups provide such benefits? Students can focus on isolating active moiety from various regional medicinal plants as well as from edible and medicinal mushrooms for the treatment of diseases. Medicinal Plants have been used virtually by all cultures as a source of medicine.

The project efforts will focus on a number of active fractions of medicinal plants in several regions that show promising anti-proliferative action against cells. Using different technologies, the students will try to show that active fractions cause a significant reduction in the expression levels. The comparison of plants and uses in different schools' environment could build an interesting framework for discussions between the students.

3. Water quality project

Aims:

➢ To teach science and ecology with the aid of the telecomputing system combined with experimental work in rivers and water-bodies.
➢ To assist teachers in developing activities with students and information concerning the quality of water resources close to them.
➢ To develop a locally-oriented program of environmental education for schools, but can be used by all.

We planned and built a web-site for the project that included background materials and instructions for the students and their teachers to do the experiments. The main components are described herein:
The project explores ways for communication and joint experimentation between students from different schools all over the world. The project provides students with a strong foundation in Natural Sciences, Ecology and computer literacy, as a springboard for higher education in sciences and provides an international meeting ground for students from diverse backgrounds, in a centralized science programme which combines experimental work with the use of computers.

Students develop their awareness of science and of the ecology of their near vicinity, and examine the local biotic and abiotic parameters. Students are working to observe, experiment, discuss and explore the subjects of water pollution, which is the basis for their ecological projects. This program includes both outdoor experiments and, if possible, the in-depth study of some aspects (biological oxygen demand, dissolved oxygen concentration, organic content etc.) in the laboratory with some equipment.

Observations are related to events like drought or storms and to apparent sources of pollution. Non-point sources of pollution, like rainfall, soil erosion, fish ponds or cattle feedlots are identified also. Students exchange information between themselves through the Network, trying to reach a better understanding on fresh water, water ponds and the presence of pesticides. The conclusions they draw include, beyond science and study, social and political awareness.

4. Project in Botany and Plant Physiology - "Fast Plant" Project

This program exposes groups of students (8-11 Grades) from different schools to scientific experimentation, observation and reasoning. They learn about the physiology and genetics of plants, and gather the data from the experiment by mean of computers linked to all the schools taking part. Work is done simultaneously by a number of classes in different countries, permitting the study of the same growth parameters in a wide range of environments. The program teaches the student to collect data, analyze it, send it to others, compare results and discuss the differences and the underlying reasons with peers and participating scientists.

Telecomputing between remote classes, sharing experimental and observation data, are planned and prepared as structured and formatted projects. Clear task definition, well defined schedules, formatted data collection and consensus on goals and methods are prerequisites for success. Ample room is provided for improvisation and creativity around the basic formats, but this matter is settled by the participants at the planning stage. The programme consists of theoretical and background knowledge bases, a set of experiments
and/or observations and provision for the collation of data from the diverse sources. Some of the experimental systems with students are presented in the attached pictures.

The above pictures are taken from experiments already done by some of the partners. It shows the use of computers, by students, in the field and the labs for gathering data and analysing it through the "near-by" computers (sometimes connected directly to the probes). It does not yet show the possibilities to use WPC. The stage of interaction with over-sea's classes will enable the "frog-leap" of the interests of students in their studies.
Infrastructure characteristics of global innovation cities

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Structured Abstract

Purpose – This purpose of this paper is to understand the localised spatial characteristics of infrastructure conducive to innovation.

Design/methodology/approach – This paper briefly reviews urban networking and community-based urban planning models, particularly their capacity for global knowledge flows and to create human-scale environments. It then maps the presence, relative density and distribution of infrastructure for innovation. This is done around major train stations in the highly innovative mid-size cities of Boston, Portland, Stuttgart and Dusseldorf.

Originality/value – This paper contributes to discussions of how local-global linkages and social capital building capacity of local urban planning can support innovation and knowledge development. It proposes that an analysis of localised spatial infrastructure and amenities can give an indication of a region’s propensity to fulfil knowledge economy priorities.

Practical implications – This paper concludes that a better understanding of how to incorporate infrastructure for innovation into planning strategies can assist regional and national priorities of innovation and knowledge development.

Keywords – economic development, urban planning, innovation, knowledge economy, infrastructure.

Paper type – Academic Research Paper

1 Introduction

The influence of technology over human living patterns and city structures has inspired many to speculate how future technology will alter urban space and cities. The overriding theme of such discussions often relates to the relationship between people, the automobile and urban form. More recent shifts from industrial to knowledge economy have translated to an increasing importance for the mobility, connectivity and accessibility of human resources.

In 1920, Le Corbusier envisioned future cities would be defined by gleaning skyscrapers, not by the finer human scale. Wealthy people would drive cars between work and home, with the less advantaged using public transport (Salingaros, 2003). His vision rejected the cityscapes of his era, inspiring a new generation of architecture and urban planning. It was described as:
… no more congested streets and sidewalks, no more bustling public squares, no more untidy neighbourhoods. People would live in hygienic, regimented high-rise towers, set far apart in a park-like landscape. This rational city would be separated into discrete zones for working, living and leisure. Above all, everything should be done on a big scale - big buildings, big open spaces, big urban highways (Rybczynski, 1998)

Practical implementation of his vision created communities of social disconnect, and little human warmth. Despite this, car-based planning continued to be popular under the influence of planners such as New York’s Robert Moses who purported that "cities are created for and by traffic" (Fishman, 2007, p. 125). The 1960’s saw the rise of new ideologies based on maximising human interaction and urban vibrancy; some of the most notable were the works of Mumford and Jacobs. Lewis Mumford argued that modern cities should reflect the organic relationship of people and their living spaces (Mumford, 1961). Based on a book first published in 1940, he contested that the city is:

...a conscious work of art, and it holds within its communal framework many simpler and more personal forms of art. Mind takes form in the city; and in turn, urban form conditions mind. For space, no less than time, is artfully reorganised in cities: in boundary lines and silhouettes in the fixing of horizontal planes and vertical peaks, in utilising or denying the natural site, the city records the attitude of a culture and an epoch to the fundamental facts of its existence. ...(It) is both a physical utility for collective living and a symbol for those collective purposes. ...With language itself, it remains mans greatest work of art (Mumford & Turner, 1997, p. 5)

Jane Jacob wrote of ‘the need of cities for a most intricate and close-grained diversity of uses that give each other constant mutual support, both economically and socially. The components of this diversity can differ enormously, but they must supplement each other in certain concrete ways’ (1961, p. 68). These urban design elements supported the emergence of New Urbanism and neighbourhood strategies. They espoused the historic human role of cities as centres of culture and knowledge, a view which contradicted the car-dominant commodity-based manufacturing production landscapes of the time. They marked the beginning of a new wave of city and urban planning philosophies propelled by the power of globalisation, declining industrial activities, quest for knowledge and innovation, moves for better global community connectivity and widespread adoption of the Internet.

This paper will briefly discuss more recent interpretations of the link between city planning and the creation of human-oriented environments, with particular attention to their human-scale aspects. Section 3 will present the results of a study which aims to understand the built form surrounding key infrastructure points in cities of innovation. It will map the presence, relative density and distribution of amenities and infrastructure surrounding major train stations in four of the most highly innovative mid-size cities in the world: Boston, Portland, Stuttgart and Dusseldorf. Section 4 will conclude that building cities of innovation and knowledge development require a better understanding of human flow on all levels of the city: from human-scale pedestrian environments to the complex links of networked cities and regions. It also notes that additional research is required into urban form variations between the least innovative and other highly innovative cities. This will enable firmer conclusions to be drawn.
2 Responding to the growing global need to access local knowledge resources

Through the industrial era cities have largely grown in population, wealth and complexity. This is partly a signal of the success and efficiency of the relationship between humans, technology and their environment. The car has become an indelible part of this, particularly in countries such as Australia and the USA. It is structurally embedded in many of their cities and urban planning schemes. The simple explanation in such cases that ‘we are a car-culture’ ignores the cars’ relatively recent appearance in the ancient connect between humans and their cities. Many argued that car-based planning has eroded the social fabric by facilitating urban sprawl and social exclusion, particularly for already high-risk groups (e.g., unemployed youth, single mothers, elderly) (Newman, 2001; Salingaros, 2003). It appears that a hundred plus years after the industrial revolution, car-cities have an urban system poorly suited to human connectivity and interaction. As such, they may be at a competitive disadvantage in the race for innovation.

Given the economic significance of innovation and knowledge development in the new economy, many cities are trying to better address human needs (Hutton, 2004). The importance of the urban planning component in the generation of knowledge is generally accepted, but its relationship uncertain. Advocates of top-down (prescriptive - for controlled growth) have been debating those of bottom-up (self-generating - preserving the living fabric of urban spaces) city planning systems (Salingaros, 2003).

Indeed, many cities are challenging the need for strong land-use planning. Where land use planning is described as ‘settlements display(ing) exclusively residential districts arranged around a centre mixing all other land uses (commercial, services, culture, etc) but houses; industries and transport building installations (which are) located in special zones at the urban outskirts’ (Gospodini, 2006, p. 312). Mainstream city planning and urban development policies and projects world-wide emerged in the 80’s and 90’s supporting stronger urban networks (e.g., Network Cities, Learning Cities) and local communities (e.g., Liveable Streets, Transit-Oriented Developments). The following sections will briefly look at the contribution and failure of these.

2.1 Urban network strategies

Urban networks emphasise ‘the criss-crossing pattern of interdependencies between spatial units at the intra-urban (local) and inter-urban (regional) scales’ (de Goei et al., 2010, forthcoming, p. 1). The concept presumes that a network of urban centres is greater than the sum of its parts. Complementary elements operate in synergy generating positive economic externalities for citizens and companies (Meijers, 2005).

National and sub-national level network strategies aim to address different cultural and historic planning contexts. Their overarching theme is to improve local-global spatial flows of goods and human capital as the functional area of cities and regions widens. They are products of the spatial restructuring of cities from the traditional hierarchy of urban centres. Traditional planning has not been flexible enough to deliver the socio-economic priorities of an increasingly complex global system of industrial/business networks, creativity and knowledge exchange (Batten, 1995; de Goei et al., 2010, forthcoming). Instead, urban networks have become a popular foundation for contemporary urban planning (Meijers 2005). They have emerged globally as corridor and polycentric city strategies of varying complexity, such as network cities (Curtis,
Despite their popularity, the mechanics of urban networks are unclear as proximity does not automatically ensure socio-economic interaction. Why some networks are more successful than others is of significant debate. This uncertainty is compounded by definitional issues and empirical deficiencies in measuring urban flows (de Goei et al., 2010, forthcoming; Meijers, 2008). De Goei et al. (2010) found that current methods evaluating urban networks on node characteristics, ‘such as location quotients, rank-size relations, sufficiency indices, and employment-to-work ratios’ ignore urban flow characteristics.

Limtanakool et al. (2007) agreed, arguing that human, service and product flows between urban nodes were better indicators of success than the fixed factors of each node. These flows were defined by interaction on three levels (strength, symmetry and structure), and that the spatial flow of people for both work and non-work activities was an appropriate measure for the capacity of urban networks. Limtanakool et al. (2009) demonstrated commuting flows over time consolidated urban networks more than leisure flows which remained more fragmented and decentralised. They contended that commuting and leisure flows should be analysed separately, as different types of flows generate different patterns of human interaction between urban systems. Green (2007) proposed that models of urban networks should include all manner of social flows, such as business connections, commuting, leisure travel and email.

Thus, despite the good local-global connections of network strategies, there appears to be limited consideration for socio-economic interactions and human flows. This poses challenges for cities of innovation, as innovation is supported by the diversity and flows of human interaction and social connectivity. It is highly likely that future strategies relevant to the knowledge economy will require that urban planning take into account its influence on these elements in the local milieu.

### 2.2 Community strategies

Urban planning strategies which enhance the social capital and connectivity of local business and community networks are highly appropriate for knowledge development and innovation. As such, soft infrastructure components embedding life-long learning and local culture have become critical elements of city and urban planning (Knight, 1995). Some of these community-based strategies are detailed in this section.

One example of a community-based strategy is the Learning City or Community concept. This ‘has been advanced to both describe how certain locations have become centres of knowledge discovery, development, and innovation, and to suggest models that other regions might pursue...such learning regions exhibit a high level of knowledge-based interchange within and among geographically proximate firms and between regional institutions, research and technology centres, private and non-profit organisations, and policymaking agencies’ (Shapira & Youtie, 2008, p. 1208). Learning cities promote life-long learning and the ‘need for integrated planning and the relationship between education and cultural development; and the need to deal with inequity and demands for education throughout life’ (Schrey-Niemenmaa et al., 2003, p. 161). This concept is based on the idea that well-planned regions can address the face-to-face needs for tacit knowledge transfer by combining learning, leisure, work and living components (Schrey-Niemenmaa et al., 2003).
Different countries and regions have assumed various forms of community strategies appropriate to their particular cultural, social and economic environment. Most focus on building social capital through the greater social connectivity and more aesthetic pedestrian-oriented spaces of local neighbourhoods. For example, the US experimented with a range of local urban planning schemes and initiatives to reinvigorate the suburbs and address urban sprawl, such as:

- **Liveable Streets** as based on the work of Donald Appleyard (1981) who found that people perceived a shrinking of territory in areas of more traffic. He was one of the first to map spatial interactions between residents. He found that members of car-oriented communities had fewer friends and opportunities for social exchange as urban social spaces were constricted by cars. He purported that there was an inverse relationship between cars and urban interactions (Appleyard, 2005; Appleyard, 1981).

- **Transit-Oriented Developments** as defined by Calthorpe (1993). This promoted the idea that people living in mixed-use transit areas to reduce car-dependency addressed environmental issues and increased quality of life (Carlton, 2007).

- **Edge Cities** where Garreau (1992) suggested that jobs follow people. This simple proposition changed conceptions of the socio-economic urban forces driving successful regions prompting planners to construct spaces attractive to human capital.

In Western Australia, **Liveable Neighbourhoods** were proposed to encourage residents to interact for daily living/working activities in neighbourhood walkable catchments of 400m (WAPC, 1997, 2004a). This document responded to demands for more interactive and inclusive communities destroyed by car-based planning (Martinus, 2008). It viewed suburbs as a series of 400-metre walkable neighbourhood catchments. This was consistent with The University of Western Australia’s 1995 findings that people will walk 400 metres to facilities and 800 metres to transport (Pikora et al., 2001).

In Japan, **machizukuri** aimed to increase community participation in urban planning decisions. Though it was implemented more to improve living standards and reverse the outflow of human capital, machizukuri intensified community and economic development efforts (Eggers, 2006; Jacobs, 2002; Sorensen, 2003). These elements had been too long discounted for the good of national economic progress (Japan Ministry of Education Culture Sports Science and Technology, 2002; McCreedy, 2004). Machizukuri required the government to change from its primarily top-down process to a bottom-up planning approach. This meant greater citizen involvement (Evans, 2001; Sorensen & Funck, 2007) and enhanced quality of local life through stakeholder consensus building and decision making.

Theoretically, community strategies integrating various local stakeholders and actors support the development of strong knowledge-based regions and economies. However, in reality, they are prone to produce overly strong intra-regional networks which may be resistant to outside knowledge sources and influences. This may limit innovation (Shapira & Youtie, 2008). As a result, planning strategies must be careful not to excessively focus on insular community and business linkages. Such strategies are in direct conflict with innovation and knowledge development which instead value human diversity and global flows.
3 Cities of innovation

This paper adds to discussions of how planning can support a city’s movement into the knowledge economy. It recognises the importance of the respective local-global linkages and social capital building capacity of network and community-based strategies. Additionally, it proposes that a deeper understanding of the infrastructure and amenities specific for knowledge development and innovation is needed for greater effectiveness in the knowledge economy. Reviewing spatial links between economic growth, innovation and knowledge productivity, Martinus (2010) suggested five key soft (human) and hard (built form) infrastructure and amenity types (hereafter referred to as INAM). These were: 1) connectivity; 2) education and skills; 3) creativity; 4) business networks; and, 5) diversity. She concluded that ‘developments facilitating these…are more conducive to knowledge development and innovation, and thus, represented a comparative and competitive advantage for knowledge economies’. This section presents the result of a study mapping the presence, relative density and distribution of these five INAM types in key pedestrian developments of four successful globally-competitive cities of innovation.

3.1 Site selection

Cities with high levels of innovation were selected from two highly innovative countries. Patent statistics were selected as the most appropriate indicators of innovative capacity and industrial competitiveness (Eurostat, 2009). According to 2008 patent data published by the World Intellectual Property Organisation (WIPO, 2008), Japan ranked highest with 32.6% of the world share of total patent applications, USA as second with 25.9% and Germany as third with 7.9%. As a Japanese city is being analysed in an associated case study, cities from USA and Germany were selected using the Table 1 city selection criteria and indicators.

Table 1 selection criteria targeted cities with competitive levels of innovation and a natural capacity for knowledge development and innovation. That is, cities which appeared to relatively easily transition to and have global success in knowledge-based industry despite previous struggles as an industrial economy. Each city is purposely selected as having comparatively lower populations and higher innovation than adjacent competing cities. After a global review of cities, Boston, Portland, Stuttgart and Dusseldorf were found to best fit the selection criteria of Table 1. Table 2 summarises the indicator results and success of each in the transition from an industrial to a knowledge and service economy.
### Table 1. City selection criteria and indicators

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator</th>
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<tbody>
<tr>
<td>Significant contributor to the global new economy</td>
<td>• Global and regional ranking of creativity or innovation</td>
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<td></td>
<td>• Dominance of new economy industry, such as high tech, biotech, robotics, etc</td>
</tr>
<tr>
<td>Competitive advantage in knowledge development and innovation</td>
<td>• Political leadership and vision to facilitate knowledge economy after period of economic struggle and decline</td>
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<td></td>
<td>• Rapid success in new economy-based activities once switch was made</td>
</tr>
<tr>
<td></td>
<td>• Highly innovative – as indicated by patent activity</td>
</tr>
<tr>
<td></td>
<td>• Beta to gamma level cities as defined by the ranking of cities of ‘The world according to GaWC’ (2008) and supported by the work of Sassen (2001) and Beaverstock et al. (1999)</td>
</tr>
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<td></td>
<td>- Beta city being ‘important world cities that are instrumental in linking their region or state into the world economy’ (GaWC, 2008)</td>
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<tr>
<td></td>
<td>- Gamma cities being ‘world cities linking smaller regions or states into the world economy, or important world cities whose major global capacity is not in advanced producer services’ (GaWC, 2008)</td>
</tr>
<tr>
<td>Globally competitive</td>
<td>• Other cities in the wider region or country have greater populations</td>
</tr>
<tr>
<td>Relevant to smaller cities/regions competing against more populated cities/regions</td>
<td></td>
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</tbody>
</table>
Table 2. Selected cities and indicator results

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Boston</th>
<th>Portland</th>
<th>Stuttgart</th>
<th>Dusseldorf</th>
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<tbody>
<tr>
<td>Ranking of:</td>
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<tr>
<td>• World innovation (2thinknow, 2009)</td>
<td>• #1 in world</td>
<td>• #55 in world</td>
<td>• #11 in world</td>
<td>• #29 in world</td>
</tr>
<tr>
<td>• Regional innovation (2thinknow, 2009)</td>
<td>• #1 in Americas</td>
<td>• #12 in Americas</td>
<td>• #7 in Europe</td>
<td>• #20 in Europe</td>
</tr>
<tr>
<td>• Creative industry ranked by arts employees</td>
<td>• #6 in USA</td>
<td>• #9 in USA</td>
<td></td>
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<tr>
<td>employees per capita (America for the Arts, 2008)</td>
<td></td>
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</tr>
<tr>
<td>• Patent activity</td>
<td>• #3 in World over 1975-2008 according to USA Patent Office data (M. Arndt, 2009)</td>
<td>• #9 in World over 1975-2008 according to USA Patent Office data (Arndt, 2009)</td>
<td>• #1 in Germany (Eurostat, 2009; Stuttgart Region Economic Development Corporation, 2002)</td>
<td>• #3 in Germany (Stuttgart Region Economic Development Corporation, 2002)</td>
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<td>• Patent activity</td>
<td>• #3 in World over 1975-2008 according to USA Patent Office data (M. Arndt, 2009)</td>
<td>• #9 in World over 1975-2008 according to USA Patent Office data (Arndt, 2009)</td>
<td>• #1 in Germany (Eurostat, 2009; Stuttgart Region Economic Development Corporation, 2002)</td>
<td>• #3 in Germany (Stuttgart Region Economic Development Corporation, 2002)</td>
</tr>
<tr>
<td>• Patent activity</td>
<td>• #3 in World over 1975-2008 according to USA Patent Office data (M. Arndt, 2009)</td>
<td>• #9 in World over 1975-2008 according to USA Patent Office data (Arndt, 2009)</td>
<td>• #1 in Germany (Eurostat, 2009; Stuttgart Region Economic Development Corporation, 2002)</td>
<td>• #3 in Germany (StuttgartRegion Economic Development Corporation, 2002)</td>
</tr>
<tr>
<td>• Regional economic growth</td>
<td>• #12 GPD at purchasing price parity in world 2008 (PriceWaterhouseCoopers, 2009)</td>
<td>• #57 GPD at purchasing price parity in world 2008 (PriceWaterhouseCoopers, 2009)</td>
<td>• #9 in Europe (Baker, 2009)</td>
<td>• #34 in Europe (Baker, 2009)</td>
</tr>
<tr>
<td>Dominance of new economy industry</td>
<td>Key industry in: software and communications services; innovation services; postsecondary education; diversified industrial support; financial services; healthcare technology; textiles and apparel; computer and communications hardware; defence; tourism, the creative economy. construction, and the non-profit sector (COBTH, 2007; The Boston Foundation, 2002a)</td>
<td>2000 US statistics showed a service sector dominated manufacturing, and an increasing level of high-tech activity (Portland Development Commission, 2002). Key clusters in: Clean Tech; High Tech; Advanced Manufacturing; Activewear and Design (Portland Development Commission, 2009)</td>
<td>Europe leading high tech region with 23.94% employed in high-tech (Stuttgart Region Economic Development Corporation, 2002). In 2009, leading hi-tech industries were: Automotive, Telecoms, Electrical, Software, Engineering, Automation, Simulation/VR, Med tech, Nanomaterials, Tech. Textiles, Mechatronic, Aerospace, Logistics</td>
<td>One of the most powerful regions in Germany. Leading industries are: energy generation and supply, chemical, steelmaking and metalworking, and manufacturing (Eurostat, 2004); also ICT, media, fashion, advertising, trade and biotechnology (Urban Audit 2008)</td>
</tr>
<tr>
<td>Indicators</td>
<td>Boston</td>
<td>Portland</td>
<td>Stuttgart</td>
<td>Dusseldorf</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Political leadership and vision to facilitate knowledge economy after</td>
<td>Sharp decline in manufacturing jobs between 1969-1992, shifting</td>
<td>Large structural shifts from 1980’s away from manufacturing (City of Portland, 2006).</td>
<td>Healthcare (Haug, 2009; Urban Audit, 2008)</td>
<td>Shift from traditional manufacturing to knowledge industry (Kaskinen et al., 2006; Knapp et al., 2005). Decline in industrial employment occurring around the 1970’s due to large portion of old industrial regions (Birch et al., 2010)</td>
</tr>
<tr>
<td>period of economic struggle and decline</td>
<td>industrial and urban development focus to attracting ‘new collar’ work and opportunities (Lewis et al., 1999; O’Brien, 1999)</td>
<td>The 1970’s were lead by the strong urban focus of mayor Neil Goldschmidt and 1980’s by the funding of neighbourhood conservation projects (Wollner et al., 2005)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid success in new economy-based activities once switch was made</td>
<td>Since 1990’s, grown quickly as a new economy, particularly in its</td>
<td>A growing high-tech industry has earned it the nickname ‘Silicon Forrest’ (Wollner, 2008), as well as emerging Cleantech industry (City of Portland, 2009)</td>
<td>Combination of increased city-region development, infrastructure projects and urban renewal made Stuttgart part of one of the most successful knowledge-based regions in Europe (Greenblatt, 2008)</td>
<td>50% of manufacturing jobs lost between 1980-2002 replaced by knowledge-based industry (Pinkwart, 2007). It is has one of the highest correlations between economic growth and technological innovation in Germany (Arndt, 2003)</td>
</tr>
<tr>
<td>The World According to GaWC ranking (2008)</td>
<td>Beta</td>
<td>Gamma</td>
<td>Gamma plus</td>
<td>Beta minus</td>
</tr>
<tr>
<td>Population of other cities in the wider region or country</td>
<td>New York - 19,490,297; Philadelphia – 1,448,394; Chicago - 2,883,321</td>
<td>San Francisco - 744,041; San Jose – 929,936; Los Angeles - 3,849,378 (US Census Bureau, 2006)</td>
<td>Berlin - 3,431,675; Hamburg - 1,772,100; Munich - 1,326,807; Koln - 995,420; Frankfurt - 664,838 (Brinkhoff, 2008)</td>
<td></td>
</tr>
</tbody>
</table>
3.2 Methodology

This paper aims to investigate the INAM of cities which appear to have a natural capacity for innovation and knowledge development. Martinus (2010) suggested the INAM for innovation and knowledge development could be classified into five types linked to specific urban form. Given the infinite permutations of a broad range of urban form found in different cities, Table 3 gives examples of urban indicators highly likely to facilitate a knowledge-based economy being derived from Martinus’ five categories (2010).

Table 3. INAM and indicator examples

<table>
<thead>
<tr>
<th>INAM type</th>
<th>Examples of indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity</td>
<td>• Transport nodes (including airports, train, bus)</td>
</tr>
<tr>
<td></td>
<td>• Travel time between International airport and CBD by public</td>
</tr>
<tr>
<td></td>
<td>transport</td>
</tr>
<tr>
<td></td>
<td>• Average no. intersections in 400m radius (as measure of</td>
</tr>
<tr>
<td></td>
<td>walkability)</td>
</tr>
<tr>
<td></td>
<td>• Community open space</td>
</tr>
<tr>
<td></td>
<td>• Wireless hotspot</td>
</tr>
<tr>
<td></td>
<td>• Hotels, accommodation</td>
</tr>
<tr>
<td></td>
<td>• Range of entertainment and personal services</td>
</tr>
<tr>
<td></td>
<td>• Small and large retail</td>
</tr>
<tr>
<td></td>
<td>• Supermarket (daily grocery)</td>
</tr>
<tr>
<td>Education and</td>
<td>• Universities and higher education facilities</td>
</tr>
<tr>
<td>Skills</td>
<td>• High schools</td>
</tr>
<tr>
<td></td>
<td>• Other learning centres</td>
</tr>
<tr>
<td></td>
<td>• Public library</td>
</tr>
<tr>
<td>Creativity and</td>
<td>• Entertainment</td>
</tr>
<tr>
<td>culture</td>
<td>• Restaurants, cafés, etc</td>
</tr>
<tr>
<td></td>
<td>• Cultural, historical tourism, etc</td>
</tr>
<tr>
<td></td>
<td>• Street art</td>
</tr>
<tr>
<td>Business and</td>
<td>• Transport nodes (including airports, train, bus)</td>
</tr>
<tr>
<td>industrial</td>
<td>• Personal, financial and business services</td>
</tr>
<tr>
<td>networks</td>
<td>• Entertainment</td>
</tr>
<tr>
<td></td>
<td>• Restaurants, cafés, etc</td>
</tr>
<tr>
<td></td>
<td>• Small and large retail</td>
</tr>
<tr>
<td></td>
<td>• Wireless hotspots</td>
</tr>
<tr>
<td></td>
<td>• Hotels, accommodation</td>
</tr>
<tr>
<td></td>
<td>• Sporting facilities</td>
</tr>
<tr>
<td>Diversity</td>
<td>Degree of mixed use and diversity in</td>
</tr>
<tr>
<td></td>
<td>• Transport (airport, train, bus, bike, foot, etc)</td>
</tr>
<tr>
<td></td>
<td>• Shopping (24-hr marts to major retail)</td>
</tr>
<tr>
<td></td>
<td>• Learning (Universities, schools, learning centres, etc)</td>
</tr>
<tr>
<td></td>
<td>• Business and personal (services, etc)</td>
</tr>
<tr>
<td></td>
<td>• Entertainment (clubs, tourism, etc)</td>
</tr>
<tr>
<td></td>
<td>• Supermarket (daily grocery)</td>
</tr>
</tbody>
</table>

This paper uses the methodology outlined in Martinus (2009), which stated ‘observing the existence and spatial distribution of key amenities and infrastructure (rather than exact numbers)...provide(s) insight into a city’s unique socio-economic imprint of human
activity. Population increases will intensify, but not significantly alter, these patterns of activity. This enables cross-country or cross-regional comparisons between locations similarly placed on the urban hierarchy irrespective of real urban densities’ (2009: 13-14). She suggested that a study of human movement between different urban sites using the presence of INAM, not intensities, will be largely independent of inter-urban density differences. As such the INAM types of Table 3 will be used to evaluate the innovative capacity of key urban sites within the selected cities.

Key urban sites in each city were identified as the area within a 1km radius of the city’s main train station with direct links to an international airport. These were deemed most appropriate given the importance of physical connectivity and human movement between local and global spheres. The 1km radius is consistent with studies of the limiting size of pedestrian cities (Salingaros, 2003) and transit-oriented developments (DPI, 2005). It is also consistent with the importance of pedestrian mobility, connectivity and access to Martinus’ five INAM types (2009; 2010).

**Table 4.** Presence, comparative densities and distribution of INAM in a 1km radius of the main train station in each city

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Boston</th>
<th>Portland</th>
<th>Stuttgart</th>
<th>Dusseldorf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport options (e.g., train, bus, pedestrian, tram)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Community open space (e.g., parks, public squares)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Retail (e.g., small and major)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Supermarket (daily grocery)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Personal services (eg, beauty)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Business services (e.g., computer, accounting)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Financial services (e.g., banking, financial advisory)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Public wireless hotspots (e.g., cafes, hotels)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Entertainment (various clubs, agencies, theatres)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cinema</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Theatres</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Restaurants and cafes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Accommodation (e.g., hotels, motels, B&amp;B’s)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sporting services (e.g., gyms, specialist retail)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>History (e.g., museums, tourism)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Library (public and private)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>University</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Education (e.g., technical colleges, other learning)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>High school</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| Average density and distribution of INAM | 19 | 19 | 19 | 19 |
| Total presence score (out of 19) | ✓ | ✓ | ✓ | ✓ |

A search of Table 3 indicators within the selected site was conducted to identify the presence and spatial distribution of INAM using Google maps. As in Martinus (2009), there are 19 indicators. However, ‘small retail’ and ‘major retail’ were combined into ‘retail’, and ‘personal services’ were added. The presence of indicators were documented and recorded in Table 4 as either present (✓) with a value of 1 or not (✗) with a value of
This allowed a numerical value to be assigned to the presence of natural and constructed INAM types surrounding each station. A higher total value indicates a site has a larger number and range of opportunities for socio-economic interaction. The spatial distribution of indicators was evaluated by recording their relative density and distribution (compared to the relative density and distribution of other indicators in the same site), where light grey represented little density and highly uneven distribution, mid-grey moderate density and distribution, and dark grey highly dense and even distribution of INAM types within the 1-km radius of each station. The results are given in Table 4.

3.3 Analysis

Despite the moderate population size of all cities, each is globally recognised as a leading city in the new economy. The ability of each city to compete with neighbouring larger global cities can be viewed as a function of their individual capacity to attract the right people and foster knowledge development. Both of which can be enhanced by urban planning as INAM act as constraints on a city (Martinus, 2010). The study site of each city is highly walkable and globally-connected encouraging high human connectivity, pedestrian movement and urban vibrancy. These have been identified by Martinus as facilitators of knowledge transfer and creativity.

Table 4 gives the total presence and average relative density and distribution of INAM for each site. The presence of all 19 indicators in each is consistent with their respective city GaWC rankings (GaWC, 2008). It is also a strong indicator of their socio-economic capacity to support new economy activities. It is worth noting that the Joondalup study site, as reported in a 2009 study by Martinus, scored only 17/19 for the presence of INAM. This indicated its slightly lower socio-economic capacity for innovation and knowledge development. Boston, Stuttgart and Dusseldorf average mid-level relative density and distribution across all INAM within the area of study. Portland is the exception; with averaging a low density compensated by a highly even average distribution of INAM. The following outlines the individual findings of each city.

3.3.1 Boston

Moving up one rank from 2007 to become the most innovative city in the world in 2008 (2thinknow, 2007, 2009), Boston’s story is one of reinvention and rise from the economic hardship and decline between the 1950’s to 1980’s (Glaeser, 2003). Boston town centre has between 22 and 45 pedestrian intersections in a 400-metre radius (see Figure 1). Transport modes are well-distributed, and it takes 15-20 minutes by bus from the international airport to the study train station site. It is considered USA’s third most walkable city (Chernikoff, 2008), with the town centre classed as either a ‘walker’s paradise’ or ‘very walkable’ (Walk Score, 2010).

Figure 2 describes the relative density and distribution by INAM type throughout the 1km radius of study area. INAM are concentrated in the upper southwest to northeast section, making it highly mixed-use (red area of Figure 1). These were primarily supermarket, wireless hotspots, entertainment, accommodation, sporting services, libraries, universities, education and high schools. All scored low for overall distribution despite mid to high relative density.

The section located in the lower half of the southwest to northeast diagonal was only moderately mixed-use containing a smaller range of INAM. The most evenly distributed INAM were transport, business and financial services, restaurants and cafes. Retail and restaurants/cafes were the most dense INAM (dark grey in Figure 2), where
restaurants/cafes was also the most evenly distributed. On average, the INAM of Boston exhibited moderate density and mid-level evenness in distribution.

![Figure 1. Map of study area (Boston)](image)

**Figure 1.** Map of study area (Boston)

**Figure 2.** Relative density and distribution by INAM type in 1km radius study area of Boston

3.3.2 Portland

Ranked as USA’s cleanest city 2006 (Blackmer, 2006), Portland’s growing high-tech industry and green image has earned it the nickname ‘Silicon Forrest’ (Wollner, 2008). Since 1973, its urban growth boundary has generated innovative planning solutions focused on mixed-use to accommodate its growing economy and population (Dieleman & Wegener, 2004). Despite a moderate population, Portland has fostered a hip image. This
has acted to attract youth even with the lower number of jobs since the Global Financial Crisis (Dougherty, 2009a, 2009b).

Portland town centre has approximately 34 pedestrian intersections in a 400-metre radius (See Figure 3). Transport modes are well-distributed and relatively dense within the 1km area, and light rail takes 42 minutes from the international airport to the study train station. Walkscore (2010) assessed it as USA’s tenth most walkable city. It has 45% of residents living in areas with a walkscore of 70 or above, with the majority of the town centre classed as either a ‘walker’s paradise’ or ‘very walkable’. Figure 4 describes the relative density and distribution by INAM within 1km radius study area. Portland demonstrates the most even distribution of INAM of all four cities. 42% of indicators scored an even distribution (transport, open spaces, retail, supermarket, personal and business services, restaurants/cafes, and sporting services) and 47% were moderately-well distributed (financial services, wireless hotspots, entertainment, theatres, accommodation, library, university, education and high schools). Of the most evenly distributed - transport, retail and restaurants/cafes also had the highest density. Only two INAM types showed a highly uneven pattern of distribution (cinema and history), they also lacked density. The relatively even distribution of all INAM highlights the highly mixed-use characteristic of the area (see red section of Figure 3).

INAM with mid-level to uneven distribution exhibited even distribution in various sections of the 1km radius. There are various examples of this. Universities, accommodation, entertainment and wireless hotspots are primarily found in upper east-west half, with a large number of universities found to the south just outside the study area. Cinemas and financial services are mainly south of the station. High schools and restaurants and cafes are in the upper area running diagonally southwest to northeast. Libraries are around the station. History-related INAM found along southwest-northeast diagonal, but primarily southwest. The lowest densities were in cinema, theatres, history, library, university and high schools. On average, INAM were characterised by low density, with a highly even distribution.
3.3.3 Stuttgart

Heading up the Cities for Mobility (United Cities and Local Governments, 2009a) with over 500 members from 70 countries targeting three objectives for urban mobility. These are social inclusivity, environmentally-friendly and economic sustainability, Stuttgart sees itself as at the forefront in recognising cities as the ‘living space for people’ and ‘the motor of economic and social development’ (United Cities and Local Governments, 2009b, p. 5). The Stuttgart Region is internationally known for its capacity to generate innovative and knowledge development. It has met and exceeded most key Lisbon targets aimed at making Europe the most competitive knowledge-based economy in the world (European Commission, 2009b). Compared to the rest of Europe, Stuttgart is identified by GaWC as having one of the highest levels of employment in high-tech, medium-tech and knowledge economy industry since 2004. It is seen as an ‘urban region in which knowledge intense industry are shaping the development path’ (Kratke, 2007, p. 24).

Stuttgart town centre has approximately 150 pedestrian intersections in a 400 metre radius (See Figure 5). Transport modes are relatively well-distributed with mid-level density (mid-grey in Figure 6). It takes 25 minutes by train from the international airport to the study train station. With two-thirds of the city destroyed during WWII, the city has been focussed on improving pedestrian walkability since 1950’s. Rail is currently seen as the primary form of transport throughout the city (Commission for Integrated Transport, 2001; Monheim, 2001). Figure 6 describes the relative density and distribution by INAM throughout the 1km radius of study area. On average, analysis of INAM revealed mid-level density and distribution.
Though personal services, restaurants/cafes, accommodation and sporting services were highly dense, no INAM types were evenly distributed (dark grey in Figure 6). The majority of these were located south of the station. Cafes/restaurants, accommodation, sports, education and transport exhibited the most even distribution, but were most highly-mixed in the area below the southwest-southeast diagonal. This section had the highest density of parks, entertainment, cafes/restaurants, accommodation and sports. Several high schools were located along the southwest-southeast diagonal line. Financial, historical and libraries were found in the southern half, while university, theatres and cinemas were primarily to the southwest. Wifi hotspots, retail, supermarket, personal and business services were concentrated in the southeast.

**Figure 5.** Map of study area (Stuttgart)

**Figure 6.** Relative density and distribution by INAM in 1km radius study area of Stuttgart
3.3.4 Dusseldorf

 Ranked by the 2009 Mercer Quality of Life Index as the sixth best city in the world and first in Germany (Mercer Consulting, 2009). Similar to Stuttgart, Dusseldorf has one of the highest levels of employment in high-tech, medium-tech and knowledge economy industry in Europe. It has a stronger knowledge economy than Stuttgart being an ‘urban region in which knowledge intense industry are determining the development path’ (Krätke, 2007).

Figure 7. Map of study area (Dusseldorf)

Dusseldorf town centre has approximately 50 pedestrian intersections in a 400-metre radius (see Figure 7). Transport modes are well-distributed (dark grey in Figure 8) with mid-level density. The train takes 12 minutes from the international airport to the study train station. Dusseldorf is highly walkable, with a large number of bars in its charming

Figure 8. Relative density and distribution by INAM in 1km radius study area of Dusseldorf
3.4 Average results for the four cities

Public transport is significantly evenly distributed and dense in each study area. There is easy access to an international airport. All five INAM types are well represented as all indicators were present. Thus, it is likely the areas are highly supportive of human global and local movement and flow, as well as the attraction of a range of human capital types. In addition, each city was comprised of highly attractive and identifiable districts offering unique human experiences associated with their food, entertainment, architecture or art. Some of these were inside the study areas, some just outside.

Figure 9 shows similar patterns for relative density and distribution in all INAM, except cinemas and wireless hotspots which had relatively high densities clustered in one area (i.e., poor distribution). Density was higher than evenness of distribution for 63% of the INAM, while 26% were more evenly distributed with lower levels of density and 11% had equal levels of density and distribution. These results indicate that the majority of INAM are more concentrate (i.e., highly-mixed) in one area of the study site. Spatial mapping of each INAM confirmed that for all cities, except for Portland, the majority of INAM were located within one half of the study area radius. These observations are consistent with cluster theory, where greater competitiveness is generated through economies of scale (Martinus, 2010). Furthermore, the areas of highest density had the highest number of intersections characterised by a large number of narrow streets and small blocks. This suggests that the highly mixed-use areas most concentrated with INAM are also highly walkable.

Table 5 gives a breakdown of Figure 9 averages. It classifies INAM by level of relative density and evenness of distribution. The indicators were organised into 5 groupings based on a number assigned to their comparative density and distribution. This gave a
clear picture of the significance of each indicator. The results describe the relative importance of each INAM in the areas under study. Restaurants/cafes and transport options were the densest and most evenly distributed throughout the study area, followed closely by retail, sporting and personal services. The majority of INAM were characterised by medium density and distribution. There were very few universities, libraries and historical facilities, and even less cinemas, theatres and high schools.

Table 5. Average relative density and distribution by INAM in 1km radius study area for 4 cities

<table>
<thead>
<tr>
<th>Indicator according to relative density and distribution ranking (5 groupings)</th>
<th>Based on 3 levels of density and distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurants and cafes</td>
<td>Densest and most well-distributed</td>
</tr>
<tr>
<td>Transport options</td>
<td>Mid-level density and semi-evenly distributed</td>
</tr>
<tr>
<td>Retail</td>
<td></td>
</tr>
<tr>
<td>Sporting services</td>
<td></td>
</tr>
<tr>
<td>Personal services</td>
<td></td>
</tr>
<tr>
<td>Community open space</td>
<td></td>
</tr>
<tr>
<td>Supermarket</td>
<td></td>
</tr>
<tr>
<td>Business services</td>
<td></td>
</tr>
<tr>
<td>Financial services</td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td></td>
</tr>
<tr>
<td>Public wireless hotspots</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>Very few and not evenly distributed</td>
</tr>
<tr>
<td>Library</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td></td>
</tr>
<tr>
<td>Cinema</td>
<td></td>
</tr>
<tr>
<td>Theatres</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td></td>
</tr>
</tbody>
</table>

4 Conclusion

Urban planning has the difficult task of interpreting how ever-faster technological changes will affect the human economic, social and ecological function of cities. The car is a great example of this. It has left an indelible mark both positive in expanding human movement, interaction and connectivity, and negative in demanding wider roads and more parking. As a result, some view the car as having destroyed the urban fabric, and therefore being incompatible with the more intimate human-scale planning needs of the knowledge economy. Various planning strategies have attempted to address the fundamental different needs of cars and pedestrians. Network cities have aimed to connect the local and global, while community-based models have focussed on strengthening vibrancy and community in local neighbourhoods. Both strategies have been criticised as lacking globally-oriented socio-economic interaction and human flows.
Infrastructure and amenities are increasingly being recognised as key factors in attracting people and influencing pedestrian movement, interaction and connectivity. Martinus (2010) suggested five infrastructure and amenity (INAM) types specifically relevant for knowledge development and innovation. This paper argued that incorporating these into current planning strategies, such as network cities and community-based strategies, may provide a platform for better targeting national priorities of innovation and knowledge development. This paper investigated the presence, relative density and distribution of Martinus’ amenities and infrastructure in four highly innovative mid-size cities: Boston, Portland, Stuttgart and Dusseldorf. Several lessons emerged from the data. However, further research exploring urban form variations between the least innovative and other highly innovative cities is required before firmer conclusions can be drawn.

Firstly, public transport was readily accessible in all areas of the 1km radius, at the centre of which was a train station with direct links running to the international airport. Thus, each study area appeared highly supportive of human flows in and out of the city. This is a highly desirable environment for the open exchange of ideas and stimulation of creativity. Secondly, all five INAM types were found in each study area. Though their density and distribution was not necessarily even, a significant section of each study area was highly mixed and had the greatest density of INAM. In addition, the highly-mixed sections had the highest number of intersections making them highly walkable and pedestrian- rather than car-oriented. As such, these sections appeared to present the greatest capacity for human experiences, flows and diversity. Thirdly, each city is comprised of renowned districts presenting unique human experiences defined by their individual and distinct architecture, street art, food or entertainment. These districts were distributed just outside or within the study area, and likely to contribute to the attraction, diversity and flow of human capital.

Lastly, Portland was observed to have mid-level density and distribution of INAM, while the other three cities had high density but highly uneven distribution of INAM. This is consistent with research emphasising the importance of human diversity, interaction and movement to innovation. Therefore, it may be said that low density and distribution of INAM is not likely to be highly supportive of innovation and knowledge development. The results suggest that cities of innovation require a critical mass of INAM within the 1km area of key pedestrian infrastructure, such as train stations. This critical mass is likely to be dependent on the economic significance of the development to the city as a whole. For example, train stations in the centre of a city will require comparatively more INAM for innovation and knowledge development than local train stations.

Throughout a city – be it in the CBD or in the local neighbourhoods – the contribution of such developments to the regional innovation system, as a whole, will be significant. Therefore, even local or neighbourhood key pedestrian infrastructure needs to be integrated using infrastructure and amenities appropriate for knowledge development and innovation. Therefore, a better understanding of the INAM for innovation and knowledge development and how to integrate them into neighbourhoods and strategic centres is likely to be increasingly important for cities of innovation.

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References


The coffeeless urban café: understanding the attraction of urban space

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Structured Abstract

Purpose – This paper explores human attraction to urban space. Vibrant and interactive socio-economic spaces are often associated with better regional knowledge transfer mechanisms and flows. This can enhance worker productivity in knowledge-based industries and generate economic efficiency for cities of innovation.

Design/methodology/approach – This paper reviews literature of innovation systems and discusses the contribution of urban space. It presents the results of a survey examining the human presence in and movement through a particular space outside of a busy train station in Kobe, Japan.

Originality/value – This paper contends that urban space is a critical part of the knowledge production function. Urban space becomes knowledge infrastructure for a city by consolidating creativity and diversity in perspective across the whole knowledge exchange process and lifecycle. Public spaces adjacent to train stations are prime locations to leverage this given that their point-to-point mass movement function makes them potential daily activity hubs.

Practical implications – The paper concludes that despite its lack of aesthetic qualities, the area under study acted as a magnet for people irrespective of age or status. Analysis of results showed that convenience and accessibility to entertainment and leisure rated highest. There was a positive correlation between frequency of visits and likelihood of an unplanned meeting. The spaces’ capacity to generate the buzz and excitement of a street-side café without discrimination suggests that it can significantly contribute to strengthening and sustaining local social capital. Such spaces are likely to become key knowledge infrastructure contributors to or constraints on the economic efficiency of future cities of knowledge and innovation.

Keywords – innovation systems, urban space, economic development, social capital, infrastructure.

Paper type – Academic Research Paper

1 Introduction

Large cars and extensive highways are often seen as indicators of success in industrialising cities. In contrast, success in innovative cities appears associated with a pool of talented human capital and the creation of intimate urban space. On the surface, contemporary urban development philosophies reflect the human-scale, village-like precincts of ancient cities. However, in reality they are very different. Innovative cities competing for knowledge are struggling to integrate local and global paradigms, as well
as construct environments conducive to vibrancy and human interaction. Castells argued that urban planning in The Information Age is:

...based on knowledge, organized around networks, and partly made up of flows, the informational city is not a form but a process, a process characterized by the structural domination of the space of flows (2000, p. 429)

This theme is emerging in the literature. Some find the flows and accessibility of urban planning more appropriate than traditional zones and proximity (Bertolini & Dijst, 2003). Others believe that cities and regions should be defined in knowledge nodes and linkages (Van Winden & Van den Berg, 2004). The organic globally-competitive knowledge city can incorporate human flows and accessibility by enabling human connectivity on all levels (virtual, physical, global and local). Higher accessibility and connectivity is supported by a more open urban system, the key to which is transport and mobility environments.

Bertolini and Dijst (2003) suggested highly-accessible mobility environments (e.g., train stations, airports, motorway service areas, pedestrian/bicycle nodes) are physical spaces appropriate for anchoring human interaction in the borderless context of the new economy. As a result, urban transport provision is shifting from its traditional predict and provide approach to one more sensitive to the physical mobility needs of individuals and organisations (Bertolini et al., 2008). Mobility environments are viewed both as having a transport and mobility function as well as a capacity for socio-economic activity. They are platforms to layer human activity (such as recreation, transport, work and learning) and provide opportunities to connect local actors to the global urban system.

This paper asserts that public open space adjacent to key transport infrastructure can contribute to innovation systems, and as such economic efficiency in a knowledge economy. This is based on the assumption that public transport can enable point-to-point mass movement and be hubs of daily business and living activity. Such spaces provide an opportunity to explore the conceptual framework outlined by Martinus as urban form capable of enhancing ‘the knowledge productivity of local inputs by facilitating human spatial movement and providing opportunities for knowledge spillovers’ (2010a: 733).

Section 2 reviews contemporary literature describing how urban form may contribute to knowledge productivity and the complex urban systems required for innovation. It examines the potential of urban space to enhance local knowledge resources and be an integral part of the innovative system. Section 3 presents the results of a survey examining the human presence in and movement through a particular space outside of a busy train station in Kobe, Japan. Section 4 concludes that despite its lack of aesthetic qualities, the space acts as a magnet for people irrespective of age or status. Its ability to generate the buzz and excitement of a street-side café without discrimination suggests that it significantly contributes to strengthening and sustaining local social capital. Such spaces are likely to become key resources for future cities of knowledge and innovation.

2 The urban framework of innovation

The local milieu has become crucial to the process of innovation. Howells (2002) suggested that innovation itself was geographically concentrated. Other research has observed that regional innovation systems are unique. They are the product of distinctly different dynamics and flows of information and knowledge through a network of actors (Lambooy, 2005; Simmie, 2002, 2003). The efficacy of collaboration between these actors in facilitating knowledge creation and organisation varies between countries, and even regions of the same country. These local variations not only impact on competitive advantage, but make it difficult to formulate effective policies and strategies to support
innovation. Van Winden & van den Berg (2004) suggested categorising knowledge cities according to labour market size, level of cultural diversity and integration into the global economy. They stated that each had very different dynamics and systems contributing to the foundation and organisation of knowledge activities. They concluded that adopting policy approaches sensitive to local conditions would better address knowledge economy issues, such as increasing social exclusion.

The process of knowledge creation itself does not generate innovation, but rather it is the diffusion and useful application by various actors (Lambooy 2005). Lambooy (2002) proposed that three interrelated environments act as selection mechanisms for the innovative success of a particular region – spatial, market and institutional. In which, the local spatial environment:

…influence(s) accessibility, the availability of information and the possibility of organisation based on personal contacts. (It) provides a kind of selection mechanism which may or may not provide conditions favourable to meet the new requirements of change (2002: 1029)

Urban space, itself, is a vital resource in the new economy. It provides a platform for knowledge exchange and social networks. Leveraging this to facilitate innovation can generate multiplier effects with benefits not just confined to the cities or districts of innovation. In a study of various size cities throughout Europe, Gospodini noted that urban development had a positive influence ‘on the economic development of all classes and groups of cities within the European global urban system’ (2002, p. 69).

Understanding how urban space contributes to regional transfer mechanisms and flows can enable government policy to better identify and address particular innovation and knowledge gaps. A large volume of work has examined various aspects of regional and local innovation, as well as the significance and function of various facilitators, regional transfer mechanisms and flows. An overview of this literature is discussed in the following sections.

2.1 Innovation in the urban environment

Cooke (2001) suggested that regional innovative systems are best represented by an interactive network model of different actors from education, government and firms. It is reasonable to assume that policies to promote this interaction will be the most successful in stimulating innovation. However, despite research, it remains unclear how various local spatial mechanisms might work together to influence the innovation process.

Some have suggested that urban density and industrial cluster activity are central. They facilitate the spread of tacit knowledge, access to quality networks and match relevant economic actors or useful input and outputs. This geographical concentration creates strong externalities for innovation through knowledge spillovers (Carlino et al., 2007; Park, 2001). Lambooy (2005) suggested that synergies conducive to innovative activity are driven by interconnected networks of geographically-clustered complimentary firms. However, as argued by Simmie (2002), the knowledge spillover hypothesis of industrial clustering does not adequately explain regional imbalances in innovation. He (2002, 2003) contested that over-emphasizing the supply-side contributors (e.g., clustered industry) of regional innovative capacity has left government policy deficient in demand-side elements (e.g., strong local access to highly-competitive global markets or consumption of knowledge).

Simmie (2002) suggested that first-class and globally-competitive cities of innovation need sufficient local-global links of different knowledge types and sources to ensure continued learning throughout the innovation process. This was supported by Lambooy
(2002) who observed that the breadth of knowledge and strategic economic relations required are often external to the region. Malecki (2002) agreed finding that networks are of greatest importance to cities of innovation. He stated that hard networks (e.g., communications and transport infrastructure) must support the soft networks of public and private sectors and their interactions.

Others have found that nurturing cultural and environmental factors attracts high-value human capital, as well as creates urban spaces of improved life quality and diverse interaction. Such environments are conducive to innovation (Edvinsson, 2006; Florida & Tinagli, 2004; Newman, 2001). However, Luciani (2006) argued that attracting high-value human capital is not an automatic outcome of culture-oriented city policy. He observed that the widely-acknowledged ‘cool’ cultural cities of Toronto, Montreal and Vancouver actually performed economically worse than other Canadian cities. He concluded that money could be better spent on quality infrastructure to enable a city to work efficiently. Culture would be generated as a spin-off. Martinus (2010a) agreed, arguing that inadequate hard infrastructure (including hard networks) acted as a constraint on soft infrastructure (and networks). Her research suggested that ‘cities have a maximum innovative capacity for a fixed level of infrastructure (capital asset) after which increasing inputs (such as skilled labour, creativity) will cause decreasing returns to scale for innovation’ (2010a: 732). That is, increasing soft infrastructure (and network) components in environments with low levels of hard infrastructure is economically inefficient for the production of innovation and knowledge.

Emerging literature on Knowledge Based Urban Developments (KBUD) also appears to support a dual soft and hard infrastructure approach. Rooted in the Knowledge Based Development (KBD) work of Carillo (2002), KBUD are described as:

…urban development for the 21st century that could, potentially, bring both economic prosperity and sustainable social spatial order to the contemporary city…policies include: developing and adopting the state of art technologies, distributing instrumental capital, developing human capital, and developing capital systems (Yigitcanlar & Martinez-Fernandez, 2007: 3)

Various papers have used KBUD to broadly describe any location dealing in the 21st Century new milieu, such as knowledge precincts, science parks, technopoles, high-tech zones and creative cities (Wang, 2009; Yigitcanlar, 2007; Yigitcanlar & Martinez-Fernandez, 2007; Yigitcanlar et al., 2008). Others have used it to explain the success of cities and State-based knowledge strategies (Yigitcanlar et al., 2008; Yigitcanlar & Velibeyoglu, 2008). Each piece of research adds to the debate on the importance of developing regions specifically for knowledge and innovation. However, knowledge facilitators are largely focused on soft socio-economic infrastructure (e.g., policy development, education, human capital, creativity, ICT, industry). There is limited analysis of the hard infrastructure mechanisms facilitating innovation. For example, KBUD research-to-date does not explain how urban development can leverage daily knowledge opportunities through human flows or the local-global construct of physical human-scale spaces.

The range of research considering innovative capacity and how to best support it, highlights the variation and complexity of social, economic and spatial factors. These extend beyond any one element, such that each of the above contributes to an understanding of regional transfer mechanisms and flows. Martinus (2009; 2010a) suggested that there were five classifications of hard and soft infrastructure components important for innovation and knowledge development: 1) connectivity, 2) education and skills, 3) business and industrial networks, 4) creativity and culture, and 5) diversity. Each was selected to be ‘based on human qualities associated with innovative activity’ (2010a).
Her classification of infrastructure appears logical and consistent with innovation as a by-product of human thought, creativity and endeavour. Indeed, much literature on innovation focuses on enhancing soft infrastructure aspects of the local-global environment. The possibility that urban space can strengthen local social capital (Hanna, Dale, & Ling, 2009) suggests that it can be used as a tool for government policy targeting innovation and knowledge development (Martinus, 2009).

….urban planning should aim to harness the human energy of urban space through an understanding of how hard infrastructure can influence the socio-economic pattern of the city. This will broaden foundations for social capital building and knowledge transfer, enabling highly productive knowledge-based developments. In the long term, effectively-planned knowledge-based developments are potentially a tool for the delivery of sustainable national innovation and productivity priorities and strategies (Martinus, 2010a: 738).

However, in reality, well-implemented strategies creating vibrant socio-economic spaces capable of contributing to innovation are difficult outside of the theoretical construct. Urban planners and other city stakeholders, often directed by government prescriptions and compliances, are unable to remain abreast of the rapidly-changing social and economic demands on infrastructure. Many countries are experiencing renewed political interest in the built form of urban spaces. This is particularly true in urban fringe or regional areas. Cities are finding it increasingly difficult to combat globalisation issues of uneven wealth distribution, social isolation and urban deterioration, as well as density issues of increased crime, congestion and pollution (Douglass, 2000). Some are calling for greater collaboration between urban planners and other community stakeholders to construct quality urban space suitable for facilitating knowledge transfer and innovation (Knight, 1995). The remainder of this section will discuss the relationship between urban space and the regional innovation system.

2.2 The contribution of local spaces

Beriatos & Gospodini (2004) saw modern cities as being eclectic landscapes of heritage-rich and cutting-edge innovative architecture reflecting two opposing spheres. That of ‘tradition with rather local spatial reference, and...of innovation having more universal or global spatial references’ (2004: 187). In a study of European, North American and developed Asian cities, Gospodini (2006) described a new emerging urban landscape centred on leisure and culture. He believed that modern cities were best characterised by clusters of new economy production, such as high-tech, knowledge-intensive, financial, cultural services, innovation and creativity. He found these clusters dispersed throughout the inner city and even in outer-metro strategic areas rather than in the CBD. Gospodini suggested that they were ‘sifting/expanding the spatial core and altering the city’s spatial organisation and structure’ (2006: 314). This was providing cities with critical socio-economic infrastructure. He argued that this infrastructure was capable of driving new economy production and redefining urban consumption patterns. It was also giving importance to local identity and environmental amenities, as well as offering opportunities for social interaction and knowledge exchange.

Indeed, the city and its economy appear to be increasingly linked. New economy wealth and global competitiveness is no longer just a function of technology, business and institutional environment. It also includes measures of coherent city planning, amenity levels, infrastructure and quality of life (Sim et al., 2003). Gospodini observed that cities of minimal natural resources were particularly reliant on urban design such that ‘avant-garde design of urban space combined with large scale interventions appeared to control
the city’s future’ (2002: 69). Such observations are linked to the growing importance of attracting quality human capital. They call for the construction of urban space capable of connecting people to each other, as well as a range of work, life and leisure possibilities.

This has created an environment where leisure and non-work opportunities are now as important to competitive advantage as industrial structure. Social, leisure, entertainment and culture aspects of the city are the focus of many studies exploring economic competitiveness (Beriatos & Gospodini, 2004; Clark, 2004; Clark et al., 2002; Gospodini, 2006; Hall, 2000; Hannigan, 2003). Many believing that the more liveable and pleasant a city, the more equipped it is to attract high-value knowledge workers (Carlino & Saiz, 2008; Clark, 2004; Clark et al., 2002; Florida & Tinagli, 2004). Clark observed that cities are being viewed as life-style playgrounds by citizens who act like tourists demanding more aesthetic urban considerations. He noted a new breed of policies, centred on ‘enhancing a distinct urban life style and neighbourhood amenities’ (2002: 512), are being driven by these consumption and amenity concerns. Given the importance of the local realm to the creation of knowledge, such studies are just as relevant to local neighbourhoods as they are to the CBD. Applying these concepts to local urban space can contribute to the local milieu’s capacity to support new economy objectives.

Franck and Stevens (2007) contended that sp aces hold the vital force of cities, such that the ‘ordinary and extraordinary activities of public spaces constantly evade the ‘tightness’ of design and control and produce spaces that are ‘loose’ (Huxley, 2007). This paper defines the concept of a ‘loose’ space as one that does not dictate the type of people attracted. The greater the ‘looseness’ of space, the more appealing it is to a broad spectrum of humanity. People are able to move freely in and out of the space. By optimising human movement and interaction, spaces have the capacity to foster environments supportive of local innovation and knowledge-based activities (Martinus, 2009; 2010a). Space itself, then, becomes a knowledge resource for cities of innovation. It enables diversity in human perspectives across the whole knowledge exchange process and lifecycle (Edvinsson 2006).

However, the largely unpredictable nature of human movement and interaction makes the construction of such spaces difficult. In researching how urban space can generate an environment rich in human interaction and experience, many suggest that designing spaces for a broad range of human activity and experience is most likely to attract and retain human diversity. For example, Gehl’s (2007) found three outdoor activity types dominated how people use public space – necessity, optional and social. He contended that within certain limits urban design could influence how long people stayed in a space, how many people were attracted to a space, and which activities developed around the space. Jacobs (2007) espoused the importance of urban vitality generated through mixed land-use and activities. Banerjee (2007) argued that urban space should be designed to support socio-cultural activities which encourage human interaction and public life. He contended that private spaces such as coffee shops or bookstores were just as relevant as public spaces to public life. Oldenburg (2007) stated that a balanced life required a daily injection of ‘work’, ‘domestic’ and ‘social’ experiences. He asserted that the increasing demands of family and work had brought about the need for a more social and stimulating realm - a ‘third place’. Oldenburg noted that the qualities of this ‘third place’ can be found in the accessibility and neutrality of urban space (both public and private).

This research proposes that such aspects make urban space key economic infrastructure for regions focussing on knowledge development and innovation. It suggests that we need a better understanding of the contribution of urban space to national innovation systems and knowledge productivity, as well as its capacity to support our
increasingly global and high-tech lifestyles. Such spaces are most likely to be sympathetic to modern human needs, including the increasing work/life/leisure pressures of globalisation. To do this, designers must transpose the way people construct and live their lives onto the space itself.

An example of this is illustrated by considering how urban space can alleviate feelings of time and space compression, given that human capital and information continues to travel virtually and physically faster and further than ever before (Johnson, 2004). As stated by Walker (2009: 487) ‘space becomes virtual and global transactions occur in real time’. This has impacted the way we live and move through our cities, causing large socio-economic structural shifts. For instance, there is less need for us as individuals to venture out with personalised instant global access, but yet national productivity rests on the human interaction, stimulation and creativity of our cities. As a result, human-scale and vibrant local spaces are coming under increasing pressure to connect people across otherwise disparate worlds - local to global and virtual to physical. This research views urban space as a key regional platform to do this as it encapsulates both time and space.

The idea of ‘space’ being compressed is strongly influenced by global happenings. Social space and human relations have become increasingly difficult to define by territorial boundaries, places or distances, local events (Betancourth, 2002; Legge, 2005). The local urban framework is no longer about who resides there, but about its relevance to the outside world. Hard infrastructure (i.e., telecommunications, transport) is viewed as central in facilitating the local-global flow of soft elements (i.e., human capital, data). It has become almost inconceivable that highly innovative places are not hard wired into the global community through the Internet to leverage physical and virtual flows of data and knowledge.

The compression of ‘time’ has blurred the lines of what is work and what is not (Scholarios & Marks, 2004), with ever-increasing time-saving devices only adding to feelings of time depravation (Walker, 2009). Given rapid globalisation, advancing technologies and growing access to information, it seems unlikely these pressures will ease. Indeed, human response has been to do more rather than less. Activities are streamlined and time more efficiently planned. Gospodini noted that ‘multi-tasking itself can be considered as characteristic of the human interactions that underpins new media production activities’ (2006: 316). It, therefore, becomes important for key public spaces to facilitate this by employing city and urban design high in daily time-saving elements and incorporating a multitude of uses. Such spaces will better reflect and support new economy workers, and therefore the innovation process itself.

In their analysis of learning and knowledge generation, Amin and Roberts (2008: 366) contended that the ‘intersection between network space, corporate space and regional space define the geography of knowledge, with each spatial axis (office, building, region internet connectivity, space of mobility and flow, virtual space and network architecture) contributing something specific to the knowledge process’. Their conclusions add an interesting dimension to the importance of capturing the energy of increasingly trans-territorial networks in a specific point of time and space. Dvir and Pasher (2004) suggested that innovation ecology models should be applied to knowledge cities, and that innovation is based upon creating conversations. Certain urban structures (museums, libraries, cafes, industrial parks, etc) provide the ‘building blocks’ for conversations driving creativity and innovation.

In subsequent research, Dvir et al. (2006) stated that any properly designed space has potential to be vibrant and drive innovation. This paper contends that the function of some spaces make them more appropriate than others. More specifically, urban space adjacent
to key public infrastructure is a prime location to mass a region’s vitality. For example, train stations are key infrastructure drawing people through a transport function. This can be leveraged by concentrating other infrastructure, amenities and services around it to provide a convenient hub of daily business and living activities. This is critical for the new economy.

Not doing so around a train station represents a wasted opportunity to concentrate urban vibrancy, human connectivity and interaction. Indeed, a train station can represent the local public entry point for regional and global sources of knowledge. Therefore, train stations fulfilling only a transport function will likely be economically inefficient for innovative cities. As key public infrastructure, they should seek to optimise human movement, vibrancy and interaction thereby supporting local innovation and knowledge-based activities. The following section presents the results of a survey assessing a space adjacent to a train station in Kobe, Japan which appears to do this.

3 No coffee at this urban café

Martinus (2010a) asserted that future economic sustainability requires that planning consider urban forms’ contribution to innovation and knowledge based-activities. Central to this is an understanding of how space can concentrate a city’s vital force to become a seedbed for innovative activities. However, it is likely that some spaces will be more adept at doing this than others. Martinus (2009) suggested that the large number of pedestrians attracted to the transport function of train stations make them prime locations to leverage human interaction, connectivity and movement.

This research sought to leverage the natural pedestrian pull of train stations to understand why some urban spaces outside of train stations attracted people more than others. This section presents the results of a survey assessing why a specific space adjacent to a Japanese train station has fostered an extraordinary capacity to attract and retain people. This space appeared to have a sub-culture which acted as a magnet for the whole community. Its vibrancy and human interaction resembled a busy urban café. The research tested the hypothesis that the longer and more frequently people visited the space the more likely they were to meet a friend serendipitously. The attraction and retention of human capital was assumed a function of urban space in cities of innovation. Based on an extensive literature review on innovation (see Martinus, 2010a), survey questions were formulated to indicate the space’s capacity to contribute to knowledge economy priorities of better human interaction, vibrancy and connectivity. A translation of the survey questions are found in Appendix 1.

3.1 Site selection and survey methodology

The survey site was selected as the most vibrant location outside of a train station in a mid-size city with a natural capacity for knowledge development and innovation. Levels of innovative capacity were assessed using globally-recognised patent statistics (e.g. OECD and WIPO). Degree of natural innovative capacity was evaluated as the speed at which the city adapted to knowledge creation once the political shift toward the knowledge economy had been made. This is consistent with the selection criteria established by Martinus (2010b) for innovative cities.

Japan views innovation as a driver of industrial change and critical for future sustainable economic growth (Japan Ministry of Education Culture Sports Science and Technology, 2002). OECD (2009) measures of patent numbers ranked Japan second only to USA as the most globally innovative, while WIPO (2008) statistics found Japan to be
number one. Based on absolute values, the OECD noted that Kinki (in the middle of Japan) is the third most highly innovative region of the world after Kanto and California, USA (Usai, 2008). Competing against the economic strong-hold of Kanto (containing the mega-city of Tokyo), a mid-size city in the Kinki region was deemed the most appropriate for this study. Of several possibilities, Kobe-City was selected for the following reasons.

Hit by the 1995 Great Hanshin Earthquake, Kobe-City sustained severe damage to its economy and urban infrastructure. 32% of Greater Kobe was destroyed along with more than 50% of the city centre including major transport infrastructure (Karan, 1997; Olshansky et al., 2005a). Kobe demonstrated an amazingly rapid economic recovery as only a relatively small number of its human capital was lost (Horwich, 2000).

The earthquake gave Kobe a unique opportunity to redevelop its urban and industrial landscape as the international gateways for industry and knowledge to the wider Kinki Region. Consistent with national knowledge economy objectives and as a means of rebuilding the devastated city, Kobe officials recognised that the large number of established drug companies and universities could transform the city into a centre of advanced medical research and excellence (Kruger, 2002). Technology parks (super computers, biotech) were also developed under the vision and to confirm Kobe as a global hub of information and knowledge exchange. Kobe regained 75-90% of its former capacity by 1999 (Olshansky et al., 2005). By 2004, Kobe joined UNESCO’s Creative Cities Network as City of Design (City of Kobe, 2009; UNESCO, 2010); and in 2009, is ranked 37th in the world for innovation (Tokyo is 9th, Sydney is 22nd and Melbourne is 20th) (2thinknow, 2009).

Sannomiya station sits at the heart of Kobe’s over 1.5 million people (City of Kobe, 2009) and the convergence of Hankyu, JR, Hanshin, Portliner and Subway lines. Each terminal has several busy exits of people walking through, waiting for friends or alternative transport (buses, cabs, private car, etc). As such, each exit presented a possible site to conduct the survey (Figure 1).

![Figure 1. Train station entrances around Sannomiya station](image)

Given the importance of attracting and retaining human capital in facilitating human interaction, connectivity and movement (Martinus, 2010a; 2009), site selection criteria were set as the site where people appear most relaxed and most willing to spend time. The only space that fitted this was a popular open space outside Hankyu Sannomiya (Figure 2). During the survey process, it was discovered that this space had various nicknames, all strongly associated with three stone-paved bumps that rose from the ground at the site. These were The Humps (amongst foreigners), Oppai Yama (or O-Yama amongst younger...
people, translating to Breast Mountain Park) and Sankaku Koen (amongst older people, translating to Triangle Park).

The study area is paved in grey cobble stones, with metal benches and random scattered stone seats (Figure 3). It is central to a wide variety of retail shops, banking facilities, business and financial services, education facilities, 24-hour mini-marts, bookstores, eateries (fast food, ice creamery, restaurants), entertainment (karaoke, bars), tourism, etc. The site appears to draw a broad cross-section of the community. Elderly, high school and university students, foreigners (working holiday and tourists), musicians, street entertainers, trendy youth businessmen and women, mothers with children and homeless were all observed there.

![Figure 2. Hankyu station and survey site (at green dot)](image)

![Figure 3. Survey site taken from various angles](image)

A total of 80 people either sitting or standing in the study site during set time periods were asked to complete a survey. Issues of language and difficulties in expression were avoided as the researcher was an accredited Japanese-English Interpreter. Japanese was spoken for the Japanese and English for the non-Japanese participants. The survey aimed to establish prior and intended movement; why they were at the study site; feelings associated with the site; and, the likelihood of meeting an acquaintance. People passing through the site or waiting on the fringe of site for buses or other transport modes were not asked to participate. The survey was conducted in 4 time slots over one week. These were evening (between 4pm to 8pm) and daytime (between 10am to 2:30pm) during the weekday (Monday-Thursday), and evening and daytime during the weekend (Friday-
Sunday). 20 people were asked in each time slot. The evening period represented peak travel times, while daytime represented non-peak periods. The 80 surveys were spread evenly across the week, giving the researcher access to various reasons why different types of people were drawn to the study site.

3.2 Observations and survey results

The site was lively and interesting with a high proportion of both youth (under 35 year olds) and foreigners. The survey found people from all age groups, 30% of participants being 16-25 years old, 31% being 26-35 years old, 12.5% being 36-45 years old, 11.5% being 46-55 years old and 15% being 55 years and over. 16% of the survey participants were non-Japanese, coming from a range of countries such as USA, Australia, New Zealand, Colombo, Samoa, Indonesia and Ghana.

People volumes during non-peak weekday were lower than any of the other 3 time periods (between 6-9 people at the site at any given time). The high turnover and volume of people at the survey site during weekday and weekend peak and non-peak periods made data collection easy. In addition, the higher site occupation and vibrancy at peak times appeared to make people more willing to participate and provide personal information as they watched others interacting with the researcher. Several people noted that doing the survey ‘killed time’ and ‘added interest to their life’. Some said that the survey represented why they were sitting at the survey site - ‘it (the site) always has different things going on, like a foreigner doing a PhD survey’ (quotes are translations of Japanese survey answers). Non-Japanese survey participants (foreigners) particularly enjoyed the survey and engaging with the researcher.

The majority of the 80 people surveyed were either employees (34%) or students (25%). This is consistent with the survey sites’ proximity to the central business district (CBD) and several universities. Housewives (16%) were next most prominent; covering a wide range of 20+ year-old young mothers with children to 70+ year-old elderly ladies married to retirees. 6% were self-employed, 5% were volunteers (all women), 4% were retirees (males only, women of the same age group described themselves as housewives) and 4% had part-time jobs (all women). Portions of employees and self-employed were higher during the day at the survey site, while housewives preferred weekday evenings and students anytime during weekends (See Figure 4). In general, the different types of people and occupation found in the survey site added to the interest and vibrancy of the site.

Figure 4. Survey response to ‘What is your current occupation?’
The high public transport and pedestrian usage compared to that of the car reflected both the survey site’s position outside of a train station and its high pedestrian-orientation (see Figures 5 and 6). 75% of all survey participants used the train to reach the site and 40% to their next intended activity. Walking was also popular with 16% of all respondents travelling to and 55% leaving the site on foot. 12.5% of respondents reached the survey site by bus, while only 2.5% intended to use it to their next destination. Of all 80 survey participants, only 1 person used their car (1.25%) and 4 people (5%) used their bike to reach the site, while 2 (2.5%) for each car and bike were recorded as the transport mode to next activity.

Daytime respondents (80-85%) were more likely than evening respondents (65-70%) to have reached the site via train, while 25-30% respondents intended to use the train to their next activity on weekend day and weekday evening, 45% on the weekend evening and 60% on the weekday daytime. This figure was higher in the evenings (25%) than during the day (5-10%) for those who travelled to the site on foot, but lower in the evening (40-45%) than during the day (60-75%). 10-15% of the respondents during the day had used the bus to travel to the site while 20-25% used it in the evening, while no one was recorded as intending to use the bus to their next destination in the day. Car and bike use for those travelling to and from the site was only noted in the evening.

The organic nature of pedestrians standing at the site and walking through the site created an ever-changing landscape. This added to the vibrancy and unique human narrative of the site. At any one time during non-peak periods there were between 2 and 11 different groups of people gathered and waiting for more friends to come. During the weekend and peak periods, there were 5 to 20 various-sized groups of people. Weekend groups included several reoccurring events of larger organised groups. In one example, the researcher met a group of 25 Mormons from different countries doing missionary
work in Kobe and surrounds. They were conducting their monthly one hour meeting before going their separate ways. In another example, the researcher met a club of approximately 100 members which organised regular health walks throughout Kansai. The survey site was the meeting point for any Kobe-city walks.

The majority of the people asked across all time periods reported coming from home (64%), though it was less in the evening (55%-60%) than during the day (65-75%). 14%, 8% and 6% came respectively from work, the station or the nearby tourism precinct (Figure 7). Of those coming from the station, most were in the evening (6%). Indeed, observations of pedestrian movement through the site largely reflected commuting flows. The majority appeared to be heading away from the station (mostly North-West towards Kitanozaka and North towards Flower Road) in the morning and towards the station from these directions in the early evening. From around 6:30pm, commuting flows were less evident with considerable a number of people walking towards Kitanozaka - noted for its trendy restaurants and vibrant nightlife entertainment.

The importance of entertainment in the city was reflected in the high number of people at the survey site to meet friends for entertainment (33%) or shopping (27%). This was particularly evident in the evening being 35% and 37% respectively (see Figure 8). During the day (weekend and weekday), most people were attracted to the survey site for entertainment with friends (32%), shopping (17%), work (17%) and an organised activity (12%). When asked where they were intending to go immediately after this (see Figure 9), the majority (54%) responded with some form of leisure activity being ‘meet friends for eating/fun’ at 30%, ‘shops’ at 14%, ‘organised activity’ at 6% and ‘tourism’ at 4%.
16% said they were going home, 14% to work and 12% did not state their intended destination.

Figure 9. Survey response to ‘Where are you going immediately after this?’

Figure 10 provides a breakdown of intended destinations in Figure 9. This shows a higher response rate of those going to work during the weekday daytime and meeting friends for leisure in the other three time periods. The higher number of people going home in the evenings is consistent with commuter activity observations. However, observed high volumes of people and respondent answers are an indicator of site vibrancy but not human interaction or connectivity. Indeed, some research has found that high volumes of people are not a firm indicator of human interaction and community network strength, instead having an adverse effect on social capital formation (Glaeser & Gottlieb 2006; Glaeser et al. 2001). To evaluate the survey sites’ capacity to attract people and provide a platform for human interaction and connectivity, participants were asked how often they came to the site and the likelihood of meeting an acquaintance unexpectedly.

The majority of respondents (80%) reported they frequently came to the survey site, indicating the general high attraction of the site. Answers consisted of 15% coming every day, 17.5% twice a week, 12.5% once a week, 17.5% once every two weeks and 17.5% once a month. Only 15% estimated that it was less than once a month, and 5% did not give a time period as it was their first visit. In addition, there appeared to be a positive correlation between the number of times a respondent visited the survey site and the
likelihood of an unexpected meeting (Figure 11). That is, the more frequently someone visited the site the more likely they were to bump into a friend serendipitously. This indicated the survey site’s likely contribution to strengthening local networks, and therefore social capital.

An example of this arose during one of the many visits by the researcher to the survey site. A group of students were approached who attended the researchers’ Western Australian sister university in Hyogo. All the students knew her Japanese university research counterparts, and some students had studied English at her university in Perth. This enabled an instant bond to be formed between the researcher and the students.

![Figure 11. Correlation between Q6 'How often do you come here?' and Q7 'How often do you meet someone you know?'](image)

Human connectivity of a space relates to its capacity to attract and retain people. This was reflected by the range of respondents waiting for friends, resting or passive interaction with the space (e.g., ‘people watching’). When asked to describe the general feeling that the survey site gave them, of the 103 different responses 77% reported a positive atmosphere, 9% a negative and 14% were either indifferent or not stated (Figure 12). The most frequent response (38%) related to passive interaction with the lively and fun atmosphere of the space. Many reported people-watching (including related comments of ‘noisy with lots of different people’, ‘lots of youth’ and ‘love it’) and enjoying live bands. 15% perceived an aesthetic environment, with comments such as ‘international and interesting’, ‘lots of foreigners’, ‘big city feel’, ‘lots of tall buildings’, and ‘sophisticated and trendy’. 15% found it relaxing, 9% a central place to meet friends and 6% convenient access to other activities in the city (comments referring to surrounding amenities, such as ‘lots of bookstores’, ‘can eat out’ and ‘shopping’).

The majority of negative comments (8%) related to the increase in unsocial behaviour from evening. 5% cited idle youth and 3% that it was not pretty or relaxing, including comments such as ‘undesirables (homeless, men looking for a date, etc) may approach’. Only one person (1%) took offense to the art found in the space on religious grounds. As a Mormon missionary, he felt naked statues were morally inappropriate in a public place.

Given the range of other possible meeting places around the train station (Figure 1), it is reasonable to conclude that the benefits of the space outweighed negative feelings or criticisms. For example, Mormon missionary respondents were part of a 25-30 Mormon gathering to informally exchange notes. All members of the group agreed that the statues were offense, but no one indicated moving their monthly one-hour meetings to another location.
Figure 12. Survey response to ‘What sort of atmosphere do you think this place has?’

Survey participants were asked to specifically comment on the strengths and weaknesses of the space. This is detailed in Figures 13 and 14. Amongst the total 112 comments relating to positive aspects, only 9% did not give an opinion and 0% was indifferent. Whereas of the 96 negative comments, 18% did not give an opinion and 10% were indifferent (including comments of ‘not sure’ and ‘nothing in particular’). This suggested that the space evoked stronger overall positive feelings for most participants.

The majority of respondents found the space to be both a convenient point from which they could walk to other major destinations in the city (28%), and easy meeting point for friends as ‘everyone knows this place’ and ‘it is close to the train station’ (25%). As one respondent noted ‘it is easy to find people as it not too big and there are not too many people. It doesn’t feel like a passageway or like you are in the way. It doesn’t have too many exits unlike inside the train stations where there are too many people flowing through and exits everywhere’.

14% commented on its convenience to specific activities, such as access to shops (11%), restaurants and other eateries (3%) and sightseeing (1%). 12% felt its strengths lay in aesthetic elements, such as it being clean and they could relax in the sunshine (10%), sophisticated and trendy (3%), mix of traditional and modern (1%) and having a big city feel (1%). 10% thought its strengths lay in its vibrancy and capacity to attract a different types of people. Many of these respondents indicated that they do ‘people watching here’, comments included ‘lively, so don’t get bored’, ‘lots of youth so fun’, ‘lots of different people’ and ‘lots of foreigners’. Research observations supported this as many people did not appear to be waiting for someone in particular. Many seemed to passively enjoy the activity of the space with some leaving briefly to buy a drink and return. Others were observed sitting for long periods several times during the 2-week observation period. Two participants reported that they regularly spent over 6 hours waiting for their part-time work to start, ‘hanging around’ the space because ‘it always had something interesting happening’.

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Most of the negative feedback regarding the space related to the night increase in rubbish (25%) and anti-social behaviour/feelings of insecurity (24%). The latter including comments such as ‘too many people’, ‘not so safe’, ‘scary at night’, ‘pachinko players (gamblers)’, ‘undesirable people’, ‘panhandlers’, ‘dangerous and scary at night’, ‘noisy at night’, ‘too many drunks’ and ‘mizushobai’ (referring to night activities and nightclubs toting for business, bars and escort services). 9% noted a lack of basic conveniences (e.g., seats, protection from the elements), and 7% did not like the numbers of cars driving around the space and associated pollution. 3% were Mormons who indicated that the statutes were morally offense, particularly to children and women. However, as observed above, these negative feelings were not enough to keep respondents away from the space.

4 Conclusion

Martinus’ (2010a) suggested that urban infrastructure and form can contribute to regional innovation by supporting elements of human connectivity and creativity. This, in turn, can increase regional economic vitality enhancing national innovation, competitiveness and knowledge productivity. Such a hypothesis places new importance
on improving the capacity of the local urban ecology to influence the efficiency and mobility of regional innovation inputs. As such, local nodes of human connectivity, interaction and vibrancy become logical places to facilitate global linkages and the flow of regional information and knowledge. That is, creating more interactive socio-economic spaces can leverage more formal new economy components to assist a region in organising and developing knowledge. The challenge for individual countries, regions, cities and localities then becomes to formulate and implement innovation and knowledge development policy sensitive to respective socio-economic characters.

This link between competitiveness and the urban environment suggests that certain elements of urban space design and surrounding urban form can contribute to economic efficiency in a knowledge economy. Some spaces may be naturally more adept at doing this than others. This paper proposes that those spaces are likely to be adjacent to key public infrastructure such as train stations, and that developing these for human interaction, vibrancy and connectivity strengthens regional innovative flows. Successful interactive, vibrant and connected spaces accumulated on national or regional levels can consolidate national innovation systems and increase knowledge productivity (Martinus, 2010a).

This paper describes the preliminary findings of a space providing an environment of interaction and connection likely supportive of regional knowledge economy objectives. It presents survey results assessing respondent’s attitudes and movements through a popular public space in Kobe, Japan. This movement of people waiting in and flowing through the space was consistent with expectations of any space outside of a busy train station. However, compared to numerous other spaces in the vicinity, this space appeared to be a major point of contact for a cross-section of the local and global communities. It was a popular meeting place for the elderly, despite the large number of sometimes loud youth. It attracted mothers, children, homeless and retirees alongside the students and businessmen of adjacent CBD and universities. It drew people from a range of countries in percentages disproportionate to Kobe’s actual foreign population.

The broad range of people attracted to the space represented its borderless appeal and capacity to facilitate a regional flow of human capital, knowledge and information. This paper finds it highly likely that this space has contributed to Kobe’s relatively rapid and successful switch from an industrial manufacturing economy to one centred on the production of knowledge, creativity and innovation.

Surprisingly, the lack of aesthetic appeal observed in the space appeared to have little bearing on its above-average capacity to attract and retain people. Many survey participants reported coming to the space often and for extended periods. There were two conclusions to be drawn from this. Firstly, the diversity in infrastructure and amenities surrounding the study site supported its vibrancy by encouraging human diversity and movement. Being adjacent to the CBD, transport, tourism and education, most respondents found the space a convenient access point to a range of infrastructure and amenities. Entertainment and leisure aspects of the city appeared particularly important.

Secondly, human diversity and movement in the space created an organic non-discriminatory milieu capable of supporting and building local social capital. Respondent’s answers showed a high correlation between the number of times they frequented the space and the likelihood of an unplanned meeting. This is likely to enable a fluid and unplanned environment of human connections capable of generating a network of ad hoc personal and business relations supplementing to those formed through normal business and personal avenues. The spontaneous nature of the space can enhance
the city’s creativity and connectivity supporting a more efficient innovation and knowledge development process.

The space outside of Sannomiya Hankyu Station appears to have nurtured a unique atmosphere of humanity and culture reminiscent of busy street-side café. Its environment is highly vibrant and access socially inclusive, playing a large part in local identity and social amenity. The space appears to significantly contribute to the knowledge economy priorities of better human interaction, vibrancy, movement and connectivity. That is, in attracting a wide range of people it demonstrated its capacity to cluster knowledge, and in retaining them it offered opportunities for interaction, strengthening of local social capital and knowledge exchange. This paper concludes that the space itself forms part of the Kobe regional innovation system. Dispersing such spaces throughout a city ensures sustainability and efficiency in new economy production. Therefore, understanding how to leverage and consolidate the human aspects of such spaces provides critical infrastructure cities of knowledge and innovation.

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References


Appendix 1. Translation of survey questions
Cities, human well being and the environment: conceiving national regulatory knowledge systems to facilitate resilient knowledge, knowledge based development and inter-generational knowing

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We are interested to hear from and work with groups that have commitments to regulatory reforms and public knowledge as outlined in this paper.
Structured Abstract

Purpose – The objective of this paper is to explore the linkages between notions of ‘resilient knowledge’, ‘knowledge based development’ and what we term ‘regulatory knowledge systems’. We claim that building resilient knowledge systems will prove to be critical for the future sustainability of modern day cities. The quality of modern city life is now very dependent upon the use and integration of sophisticated technologies, human service networks and physical infrastructure systems. But such networks and systems require that a knowledge society keeps re-equipping itself so that each generation can manage these assets on a cost effective and sustainable basis. The continued equipping of future generations to manage current and emerging assets, including physical and information assets is what we mean by resilient knowledge systems. Failure to build such systems will see the erosion of the quality of our collective assets in modern day cities. This task, we think, represents an extraordinarily large conceptual and practical challenge – and we argue, requires conceiving new national architectures associated with current regulatory frameworks.

Design/methodology/approach – We progress our investigation as to the nature of resilient knowledge and knowledge based development as an emerging scientific discipline, in two separate sections. In the first section, we explore the idea of the epistemic loss of knowledge. We suggest this type of knowledge loss occurs where there is inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information through time. We suggest this is a serious problem for those that have responsibility for the on-going management of our modern day cities, because inadequate attention is paid to supporting effective knowledge exchange across the generations. We provide a brief overview of an emergent approach that could address this problem – an approach called contextual information management. In the second section, we document examples of how this new approach might be harnessed to create a framework for a (national) regulatory knowledge system. We draw upon one particular case study: the conception of quality standards within the Victorian Community Sector.

Originality/value – We claim that the originality and value of our proposal is that we show how to turn the problem of epistemic knowledge loss on its head. We are interested in how the dynamics of knowledge acquisition can emerge through different type of regulatory network systems that allow Government, citizens and other relevant stakeholders to collaborate in new frameworks of engagement. But to achieve new models of engagement, we think philosophical issues associated with conceptions of knowledge acquisition need to be considered. By extension, therefore, we suggest the focus of regulatory interventions should not be on compliance per se, but on creating a shared context between Government, stakeholders and citizens to support the dynamics of problem solving, knowledge acquisition and what we call evolutionary possibility. We suggest that the approach we outline will be important if effective and sustainable inter-generational knowledge exchange is to be successfully achieved through time.

Practical implications – The outcomes of such an approach involves the creation of resilient knowledge systems. Such systems allow for the continued evolution of knowledge associated with, in principle, any aspect of city life - for example, activities associated with health and community services, infrastructure and waste management services, sustainable procurement from agricultural hinterlands and even regulatory pathways to transition towards a post carbon economy. It is no coincidence that the application of contextual information management practices could do much to allow for the emergence of harmonised knowledge systems for example across State and Commonwealth areas of jurisdiction. In this way, this could avoid the turf warfare of top
down (political) and bottom up (grass roots) approaches to national reform and regulation. Crucial to the successful achievement of these challenges will be how regulatory knowledge systems are designed to support effective cycling between tacit and explicit forms of knowledge representations, which we discuss in some detail. We conclude here that the emergent social systems within which tacit – explicit knowledge cycling will be required could spawn the emergence of radically distributed knowledge systems. We refer to these systems as public knowledge spaces. Such models might well be considered radical for now. However, Martin Luther’s spawning of the European centric reformation occurred less than 100 years after the invention of Gutenberg’s printing press. This provides an example of the sorts of radical changes that can be unleashed through new technologies. We are really only about 30 years into the global journey associated with the rise of digital technologies and have only just begun to experience the disruptive effect on all types of social systems across the world. This paper should be considered from within this larger historical context.

Keywords – Economic Policy, Resilient knowledge, Waste management, Regulatory frameworks, Knowledge Networks, archival informatics

Paper type – Academic Research Paper

1 Resilient knowledge, regulatory knowledge systems and intergenerational knowing

1.1 Introduction

Javier Carillo, President of the World Capital Institute has been actively advocating for an emergent professional domain of practice called ‘knowledge based development’. In his presentation to the 2009 Knowledge Cities Summit (in Shenzhen, China), he has outlined how knowledge based development is emerging as a global field of research and practice. He presents a vision that this domain might follow the trend associated with the institutionalisation of ‘scientific disciplines’ in the 1970’s (Carillo, 2009, slide 8).

In the first section of this paper we aim to explore the idea that regulatory interventions made by governments can contribute to the objectives of what Carillo calls knowledge based development. We also aim to explore some of the deep intellectual issues that might be involved if knowledge based development were to evolve in a way that it might be considered as a ‘scientific discipline’ along the lines that Carillo appears to advocate.

In this era where resources are scarce we suggest that regulatory interventions should aim to contribute to knowledge based development. Our central claim is that the dual imperatives of advancing human well being and safeguarding the environment are so pressing this requires commitments to a public knowledge imperative. The public nature of this imperative is required firstly to ensure that the best type of knowledge possible is used as a basis for designing regulatory interventions in the first place. Secondly, network interactions and reflexive processes allows for the continued evolution and enhancement of public knowledge assets. Thirdly, there is a need to ensure appropriate levels of compliance are evidenced at particular points in time so as to secure and enhance the public interest and the interests of citizen themselves.

At the heart of these challenges is the need to conceive a framework that allows for the evolution of declared theories about what works in the world and the testing of these theories through the collation of an evidence base through time. But before we discuss these matters, we first wish to discuss findings of one research assignment where it has
been identified how important knowledge can be lost through time. This topic is of immense importance to cities where knowledge loss can result in catastrophic and expensive system collapse.

1.2 Exploring the dynamics of epistemic loss of knowledge through time

1.2.1 Radioactive waste management as an archetypal knowledge problem

There can be no more important metaphor to evoke the importance of time and its relevance to information and knowledge transfer through the generations, than the problem posed by the long term storage of nuclear waste (McCarthy et al., May 2006, p 3).

The length of time for which information relevant to radioactive waste safety may be required is, therefore, determined by a variety of factors. In the short-term, or during the period of direct institutional control, the length of time will be determined by technical, regulatory, operational management and societal needs. In the longer term the primary determining factor could be the longevity of the radioactive waste itself.

In their report to the IEAE, McCarthy et al (ibid, p 8) identify two modes through which failures occur in the preservation and transfer to future generations of information important to the safety of radioactive waste disposal facilities, namely:

- **Epistemic loss** – where there has been inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information; and
- **Physical loss** – where physical changes in or destruction of either the medium or the supporting technology have rendered the information unusable.

The complexity of the time dimension associated with the epistemic loss of information and knowledge has been scoped in some detail (ibid, p 17).

It is epistemic loss which is least evident to contemporary generations but is perhaps the most critical. Interestingly, early preoccupations in both the recordkeeping professions as well as in the nuclear industry were focused on finding solutions to physical loss, whereas it is only recently that the issues of context, structure and meaning started to be addressed. It is the need to sustain knowledge of the elements that comprise both the complex socio-technical framework and the specific circumstances that surround any particular information resource which is at issue here. ... The recorded evidence of the activities of a radioactive waste program is not typically held in scientific publications but in records and other information resources that lack the robust public infrastructure that supports scientific literature.

One of the key claims of our paper is that the management of radioactive waste and the information pertaining to that waste presents as an archetypal knowledge management challenge. We use the term ‘archetype’ in the sense that the models that emerge to address the challenges of information and knowledge preservation and transfer to future generations are likely to pertain to a wide range of other types of application in the management of modern day cities.

McCarthy et al (ibid) spent considerable effort in researching the characteristics of the knowledge challenge associated with a radioactive waste disposal program. Such a program encompasses activities at different points of time in the disposal program, for example, at pre-disposal, emplacement and repository post-closure stages. The time dimension associated with such programs pose challenges for those with conceptual
responsibilities for the design of resilient information systems. McCarthy and his team have described some of these challenges (ibid, p 21-22).

**Continuity of responsibility**
Ownership of responsibility for the operation of a nuclear waste facility can change over time and thus result in the loss of management system continuity.

**Changes in the socio-technical framework**
It is inevitable that significant changes in all ancillary organizations and other stakeholders with an interest in safety will occur through time. Changes in these parameters will likely influence the nature and character of the framework that underpins radioactive waste safety. For example, changes will emerge in waste management policy and regulation, societal structures, scientific and technological advancement, evolution of the waste facility, changes in land-use, State and organisational governance, language and meaning and climate change.

**In formation formats and interpretation**
Two other factors that influence potential epistemic loss are the format of the content (information) and the interpretation of the content. The content of an information resource can be expressed in various ways including the spoken word, actions, text, pictures, sound, moving images, ideograms, computer codes, and as physical objects. These information resources will generally comprise discrete data sets, documents, publications and samples, many of which are produced in vast quantities.

**Implicit and explicit knowledge**
In broad terms, the knowledge resources created during the course of a radioactive waste program comprise of two types. First there is the knowledge created through people’s direct experience and preserved in living (human) memory. Second there are the explicit knowledge artifacts that are captured through the creation of records, including objects, samples and other documents. Knowledge commonly drawn up at a social level (referred to as common knowledge) provides the contextual framework in which work is undertaken. McCarthy and his colleagues suggest that some of this context needs to be documented and made explicit if the records created are to be understandable in the future. Information custodians need to ensure that they have the capability to link their explicit information resources into larger information networks. To achieve this they will need to ensure they maintain relevant contextual information in a form that enables interlinking or citation between systems. Furthermore, individual custodians may have to manage a broad range of information resource types and ensure that their resource management and contextual information registers (metadata) meet the appropriate international standards. A significant knowledge risk is that insufficient attention is paid to creating an information resource that documents the common knowledge of the time and leaves associated records open for misinterpretation.

**Selection of information for future use**
Ownership of responsibility for the operation of a nuclear waste facility can change over time and thus result in the loss of management system continuity. An effective waste management program involves identifying the factors influencing the selection of which records are to be preserved on an on-going sense and for how long. The relevance of each information object can change with time and circumstance and it is not possible to predict, with absolute certainty which records will be required in the future.

**Capture of contextual information**
Records are never generated in isolation but occur within a multi-layered contextual framework that extends beyond the local waste disposal operations in which they were created. The extended contextual framework is defined by a number of factors including the individuals and organizations involved; the regulatory framework; governmental structure; the geographical environment; the international community; climate change; major events; and the scientific basis for the industry. Records therefore cannot be accurately interpreted in isolation but must be understood in a broader context. Contextual information provides insight to the waste disposal operations and is essential for the accurate interpretation of the detailed waste records.

1.2.2 Reframing the focus away from the problem of knowledge loss

We suggest that the learnings derived from McCarthy’s several year investigation into the epistemic challenge of knowledge loss in relation to radioactive waste management has much wider application than the domain and interests of the IEAE. Indeed, we are suggesting that the potential impact of knowledge loss is becoming so widespread that this issue should in itself become the subject of knowledge orientated interventions. The recent catastrophe in the Gulf of Mexico has highlighted just how fragile the world is becoming with respect to human impact on our environment. Thus, the disaster indicates that managing for environmental sustainability must now surely be an exceptionally high public policy imperative for all Governments – indeed for all communities – and especially those that participate in modern city life.

Within this overall context, in tackling the problem of knowledge loss we suggest a broader, yet to be realised conception of this challenge needs to be developed. As we are suggesting, it is imperative that a time dimension is taken into account to enable the sustainable and effective knowledge transfer across generations. But, we contend that an objective of intergenerational knowledge transfer will in of itself not suffice. We are suggesting in this paper that instead of focusing on this objective of knowledge transfer and the problem of epistemic loss of knowledge, in contrast the imperative is to design systems that are built upon the dynamics of knowledge acquisition and what we later call ‘evolutionary possibility’.

1.3 The dynamics of knowledge acquisition

Having described what we consider to be an archetypal knowledge management problem, we now wish to suggest there can be an archetypal solution. Because we suggest there can indeed be an archetypal solution we suggest this approach could apply equally in the health, public utilities, community services and natural resource management portfolios as it might do in the realm of radioactive waste management. Thus our central claim will be that regulatory interventions should not aim to exclusively focus on risk mitigation. They should also aim to enhance the dynamics of knowledge acquisition and evolutionary possibility.

In moving towards our proposed archetypal solution, we suggest there is a need to develop dedicated and publicly orientated knowledge spaces and knowledge-network systems. The logic of this argument needs to be advanced incrementally, and thus we first focus on the nature of knowledge itself. We understand knowledge to be an emergent property of evolutionary systems.

1.3.1 Knowledge as an emergent property of evolutionary systems

The foundation for our ontology of knowledge has been outlined in detail in Vines et. al. (2010a). To some extent this work builds upon and is complementary to McCarthy’s
et. al. (2006) earlier work. We have been influenced by Karl Popper’s theory of knowledge (1972). Popper suggested that knowledge is solutions to the problems of life – or at least claims towards solutions. As outlined in Vines et. al. (2010a) we choose to adopt this approach because it is grounded in an idea called an ‘evolutionary epistemology’ (“EE”). Donald T. Campbell (1974) first coined this term. However, Campbell credits Popper with its origination and with expressing its fundamental perspective in Logik der Forschung (1935). Both Campbell (1959, 1960, 1991) and Popper argued that knowledge emerges in living things as they adapt to the world. In his most complete explanation, Popper (1972 p. 241-5) referred to this as his ‘general theory of evolution’.

![Figure 1. Popper's 'general theory of evolution'](From Hall 2005, after Popper 1972: pp. 243).

In this theory outlined in Figure 1, $P_n$ is a ‘problem situation’ the living entity faces and $TS_m$ represents a range of ‘tentative solutions’, ‘tentative hypotheses’ or ‘tentative theories’ the living entity may propose or act on. EE (‘error elimination’) represents a process by which tentative solutions are tested or criticized to selectively remove solutions or claims that don’t work in practice. Popper and Campbell are slightly different in their perspectives of EE in that Popper sees the selective forces of reality eliminating the failures, whereas Campbell sees selection leaving behind those tentative solutions that didn’t fail. In either case, $P_{n+1}$ represents the now changed problem situation remaining after a solution has been incorporated. As the entity iterates and re-iterates the process (the arrow indicating iteration is added), it will construct increasingly accurate representations of and responses to external reality. These interconnected ideas formed the basis of Popper’s (1972) ‘general theory of evolution’ and the ‘growth of knowledge’ that takes place in living entities. This idea of an evolutionary epistemology encompasses what we mean when we say that knowledge is an emergent property of an evolutionary system.

This evolutionary aspect of Popper’s theory of knowledge is hitherto relatively unexplored by the knowledge management domain (with a few exceptions such as Joe Firestone in the US and William P. Hall at the University of Melbourne and for example, a recent collaboration between Vines, Hall, McCarthy and Firestone in Cope, Kalantzis and Magee - forthcoming). But there is a distinct convergence in ideas between the later
Popper and Darwin himself. The idea that the emergence of human-centric knowledge itself is shaped by the evolutionary systems of which they are a part and that there is a selection for retention amongst variant kinds of hypotheses is essentially a Darwinian idea (Munz, 2004, p 137):

It was not until the 1960s that he [Popper] began to understand the striking resemblance between Darwinian evolution and his own alternative to positivism. In Darwin’s theory, as in Popper’s alternative to positivism, method did not count. Mutations were as random and unpredictable as the inventions of hypothesis or theories. In Darwinism, what mattered was the selection for retention of a certain kind of mutation; and in Popper’s view, what mattered was the retention of a certain kind of invention – that is unfalsified ones. As in Darwinian evolution, none of the results can be final, and there is continuing revision and criticism.

Popper’s notion that [scientific] ‘method did not count’ in relation to the development of new theories and that developments should be considered as random and unpredictable as the occurrence of mutations in Darwinian evolutionary theory requires further clarification. Thus, we turn our attention to the evolutionary nature of human centric knowledge systems.

1.3.2 The evolutionary nature of human-centric knowledge systems

Peter Munz offers a poignant perspective of Popper’s evolutionary theory of knowledge – poignant because he is reportedly the only person in the world to have been a student of both Popper and Ludwig Wittgenstein. Both Popper and Wittgenstein were exceptionally influential philosophers of the 20th Century. Popper became known for his philosophy of science and in particular the theory of falsification. Wittgenstein was more interested in the social theory of knowledge and linguistic philosophy (Magee, 2001 p. 202). As it turns out, both men contributed to divergent streams of thinking in the 20th Century - Popper became influential in the realms of hard sciences and the politics of an open society, where as Wittgenstein became influential in the realms of the social sciences and linguistics, including functional linguistics.

A central thesis of Munz (2004) is that great benefit would have been derived if Popper and Wittgenstein had been better able to engage in critical dialogue between their respective points of view (and areas of incommensurability). We think Munz’s critique of these two great philosophers, and incidentally how they both influenced the rise of influential writers such as Thomas Kuhn (ibid, p 120-129) is relevant because we aim to draw out important principles associated with the evolutionary nature of human-centric knowledge systems. Munz, (ibid, p 203-204) came to the conclusion that a co-evolved philosophy between Popper and Wittgenstein would confirm the view that knowledge is best understood as a Darwinian idea. For example, (Munz, 2004, p 41) states:

The case of Popper’s rejection of induction as a criterion of truth is very similar. When he first formulated it, he had no idea how it would eventually lead him into Darwinism and connect with a whole movement of thought in other spheres.

To frame our further discussion of Popper and Wittgenstein, we first draw upon the philosophy of the American pragmatist Charles Sanders Peirce. Peirce’s pragmatism saw him advocate views such as ‘knowledge as a form of practical movement’, ‘knowledge is an activity’ and that meaning is derived from taking actions which make a difference (Magee, 2001, p. 186).

Sowa (2009) has neatly summarised aspects of Peirce’s philosophy of pragmatism and in particular the inter-relationships between abduction, deduction and induction. In Figure 2, we have adapted Sowa’s interpretation of Peirce’s philosophy of pragmatism.
Of primary importance to our discussion is the role of the inference logic ‘abduction’ in theory making. According to Sowa, abduction involves the activity of extracting, guessing and adapting. A hypothesis (or theory) can be developed through intuitive means by inferring from un-related facts. To this extent Popper and Peirce are very similar. Whereas Peirce talks about abduction as guessing and adapting, Popper’s philosophy involves creating possibilities where-by theories are ‘freely made up’.

Importantly, in both cases, declaring theoretical possibilities does require parallel commitments to considered and responsible judgements. For example, in Peirce’s case (as outlined in Figure 2) theory making is followed by deduction – planning, reasoning and evaluating - to deduce predictions or options for action from the theory. When action is taken, the impact in the world can be assessed through induction, by taking measurements, by articulating observations. Through induction, we draw upon our ability to monitor and measure the impact of our actions in the world.

In Popper’s case, deductive and inductive reasoning can be applied in order to prove theories wrong. By implication, for this theory of falsification to be made possible, theories need to be conjectured in ways that allows for them to be falsified. To this extent, Popper was explicit about notions of objective knowledge because he claimed knowledge was not accessible through the senses, because such knowledge can not be falsified. Munz highlights how Popper’s theory of falsification later became much closer to a Darwinian idea of natural selection (2004, p. 138)

... When Popper declared that there can be no scientific method because truths are produced by unmethodical, free inventions afterwards subjected to criticism, he was echoing Darwin’s insistence that we do not need a designer to produce a viable organism which looks as if it has been designed. The crucial point is that Popper’s philosophy of science is an extension of Darwinism to the acquisition of knowledge. But decidedly it is not a Darwinian explanation of our ability to acquire knowledge through our sense organs and do science by inductive generalizations of those sense observations.

Importantly, Munz must not be understood as an apologist for Popper. Munz was concerned about how the central tenet of positivism could be refuted by Popper if Popper did not address the problem of the meaning of a theory. He was interested in how meaning can be ascribed to a theory if that theory is freely made up before there is evidence as to its coherence and / or truth. By implication, Munz thought Popper was lacking because he did not think Popper adequately answered the question as to how a theory could have meaning if such meaning could be derived from evidence (or examples). Munz suggests this highlights a weakness of Popper’s approach – he suggests that Popper was not interested in linguistic philosophy in the way Wittgenstein was. Munz suggested that Wittgenstein helps overcomes this problem and thus confirms how Popper should be understood as anti-positivist.

The proposal [of a theory], unlike the genetic mutation, has to be understood before it can be subject to selection, that is, to criticism. Popper’s philosophy of knowledge, for this reason, needs to be amended. There has to be an explanation of how the meaning of a proposal can be ascertained when it cannot be ascertained by ostensive definition. ..... In Wittgenstein’s later philosophy, the speech community is the be-all and end-all of the source of meanings of what we are saying. He was completely indifferent to the problem that politically, not all speech communities are alike, and took it that as far as the determination of meaning is concerned, the politico-social structure of a community did not matter. In this, he was mistaken. Some allow criticism, others encourage it and others again prohibit it altogether. Therefore, Popper’s argument that only some very special politico-social orders are conducive to
the criticism the proposals have to be subjected to world, in turn, have been a welcome amendment to the later Wittgenstein.

This potential for the later Wittgenstein to have been open to the influence of Popper’s argument is of fundamental importance to our incremental argument. We are claiming there is a need to develop dedicated and publicly orientated knowledge spaces and knowledge-network systems. Thus, we now aim to draw out some of the underlying principles of this approach.

1.3.3 Principles underpinning the harnessing of evolutionary possibility

We have laboured through our analysis of Popper and Wittgenstein, because these matters have relevance to our ability to understand the dynamics of knowledge acquisition – of being able to harness evolutionary potential within human-centric knowledge systems. In considering these matters, we now wish to outline some of the cornerstone principles associated with harnessing such possibility. In so doing we again refer to our adaptation of Sowa’s (2009) interpretation of Peirce’s logic of pragmatism as outlined in Figure 2 below.

**Figure 2. The logic of pragmatism (Adapted from Sowa, J. 2009)**

What follows is a discussion of certain aspects of Figure 2 in turn. These provide an overview of the principles that underpin our understanding of the dynamics of knowledge acquisition and evolutionary possibility.

**Language is a medium for knowledge creation**

The role and appropriate use of language is pivotal in understanding how knowledge is acquired. Language is contextual and plays a generative and functional role in the knowledge acquisition process. Through language there is potential to freely declare what might be possible before there is evidence as to whether something ‘works in the world’. We have discussed this point by referencing the contributions made jointly by Peirce and Popper. Central to this ability to declare what might be possible, are the commitments that allow actors the freedom to freely invent new theories and possibilities in language. Theories are therefore linguistic expressions of declared
possibilities, but they are expressed in ways such that they can be shown to be false – that this their linguistic expression allows for them to be falsified.

**Commitments to political openness enable the propensity for possibility**

Specific groups tend to define meanings according to the social norms of the group they belong to. To avoid descent into the closed speech communities outlined in our discussion of Wittgenstein, efforts can be made to sensitively expand the context to include levels beyond the individual professional group. This ensures that constraints are imposed on individual communities to ensure their meaning frameworks co-evolve with the meaning frameworks of other groups and do not become self-referential. Thus, knowledge acquisition is accelerated when a shared context is created in order to mediate the meaning frameworks between groups. For this to be achieved, there are commitments required to create opportunities for mediated exchanges between different groups.

**Knowledge claims are context bound**

In unpacking the implications of declared theories and possible causes for action, we suggest that the linguistics used to express theories is set in relation to the context of the problem situation being considered. Thus, predictions or options for action that can be deduced from theories need to be considered within the context of the system complexities within which action is to be taken. For example, some systems might be regarded as deterministic, in which case the impact of actions to be taken might, to some extent be *predictable*. In other cases, the systems might be in-deterministic, in that there can be no cause and effect relationship between the chosen intervention and the impact. In such circumstances, different options might be evaluated and then implemented. The logic of pragmatism involves commitment to monitoring the impact of any intervention - those interventions that generate desired impact can be amplified and those that generate negative impact are best constrained.

**Knowledge claims are tested and refined through time**

Whilst knowledge is declared as possibilities in language, the potency and currency of these claims are selected through time. Selection can occur by undertaking whole and part system monitoring (for example, at local, catchment, state, national or international levels). Monitoring systems are designed to allow for different types of logic to be applied including abductive, deductive or inductive reasoning (see Figure 2). Surviving knowledge claims are selected through time giving rise to an evolving evidence-base.

**Knowledge claims can be used to establish baseline practice-norms**

Tested knowledge claims can be elevated to establish practice norms or regulatory standards. Standards, even minimum standards, establish what is possible or what can be reasonably expected. We suggest that it is the normative aspects of quality standards that give rise to the regulatory function of these standards. Evidence of action that is in alignment with declared standards arises from evidence artefacts – records of particular action events. In the evidentiary processes associated with compliance, network systems should allow for social reflexivity – to ensure that standards are not reified and exert too much constraint on the emergent properties of the systems in question. Specifically, such standards should not result in diminished opportunities for actors to make free and informed decisions about the application of theory at any particular context – the principles that theories are freely made up apply at multiple levels of focus within any given system.

**Self and external auditing is a form of system constraint (and social learning)**
Attempts to monitor the coherence of any given human system through self or external auditing should be understood as a form of constraint. The level of constraint imposed on the system can vary according to the context. This notion of constraint should not be perceived as necessarily negative, because it also creates an opportunity for social learning across multiple levels of focus. For example, external auditing can assist in ensuring consistency of approach across different parts of any distributed knowledge system.

1.4 Enhancing evolutionary possibility through distributed problem solving

Drawing upon our discussion of the epistemic loss of knowledge and the dynamics of knowledge acquisition, we now examine a possible framework for the conception of knowledge acquisition and evolutionary possibility. To do this, we will first return to the ‘archetypal knowledge problem’ of radioactive waste management described in Section 2. We will use this as a starting point for the development of an ‘archetypal knowledge solution’, then we will identify some of the specifics of what this might look like and finally consider the broader principles embodied by such an approach.

1.4.1 Revisiting the problem of radioactive waste management

We have previously highlighted the importance of developing an approach to information management that both captures and describes context. This objective forms the basis of a new type of information management practice which McCarthy calls contextual information management. Such an approach aims to mitigate the risk of epistemic loss through the retention of information about the socio-technical complexity surrounding information resources. In principle, this allows users to understand the meaning of those resources within different contexts that emerge over time.

But the function of contextual information management involves much more than this. McCarthy et al. (2006) suggest conceptions of contextual information have the potential to allow for functional abstractions of the natural complexity that exists in the world itself (ibid, pp. 31-32):

*All human societies have ... invented means of coping with uncertainty and ways [of] reducing complexity. Street directories, maps, encyclopaedias, biographical registers, dictionaries, glossaries, tourist guides, administrative histories, archival guides, library catalogues and more recently web-based search engines and knowledge networks are all examples of systems of abstracted information that help individuals cope with the complex and sometimes foreign environments in which they find themselves. It is possible to conceptualise these abstracted complex environments as networks of entities (for example: people, organisations, places, concepts, and events) that are linked by defined relationships ...*

*It is possible to conceptualise the radioactive waste industry as a complex socio-technical network with the added explicit need to preserve and transfer information over very long periods of time. An information network based on these ideas would appear to be ideally placed to take advantage of the benefits associated with open complex networks, such as robustness, utility, traceability, navigability, universality, sustainability, historical integrity and the ability to evolve through time.*

The ability for such abstractions to reflect the complexity ‘out there’ in the world is through the use of surrogates that represent real-life entities. By utilising this idea of surrogates, potential is created for ‘the assembling and interconnecting of information using contextual elements’. This results in (ibid, p. 33):
an information architecture or framework that mimics the social and operational networks of real life – a contextual information framework”.

These ideas provide the building blocks of our proposed archetypal solution to the challenges of knowledge acquisition and evolutionary possibility. McCarthy et al. go on to describe what a contextual information framework has the potential to look like (ibid, p. 35):

A contextual information framework, which generally exists within a broader information network, is usually composed of interrelated information objects (or metadata records) that represent entities found in real life. Its framework structure stems from the relationships between these entities. The information entities act as surrogates for real-life entities that could include people, organisations, concepts, ideas, places, natural phenomena, events, cultural artefacts including records, books, works of art and, indeed, radioactive waste disposal facilities. The structure is actually established through the codification and mapping of relationships between these entities. This creates a network or framework that mimics what actually occurs in life and is therefore at the human scale.

1.4.2 Contextual information and the encoded archive context (EAC) standard

This vision of entities and relationships forming a contextual information framework has been a key and evolutionary concept in archival theory over the past decade. The capture of contextual information is a vitally important part of good archival practice as it relates to creators and custodians of records. But more broadly than this, contextual information frameworks can be used to map the socio-technical space in which records were created, used, modified or destroyed. In so doing, the records are contextualised and remain understandable over time. The 2001 ‘Toronto Tenets: Principles and Criteria for a Model for Archival Context Information’ provides a vision for this notion of context (Pitti, 2003, p. 96):

Context information is not metadata that describes other information resources, but information that describes entities that are part of the environment in which information resources (i.e., records) have existed.

But, beyond context information, there is also contextual information. As noted in the quote from McCarthy et al. above, it is also useful for networks of contextual information to be linked, or to intersect, at various points. Context entities can be relevant to more than one set of records; or, to state this in broader terms, an entity relevant in one information framework may also be a relevant entity in another information framework. In other words, contextual information includes both the use of surrogates and relationships between surrogates. Surrogates act as archetypal representations of reality and contextual information encompasses their use and the relationships that exist between them.

The implication of this is very significant. In the print world (in the dictionaries, encyclopaedias and other resources used to map and represent the world in the past) creating relationships between entities was not possible. Resources or descriptions had to be duplicated across different resources. However, as we migrate to the post-print world we have other options: a single entity can become a component in multiple information frameworks; frameworks can be related and linked to each other; or relevant information (including entity information and relationship information) can be ‘harvested’ from one network for use in another network.

The archival community, in preparation for these possibilities and acknowledging the principles outlined in the so-called ‘Toronto Tenets’, saw that a standard for entity and relationship descriptions would be required to facilitate these cross-network relationships
and/or harvesting possibilities. Thus there was a move to develop the Encoded Archival Context (EAC) standard. Daniel Pitti, as a member of the working group developing the standard, writes (Pitti, 2003, p. 78-79):

Markup and relational database technologies are inspiring archivists to envision new systems that use distinct apparatus for each component and then dynamically inter-relate them to form a complete archival descriptive system ...

Markup and relational database technologies enable developing flexible and dynamic descriptive systems. By developing dedicated semantics and structures for describing each descriptive component and their complex interrelations, we can build descriptive systems that are far more efficient and effective than those we have realised in print.

Though we will not go into the specifics of the standard here, EAC was conceived to describe entities in a structured way – with unique identifiers, entity names, dates and date ranges, locations, functions, descriptions, etc. – linked by defined and dated relationships which, once created by people’s interpretative intelligence (Vines and Firestone, 2008) then exist between the entities themselves. The intention of the standard is to be able to create robust contextual information networks which are located in, and persistent through, time.

The vision is therefore one not of fixed stand-alone resources, but of complex descriptive systems built from and using dynamically interrelated components.

1.4.3 The benefits of using contextual information principles

Capturing knowledge in a contextual information framework, using EAC or a similar approach, has two broad benefits. The first is that information networks remain open, flexible and inter-operable. As an example, the National Library of Australia – by combining the use of the EAC and the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) framework have been able to effectively harvest records from multiple knowledge networks as part of their People Australia project (2008). This shows the potential that such frameworks can facilitate interoperable and open networks of exchange that allows users to navigate their way across multiple information domains. Further, the use of EAC as an information architecture allows for the import and export of EAC compliant data both forwards into new systems and backwards into older systems. This ensures that the potential for expansive inter-connectivity is continuously available.

The second benefit is that the potentially damaging effects of descent into closed or protected systems and knowledge-communities are minimised. For example, as we have previously pointed out, not all speech communities are alike, and there are differences of language, structures, and socio-political orders which operate within different sectors, communities or groups. Care therefore needs to be taken when attempting to impose a standard, or regulate the operation of disparate information networks. Pitti recognises this (2003, p. 81), suggesting that it is:

explicitly acknowledged that standards are intellectual and technical products, but also inherently political products. Cooperation and consensus are absolutely essential, and participants require a willingness to collectively create and shape ideas. A successful standard needs to embody agreement sufficient to be generally useful for the development of national and institutional systems ... and the exchange of descriptive information between systems. At the same time, the standard must accommodate national and institutional differences.

A focus on the contextual information framework principles outlined in this paper provides just such a balance. Consensus of approach is required to establish the same or
similar frameworks, allowing for interoperability, the harvesting or transfer of
information between networks, and the ongoing compatibility of information resources.

This can be achieved without requiring a significant change in the language used
within specific sectors. The intrusive impact on social languages and local speech
communities can therefore be minimised. Pitti describes this as ‘leaving room for
differences that do not undermine shared objectives’ (2003, p. 81). McCarthy et al. (2006,
p. 39) says something similar when they state that contextual information management
practice complements ‘existing practice as it is a non-invasive technique that builds
frameworks that will enable much more to be done with existing information.’ This
concept of ‘non-intrusive’ or ‘non-invasive’ approaches to storing and exchanging
information plays a vital role in the EAC standard and similar approaches for two reasons.
First, it allows for the application of the standard in a wide variety of contexts,
organisations, environments or speech communities. Second, it also acts to draw upon the
‘social’ languages that form part of the context being mapped.

1.4.4 Distributed information networks

This utilisation of non-invasive frameworks for capturing and maintaining knowledge
within sectors, groups or organisations has great functional utility in other ways as well.
For example, it lends itself to the creation of distributed information networks – a network
of networks, or networks of contextual information frameworks, each of which utilises
the context and social language of its origins. But, it also allows for ontological expansion
of meaning by allowing for the creation of relationships between different information
networks.

We use the term ‘ontological’ quite deliberately in that expanded information and
meaning frameworks are generated by people. Thus, people use their innate intelligence
and sense of being to create relationships, to create meaning, and to solve problems. Such
meaning frameworks are not generated by machines but through the use of human
interpretative intelligence (Vines and Firestone, forthcoming).

This principle is of fundamental importance in that it underpins why we claim that
such a system can only function effectively if it is accompanied by commitments to
public knowledge and public knowledge spaces. Such commitments allow people to be
free - to be fully expressive and to be able to declare possibilities by expanding meaning
frameworks. But equally, drawing upon the use of abstracted entities that act as surrogates
for entities in the world, the benefits of a standard framework for contextual information
management can be fully realised. Connections or relationships between common entities
can be made; information can be harvested from other public knowledge sources where
required; and sectors; groups or organisations become both visible and accountable.

The adoption of the principles of contextual information framework achieves these
objectives whilst being appropriately respectful to the context of the use of these entities,
concepts or ideas as part of each framework. Therefore, connecting knowledge objects
across different boundaries to outside institutional or organisational entities does not
decontextualise that knowledge inappropriately. The process innately is non-invasive or
non-intrusive in that there are no expectations that different frameworks would be forced
to interact in any way. Public knowledge spaces or distributed information networks do
not have a shape or structure into which different types of information and knowledge
must fit. Instead, links between parts of the network can emerge over time through human
use and as people have such needs and as particular solutions to identified problems
emerge.
1.4.5 Knowledge acquisition and the evolution of public knowledge

We propose there will be great utility if knowledge objects are gathered and stored using the guiding principles which underpin standards such as the EAC. We are arguing that the adoption of such a framework will not limit or negate the contextual characteristics of that knowledge or the language with which it is expressed. In contrast, such adoption will allow for the emergence of an expanded and highly distributed network. We are suggesting this can allow for different communities to gradually create a greater sense of shared context as particular pressing problems become better understood and as solutions to complex problems are worked towards.

In generating a greater sense of shared context, we are not suggesting any of this is imposed or mandated by the system itself: social languages are not artificially altered; disparate frameworks are not forcibly brought together; organisations or sectors are not merged ‘against their will’; and contested or specialised areas of knowledge are not made to collide.

Instead, distributed public knowledge spaces encourage evolutionary possibility by not constraining how, when, where or in what way that evolution occurs. Connections and harmonisation can occur at different levels, between levels. No primacy is given to changes at what are traditionally considered higher levels of hierarchy to those which happen elsewhere.

The resultant distributed network allows for knowledge acquisition throughout all nodes of a complex network, as each node is the centre of its own network of relationships and entities. Knowledge acquisition in this environment does not become bound by hierarchies, instead becoming a more organic process where resources are acquired from the surrounding contextual environment, links and are continually change, and new knowledge can emerge at or through any point in the overall system (van den Nieuwenhof, 2003, p. 245).

1.4.6 Enhanced adaptability and distributed problem solving

The approach we are beginning to scope here is consistent with the key principles underpinning the idea of knowledge acquisition as outlined in Section 1.3. Social languages are understood as contextual, the specifics of language as it relates to varied speech communities is maintained; the openness of the network leads to the possibility of evolution across and through networks, rather than within tightly constrained or closed environments; knowledge is context bound, but it is open to falsification and renewal through time.

None of this is to suggest that standards such as EAC are ready for immediate application in this area, or that they should be adopted or imposed in toto. Like any other aspect of a networked system of knowledge, the framework itself will need to be allowed to evolve and change over time as aspects of the framework are tested and falsified. This approach is also allowed and encouraged – indeed should be designed into the system itself.

What emerges from all of the above is that sectors, groups or organisations can adapt when and as required, with more understanding of how these changes affect the network of knowledge and ideas in which they operate. Rather than attempting to protect against perceived external threats, publicly orientated open networks based on common frameworks allows change to evolve through time.

Possibilities for change can also emerge at various levels of the system, either separately or in conjunction with other parts of the system; and any changes that do occur as the network evolves will be visible through time, as will previous ‘states’ of the
system. The effect of changes becomes part of the contextual information framework itself.

Finally, the architecture we are proposing here allows for problem solving to become distributed throughout the system (rather than being an activity or response imposed from above) as each part has an increased awareness of their context and the actual or possible effects of change. As knowledge is shared between networks possibilities for problem solving, knowledge acquisition and evolution possibility expand. Our meaning frameworks and our ability to adapt are progressively expanded.

1.5 Towards a regulatory knowledge system

1.5.1 The semantics of existing regulatory standards

In section 2 of this paper, we discuss at some length the objective of regulatory interventions that involve the administration of (quality) standards within the Victorian community sector as a case study. We observe there are certain types of information that are contained within the semantic content of these standards – some of which are outlined in Figure 3. We also show in Section 2 how there is significant variability and lack of coordination in the semantics of these standards across different sectors. For example we analyse the semantics of the Family Services and Out-of-Home Care, Disabilities and Housing standards and show how each sector has a different interpretation of ‘case management’.

![Related semantics within each standard](image)

**Figure 3.** Types of contextual information embedded within quality standards

In presenting the case study as we do in Section 2, our central concern is to highlight how a lack of coordination in semantics and quality frameworks is a major contributor to the problem of burden. We suggest that this problem has emerged because many of the quality systems and the publishing of standard documents are conceived and carried out using a print-based paradigm.

1.5.2 Embracing a vision beyond print

We are suggesting there is a need to establish a bold vision for re-conceiving the very nature of government regulatory interventions. We are not necessarily suggesting that
regulatory interventions should be designed to directly focus on the challenges of modern
day cities. But we are saying that a distributed and publicly orientated knowledge system
would do much to ensure the best solutions for identified problems have the possibility to
emerge through time.

The case study presented in Section 2 provides an example of the benefits that can be
derived from publishing quality standards using the EAC framework outlined in this
paper. We contend that the gradual adoption of this framework, including its integration
with approaches being developed through the National Library of Australia and other
institutions like the Public Records Office of Victoria create the potential for the
development of public knowledge spaces across a range of different sectors that are of
vital interest to the management of modern day cities. These regulatory interventions can
encompass traditional approaches to risk and compliance. But beyond this, we contend
there is potential to catalyse partnership arrangements that could support the acquisition
of knowledge and evolutionary possibilities. For example, the principles of contextual
information management could be used to publish:

- Quality standards (and clusters of standards) and modifications to these
  standards through time;
- A wide range of published resources that form part of the semantics and
  evidence-base associated with standards, including regulations and
  legislative documents;
- The mapping of institutional relationships that form part of the governance of
  these standards;
- The emerging theory and research evidence base that contribute to current
  practice and positive impacts within the sectors being regulated and upon
  which the standards are promulgated.

A commitment to an open regulatory knowledge system creates the potential for
evolutionary possibility. Different sectors are encouraged to adopt an archetypal
information framework, as outlined in this paper. The existing role of the National
Library in collating published resources including research reports and other documents is
strengthened, because resources can be shared through the EAC – OAI metadata sharing
arrangements that are being pioneered through projects such as the People Australia
Project (National Library, 2008). Constraints that prevent partnership agreements from
being struck - thus allowing contextual information frameworks to be expanded - are
minimised. The role of human interpretative intelligence is elevated. Knowledge becomes
resilient, because people are located at the centre of these contextual information
networks.

2 Conceiving a regulatory knowledge system: a case study from the
Victorian (Australia) community sector

2.1 Introduction: Challenges for the Victorian community sector

The delivery of community support-services in partnership with, and on behalf of
citizens forms an integral part of the knowledge ecology of any modern-day city. Community
expressions of inclusiveness and equity must surely be one of the most
sustainable ways of contributing to the security a city’s people.

Since the early 1800’s, Melbourne and the State of Victoria (Australia) in general
have enjoyed the benefits of a strong and vibrant community services sector. Indeed
Community Service Organizations (CSOs) have played a vital role in the delivery of
citizen-centric support services for a very long time. Victoria has a proud heritage where
initiative and independent action have historically been encouraged (Stronger Community Organisations Project, 2007, p. 7).

In more recent times, the diversity in the roles played by CSOs has expanded significantly now to the extent that allocations across the state budget are very large indeed.

In 2005-06, the community and not-for profit sector delivered around $2.2 billion in government services. (Victorian Government, 2008).

These government services delivered by CSOs and the inter-relationships between these program areas play a vital role in contributing to community harmony and sustainability. For example, take the experiences of migrant children and their transition into becoming contributory Australian citizens. Difficulties that migrant children experience as they develop emergent personal identities in their adopted country may show up at several different points – for example, through visitations to General Practitioners (GPs) or within primary and secondary schools themselves. These points of contact with mainstream Australia can reveal much about children and their experiences of being child-migrants. The points of contact provide a window into the challenges of adjustment for themselves and their whole family and thus service interventions that aim to facilitate effective integration requires a family systems perspective.

To effectively respond to emergent challenges means that services designed to support positive outcomes for children requires joined up services. By joined up, we mean there is some inter-relationship in service models and communication exchanges between, for example, GPs and schools and community organisations that provide family or housing services, or both. This sense of ‘joined up-ness’ is not for the purpose of surveillance, nor should such networks of exchange undermine privacy laws. The purpose in contrast is to maximise the benefits of early intervention services, to support children and their families and their ability to effectively engage in the productive Australian economy through all stages of their developmental life.

We see these aspirations as very much in alignment with existing ideas of knowledge based development. For example, Carillo, indicates that knowledge based development can be underpinned by community values, where he indicates that such an approach involves (2009).

Deliberate, balanced and systematic development of a community’s overall value base.

We claim this aspiration of building a community’s ‘value base’ and the ability of citizenship to develop its capital system is of fundamental importance in the design of human centric service systems. There are, however, many impediments that constrain the development of this type of participatory and democratic approach. One type of constraint is the regulatory burden placed on CSOs in the delivery of government services. In line with the growth of state budget allocations to the sector, so there has been an increased level of regulatory burden placed on CSOs in the delivery of these services. Two Victorian State government reports the Stronger Community Organisations Project (2007); and the Review of Not-for-Profit Regulation led by the State Services Authority (2007) confirm that the challenges of regulatory burden is a significant problem for the Community sector.

In this paper, we are specifically interested in the regulatory burden associated with quality standards. The Office for the Community Sector (OCS) has described the nature of this particular problem in the following way (2009).

Over recent years, both the Commonwealth and State Government have introduced a range of service standards, quality improvement and quality
assurance/accreditation processes to support and improve service delivery. Generally these have evolved independently resulting in limited mutual recognition, duplication in requirements and inconsistent timing for reviews.

This range of standards, quality improvement and accreditation processes can mean that an organisation delivering a number of differently funded programs must adhere to a variety of processes that often cover a number of similar requirements (e.g. Governance, HR management & development, privacy etc.), but have different reporting cycles, processes, and specific requirements. The compliance burden associated with this can be significant.

2.2 What are quality standards and what function do they fulfil?

In advancing our investigation as to the nature of regulatory burden, it is necessary that we outline what we think quality standards are and the functions these standards play. We claim that quality standards are best understood as formalized information schemas. Thus, in setting the context for discussing the problem of burden, we must first discuss the nature of schemas.

2.2.1 What are schemas?

We define a schema as the semantic and organisational structure of a cognitive process (Vines, Hall and McCarthy, Forthcoming). That is, schemas can be tacit, implicit and/or explicit. For example, we experience the tacit nature of schemas when working in cross-cultural contexts that are unfamiliar, where the ability to understand language and to accurately attribute meaning is far from certain. Tacit schemas cannot be made explicit and thus cannot be represented within documents or database structures. In contrast, the semantics and structures diffusely embedded within documents, for example, can implicitly encode a schema that is representative of a person’s personal knowledge of a particular domain. Such schemas are implicit to the extent that these schemas are not explicitly represented. However, given time, they can be made explicit and this is what distinguishes implicit schemas from tacit schemas.

Increasingly there is importance being placed on publishing schemas in an explicit way. That is, unstructured and semi-structured ways of thinking are increasingly being made explicit because there is significant utility associated with the use of the internet and related technological systems to manage content exchanges. This is particularly the case in relation to quality systems, where there are, for example, increasing demands to monitor and evaluate the impacts associated with different types of program/service-orientated interventions. Automated or semi-automated processing by computers can add value and greatly reduce labour requirements – so that data entered and used for one particular set of purposes can be transferred to a different information system and used for another set of purposes – without any need for re-keying of data.

For such benefits to be maximized information systems need to be harmonized by conforming to agreed standards. To reach negotiated agreements about such standards, reviews are undertaken by industry bodies which define, and then describe, the standard in question. These negotiated agreements are published as schemas. Such schemas ‘express shared vocabularies and allow machines to carry out rules made by people’ (Sperberg-McQueen & Thompson, 2007). The advantage of the process just described is that it allows an agreed body to agree upon a schema which is sympathetic to the needs of that industry (or sector) and declares this to be a standard for that industry.
2.2.2 Normative work practices and regulation frameworks

We regard the types of quality standards published by the Victorian Government (i.e. for sectors including FS-OHC, Disabilities and Housing) as specific types of standards. At this stage, these standards pertain to both practice and organisational management norms. We claim it is the normative aspects of quality standards that give rise to the regulatory function of quality standards. Regulatory frameworks that establish normative work practices can be designed to serve three complementary purposes. First, such frameworks have the potential to moderate excessive behaviours that, in extreme cases, can lead to system collapses (such as those experienced in the recent global financial crisis). Deloitte (2009) in a report for the Department of Human Services indicate something similar when they suggest that standards and quality processes are developed with the intent of defining minimum service levels, defining organisational frameworks that support the provision of quality services, for promoting service consistency and for minimising risk.

Second, Vines et. al., (2009) suggest that quality standards can, in principle, be implemented in ways which serve the wider objective of mediating and facilitating the growth of knowledge within an integrated knowledge society. This is in alignment with Deloitte (2009) when they indicate that standards and quality processes are developed to provide guidance about best practice approaches to support services to achieve organisational goals and to enable the organisation, the department and quality improvement providers to monitor and review performance in a manner that can inform the improvement of services.

Finally, the publishing and review of quality standards can also be established in ways which facilitate partnership between funding bodies and the sectors being regulated. (Vines et al, 2009).

2.2.3 The inter-relationships between schemas and standards

The enforcement of any type of standard as a base-line norm can be very problematic. The reason for this is that the real-world application of any standard needs to be understood within the context of a minimum of three different levels of work-practice norms. These levels relate to the individual practitioner, the organisational level and the sector level. In Figure 4 below, we indicate that these levels correlate to notions of personal schemas, organisational schemas and standards themselves. Thus any standard may not necessarily be in alignment with the tacit, implicit and explicit schemas held at personal and organisational levels and across organizations as well.

The sector level refers to the authority-level at which any quality standards are published. We claim that the web-based publishing and application of quality standards contributes to the fabric and nature of a ‘knowledge society’, also outlined in Figure 4. We make this connection between quality standards and a ‘knowledge society’ because we think the publishing of quality standards plays a subtle, but important role in the creation and maintenance of what we have called ‘public knowledge’. Thus, we suggest that quality standards need to be understood as public knowledge assets. However, we further suggest that such standards should not be reified. They need to be understood as negotiated and contested public knowledge and that these negotiation processes involve cycling between both tacit and explicit representations of knowledge. We claim this has significant implications for the design of any regulatory knowledge system in that data collection, collation and interpretation can never be fully automated.
2.3 Regulatory burden as a paradigm problem

2.3.1 Quality standards and the emergence of semantic fragmentation

In April 2009, the eScholarship Research Centre (hereafter – eSRC) at the University of Melbourne was engaged by the OCS to investigate particular aspects of regulatory burden. The research aimed to determine whether it would be feasible to address the problem of burden of multiple quality standards by allowing for the efficient re-use of evidence – whereby evidence used for compliance against one particular quality standard could also be tagged as evidence of compliance against other quality standards.

In undertaking the research, five different quality standards were selected for cross mapping. These were:

- Family Services and Out-of-Home-Care Standard (hereafter FS-OHC) which is a Victorian State Government quality standard (Department of Human Services, 2007a).
- Disabilities Standard encompassed within the documents associated with the industry standard and life areas guide and related ‘evidence indicators’ (hereafter Disabilities). The Disabilities standard has primarily been a Victorian State Government quality standard (Department of Human Services 2007 b, c, d, e).
- Family Relationship Services Program Standard (hereafter FRSP) which is a Commonwealth Government quality standard administered jointly by the Attorney General’s Department and the Department of Families, Housing and Community Services and Indigenous Affairs – FaHCSIA (data unknown).
- Housing Assistance Services Standard (hereafter HASS) which is a standard relevant to both the Victorian and Commonwealth Governments (Department of Human Services, 2005).
- Home and Community Care Standard (hereafter HACC) which is also a standard relevant to both the Victorian and Commonwealth Governments (HACC Working Group, 2008).

In undertaking this work, one of the objectives was to identify particular components of a number of quality standards where it was deemed that the intent of these particular
components was similar. We use the term ‘semantic equivalence’ to highlight that different standards specify similar evidence requirements, but often in quite different ways.

To suite the objectives of the project, a three tiered quality standards publishing schema was imposed onto each of the five standards (see Figure 5).

<table>
<thead>
<tr>
<th>Tier</th>
<th>Name ascribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Standard</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Standard section</td>
</tr>
<tr>
<td>Tier 3</td>
<td>Standard sub-section</td>
</tr>
</tbody>
</table>

Figure 5. A three tiered schema for cross mapping standard sub-sections (Vines et al., 2009)

By cross-mapping at the lowest level of granularity of this three tiered schema (i.e. at the standard sub-sections level) this created an opportunity to establish relationships between standard sub-sections where it was deemed there was some sort of semantic equivalence. The technology platform and informatics architecture developed by the eSRC over many years (eScholarship Research Centre, 2007; McCarthy and Evans, 2008; Australian National Library, 2008; Vines et al, 2009) allows for this type of cross-mapping to be undertaken and is governed by the Australian expression of the EAC archival description standard. A visualization of these relationships is outlined in Figure 6 where these relationships are represented by the lines.

The nature of findings of the first BISQAS-1 project was influenced by the significant levels of fragmentation and complexity (as visible in Figure 6). It was concluded that it would prove impossible to reduce burden by re-using different types of evidence for compliance against different standards. To reduce burden, it would be necessary for the Victorian Government to simplify the quality standards themselves.
2.3.2 Moving beyond a print-paradigm

To understand the reason for our claim that the problem of regulatory burden represents a paradigmatic problem and not just an incremental adjustment, it is necessary to reflect on the nature of change as we continue to move beyond what we call a print-based paradigm. What is the nature of this paradigmatic change? Cope and Kalantzis (Forthcoming) argue that within the context of the transition from the world of print to the world of digital text, the textual representation of knowledge is being transformed in significant ways. They examine six areas of current or imminent change, which they discuss under the headings of ‘the mechanics of rendering’; the rise of a ‘new navigation order’; the trend towards ‘multimodal environments’ and ‘ubiquitous recording’; the ‘change in sources and directions of knowledge flows’; and what they call ‘polylingual potentials’ of the new digital media.

Within the context of these changes, Cope and Kalantzis highlight that even though the text publishing industries are using digital technologies, much of the transition towards digital text has up until now been about digitising what fundamentally remain print-based workflows.

Information is locked up in PDFs which are designed for printing out rather than the functionalities of search, access and reproduction offered by more
advanced digitisation technologies. Such texts-for-print are not marked up by structure and semantics, [our emphasis] so even the best search mechanisms offer little more than what can be achieved through word collocation algorithms, far less adequate even in some crucial respects than the traditions of indexing and cataloguing from the era of print.

One element of Cope and Kalantzis’ (ibid) overall argument is that this paradigm shift is based on the changes arising from a changed modular unit of manufacture:

The fundamental shift in the elementary modular unit of manufacture of textual meaning—from character-level to pixel level representation—means that platforms for text construction are no longer bound by the character set of a particular national language. Every character is just a picture, and the picture elements (pixels) can be combined and recombined to create an endless array of characters.

They further argue that the shift beyond the limitations of character level to pixel level representation is part of a new paradigm change that is spawning polylingual potentials:

whereas the trend in the era of print was towards large, homogeneous speech communities and monolingual nationalism, the trend in the era of the digital may well be towards multilingualism and divergent speech communities which distinguish themselves by their peculiar manners of speech and writing—as defined, for instance, by technical domain, professional interest, cultural aspiration or sub-cultural fetish.

Our central claim in this paper is that we think these matters of paradigm change are at the source of the problem of burden creep. In developing the logic of this argument, we first suggest that the print paradigm does much to reinforce homogenous speech communities. We use the term speech communities in a similar way to Ludwig Wittgenstein (1953) in that professional social languages emerge based on the meanings of words and sentences as they are used and applied in linguistic contexts. Thus, we suggest that quality standards such as those that apply to the Family Services and Out of Home Care, Disabilities and Housing sectors reflect the emergence of particular speech communities that derive from a linguistic context associated with regulatory interventions.

The second aspect of our argument is to make the connection between speech communities and the print-paradigm. Within the print paradigm, including the use of PDF files, text is marked up to reflect only its visual manifestation (i.e. headings be in **bold**) and not to reflect the semantics and the structure contained within the document itself. Thus within the print paradigm there is no opportunity to embed the meanings of words and sentences in a wider linguistic context other than by allowing the reader to make the internal and external connections through the following of references, notes and through the literacy of the readers themselves. Thus, it is only up to readers themselves as to how these documents are interpreted and applied. This re-enforces the closed nature of these speech communities.

The final part of our argument is to highlight why we think the reliance on the print paradigm for publishing these standards contributes to the problem of burden creep. We suggest that whilst there has been an increasing convergence at the CSO level as to the delivery of multiple programs (i.e. CSOs are delivering more and more government services) there has been an ever increasing fragmentation of the semantics contained within the standard documents that pertain to those programs. That is there are no constraints imposed upon the speech communities that give rise to these standards. This lies at the heart of the problem of burden, because there is limited ability to harmonise the relationship between the personal schemas of practitioners and the quality schemas published as industry standards (refer to Figure 4).
We conclude therefore that the challenge of burden creep cannot be addressed through traditional print based exchange mechanisms. There is a need for Government to systematically adopt practices that involves publishing content marked up for both semantics and structure.

2.4 Harmonising variant quality standards

In April 2010, the eSRC was again commissioned to develop a second stage of the BISQAS initiative. The objective was to establish a foundation for the integration of quality standards across the Victorian Family Service and Out of Home Care, Disabilities and Housing sectors. In this project, we proposed a multi-staged pathway to create a foundation for harmonizing these three variant quality standards. The different stages are discussed as follows.

2.4.1 Document analysis and data entry

We first undertook a detailed analysis of the documents that make up the standards for each sector. This became the basis for data entry of the standards in preparation for cross-mapping. This process is described in some detail in BISQAS-2 project report (Vines, et al., Forthcoming). An approach to mark-up relied in the Australian expression of the Encoded Archival Context (EAC) standard (Contextual Information Initiative, 2001) – a metadata standard designed to richly describe the context of archival records and their evolution through time. Drawing upon the eSRC’s technology and vision (McCarthy, April 1999) we applied this framework to the document standards themselves which allowed us to create three visualisations of the standards that pertain to the three sectors. These are outlined in Figures 7, 8 and 9.

Internal cross references made within the standards were highlighted in different colours. In the case of the FS-OHC standard, the Client Record Review Tool (Department of Human Services, 2008a) has been included. Thus cross references from the Client Record Review Tool to components within the Evidence Guide (Department of Human Services, 2007a) are presented in different colours.

Figure 7. Structure and internal cross references within the FS-OHC Standard
In the same way Figure 8 provides a similar visualisation of the Disabilities standard. An interesting aspect of this standard is that it has been conceived as an outcomes standard. This means that within the four different standard documents, cross-relationships are explicitly specified between the different components of the standard. This gives rise to the different coloured lines outlined in Figure 8.

The Housing standard consists of the Housing Assistance Services Standard (Department of Human Services, 2005) and the Performance Standards for Registered Agencies (Victorian Government Gazette, 2005) standards — referred to as RAPS. The implicit schemas embedded within the Housing sector are again fundamentally different to the FS-OHC and the Disabilities standards.

2.4.2 Selection of generic standards for cross mapping

For this project, we did not use the same methodology for cross mapping as was undertaken in the first BISQAS project (Vines et al, 2009). In the 2009 project we documented a list of emergent concepts that we perceived clustered many of the areas of semantic equivalent and then cross mapped through these emergence concepts. In
contrast, in this second BISQAS project we felt it necessary to draw upon the authority of existing standards to cross map through. Thus, as part of the project, we undertook a detailed assessment of current generic standards to identify which would be best to cross map the three quality standards in question (see Figure 10 below). To do this, we developed several criteria that were used to select the standards from which cross-mapping would occur. These criteria are listed as follows.

- There needed to be a level of quality and simplicity about the structure and semantics of the selected standards.
- The standards could provide a simple guide for the identification of practical minimum standards.
- The copyright arrangements associated with the standards would allow the content to be sliced and diced in ways that are required in a post-print environment.
- The standards held the potential to provide an effective pathway for translating and promulgating any necessary changes to legislation and legislative intent, whilst at the same time minimising or eliminating burden creep.

We perceived that the application of these criteria was critical to the possibility of creating an integrated quality-standard across FS-OHC, Disabilities and Housing. In other words, the application of these criteria went to the heart of attending to the dual objectives of achieving effective regulatory interventions, whilst at the same time reducing regulatory burden-creep for CSOs.

2.4.3 Cross mapping heading words

Our proposed harmonisation methodology needs to be understood as a process that involves the creation of a new schema. The technical aspect of this process is described as ontology mapping, ontology merging and ontology creation (Vines and Firestone, 2008). To increase the efficiency of this schema creation process, we proposed to undertake cross-maps using two generic standards (one representing a practice standard, the other a management standard).

Considerable effort was made to select these generic standards and this matter is discussed in detail in the BISQAS-2 project report (Vines et. al., Forthcoming). Ultimately, we selected the National Standards of Practice for Case Management (Case Management Society of Australia, 2008) as a generic practice standard and some components of the Family Relationship Services Program (FaHCSIA, date unknown). The FRSP is an Australian Commonwealth Government standard related to the delivery of Family Relationship Services administered through the Attorney General’s Department and the Department of Families, Housing and Community Services and Indigenous Affairs – FaHCSIA. In selecting these standards, some small consideration was given to the fact these are both national standards – and that the approach adopted in Victoria could influence the national agenda for standards harmonization.

After data entry was completed for all five standards some analysis was undertaken of the project dataset. We provide a breakdown of this in Figure 10.
The percentage of entities associated with the FRSP standard (3.4%) and the NSOPCM (11.7%) with respect to the total number of entities within the dataset (2102) is outlined in Figure 10. This highlights that the structural frameworks associated with these two standards are significantly simpler than any of the three standards in question (FS-OHC, Disabilities and Housing) and this in principle highlights the merit of the approach we are recommending going forward.

Cross mapping was undertaken using heading words to create relationships between the ‘heading-words’ that appear in the generic standards to identify where these heading-words occur within the three variant standards.

Relationships were established if there was a degree of semantic equivalence between the heading words and other words that appeared in the standards. For example, the word ‘assessment’ as it relates to ‘staff assessment’ is semantically distinct from ‘client assessment’. Thus when cross mapping using the term assessment within the context of care planning, a relationship was only established with the occurrence of ‘client assessment’.

2.4.4 Creation and preliminary analysis of visualisations

After cross mapping, we then prepared a vast array of different visualizations. These visualizations are designed to assist stakeholders who might become part of the community of interest associated with developing an integrated standard.

In the first example, we consider one of the Guiding Principles of the Case Management Standard: Case Management Advocates for Client Rights (CM, 2008). We were interested to understand the emphasis placed on ‘client rights’ across the three standards. Figure 11 provides a visualisation as to where the term ‘rights’ of the client (or support user) appears in the three standards. What Figure 11 shows is that this principle of ‘advocacy of client rights’ is shared extensively between disabilities and housing, but does not figure so prominently in the FS-OHC standard. We would conclude that in any

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Services / OHC entities</strong></td>
<td>769</td>
<td>36.6%</td>
</tr>
<tr>
<td>Client Review Tool</td>
<td>15</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Disabilities entities</strong></td>
<td>565</td>
<td>26.9%</td>
</tr>
<tr>
<td>Life Areas Practice Guide</td>
<td>236</td>
<td>11.2%</td>
</tr>
<tr>
<td>Essential Evidence Indicators of Industry Standards</td>
<td>97</td>
<td>4.6%</td>
</tr>
<tr>
<td>Evidence Indicators of the Outcome standards</td>
<td>134</td>
<td>6.4%</td>
</tr>
<tr>
<td>Organisational Self Assessment guide template</td>
<td>97</td>
<td>4.6%</td>
</tr>
<tr>
<td>Disability Framework</td>
<td>1</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Housing Entities</strong></td>
<td>435</td>
<td>20.7%</td>
</tr>
<tr>
<td>HASS</td>
<td>348</td>
<td>16.6%</td>
</tr>
<tr>
<td>RAPS</td>
<td>87</td>
<td>4.1%</td>
</tr>
<tr>
<td><strong>Case Management Standard entities</strong></td>
<td>245</td>
<td>11.7%</td>
</tr>
<tr>
<td><strong>Family Relationship Services Program Standard entities</strong></td>
<td>72</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>2102</td>
<td>100%</td>
</tr>
<tr>
<td>Context entities</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Published Resources</td>
<td>61</td>
<td></td>
</tr>
</tbody>
</table>

Figure 10. Breakdown of project dataset
integrated standard, consideration might be given to the role of ‘rights’ within the context of the FS-OHC sector, including childrens’ rights.

*National standards of practice for case management*

![Cross-map using the term ‘rights’ (of client or support user)](image1)

**Figure 11.** Cross-map using the term ‘rights’ (of client or support user)

The second example is FRSP standard number 6: Supervision of Practitioners. In this, it is highlighted that supervision is not specified in the disabilities standard. Thus in any integrated standard, we conclude that those who deliver disability services could be required to introduce supervision more formally into their organisational work practices.

*Family Relationship Services Program Standard*

![Cross-map using the term ‘supervision’ (of practitioners)](image2)

**Figure 12.** Cross-map using the term ‘supervision’ (of practitioners)

### 2.4.5 Identification of outliers

As part of the methodology for laying a foundation for an integrated quality standard across FS-OHC, Disabilities and Housing, we set out to identify those parts of the standards where no relationships were cross-mapped to either the NSOPCM or the FRSP standards. We have called these entities ‘outliers’. We identified 475 of these and subsequently estimated that around 75 of them did not relate to the two standards and thus would require special consideration.
We also identified standards that were only very weakly represented in the FRSP and NSOPCM documents. One topic we thought worth investigating was ‘Working with the Community’, an area identified within the housing sector standard. What we have identified is that there is no reference at all to ‘working with the community’ in the NSOPCM and there are only very weak links into the FRSP standard, but these are only at the lower levels within the standard. In contrast, there are quite strong linkages into the FS-OHC and Disabilities standards. What we concluded from this is that there would likely be a need to develop a separate module associated with the activities of ‘working with the community’.

Figure 13. Cross-map from HASS using the term ‘community’

2.4.6 Creating a shared context through an on-line and open knowledge space

Going forward, as part of the overall methodology for harmonising the three variant standards, we prepared a fully integrated website that provides details of all research work undertaken as part of the project. In principle, the site allows community representatives to engage with the entire project dataset. This resource includes around 2,500 HTML pages, over one hundred visualisations in both PNG and PDF formats, and all the excel spreadsheet files which formed the basis of data entry.

In principle, the next stage of developing a common standard for the three sectors (FS-OHC, Disabilities and Housing) would involve a lengthy engagement with sector stakeholders. Such consultations are required to begin to reversion the draft common-standard. Iterative cycles of schema construction and review would be based on the continuous testing of the veracity and relevance of different standards and their elements to ensure they assist with the objectives of responding to the emergent patterns within different service systems. The eSRC regards this aspect of the harmonization process as a social learning process which involves the delicate task of ‘knowledge brokering’ between different stakeholder groups. It allows for the harmonization of schemas across the different levels of focus encompassing practitioners, organisational systems management and those responsible for publishing standards as outlined in Figure 14. This same process can also be described as iterative cycling of tacit – explicit knowledge sharing (Vines, Hall and McCarthy, Forthcoming).
2.5 *Towards an emergent regulatory knowledge system*

2.5.1 *Instruments of government regulation*

A further aspect of the BISQAS project brief specified by the Office for the Community Sector required the:

*Identification of linkages and potential overlap of these service quality standards with other Victorian instruments of regulation and with other jurisdictions.*

In responding to this request, we wanted to investigate the role that quality standards have in relation to wider sector planning and development activities. For example, in the case of the Family Services sector, quality standards were recognized as an integral part of the Government’s Strategic Framework for Family Services (Department of Human Services, 2007 p 69).

*To support a focus on culture, both A Fairer Victoria and the Growing Victoria Together policy emphasise the importance of working closely with communities and measuring progress, to enable continuous improvement in terms of service responsiveness, effectiveness and outcomes. This focus will be maintained in relation to community, child and family services, with services using the new Standards for Family Services to support compliance, and a culture of innovation, flexibility and continuous improvement in the quality of service provision to children, young people and families.*

Therefore, we suggest that the intent and content of quality standards need to be understood within a wide context. It is this concern for the systematic capturing of context that has been at the heart of the emergent standards associated with archival practice over the past 15 years. Thus, we think there is much that can be gained from applying archival informatics to the publishing of government regulatory information in the ways we described in a previous BISQAS-1 project report (Vines, et. al. 2009)
In our project work we have undertaken an analysis of a wide range of quality standards. There appears to be certain types of information that are contained within the semantic content of the standards (refer to Figure 3).

In order to determine the extent to which such contextual information is actually contained in some quality standards, we undertook an analysis of the FS-OHC standard as an example. We were able to prepare a visualization of the inter-relationship between the components of the standard and external relationships embedded within the standard (see Figure 15).

What can be seen is that the FS-OHC standard references a large number of Published Resources including a several Acts of Parliament. The standard is also unusual in that it contains explicit reference to other standards within the document itself.

![Figure 15. Contextual information referred to within the FS-OHC standard](image)

2.5.2 **Inter-relationships between instruments of regulation**

Upon closer analysis of these matters, what becomes evident is that the publishing of quality standards is not well suited to a print-presentation format. For example, within the PDF file of the Evidence Guide there is reference to the Aboriginal Cultural Competence Framework (Department of Human Services, 2008b) within the FS-OHC standard thirty seven times. This tendency to reference one ‘published resource’ multiple times is problematic, because it does not result in the compilation of a consolidated list of evidence requirements related to the reason why the published resource is referenced. This places an undue responsibility on CSOs to make such interpretative judgments and is an example of the subtle nature of burden creep that can arise as a result of publishing standards exclusively in a print-based format.

In order to address the research brief, we undertook further analysis to assess the extent to which the content of the quality standards adequately and coherently reflect the inter-relationships between the various instruments of regulation. We have interpreted the instruments of regulation to include:

- The referencing of Acts of Parliaments within the standards.
The referencing of other types of published resources such as practice guidelines and the like that form part of the basis of legislative intent.

The ability of citizen and industry stakeholders to understand the role and the function of the various corporate bodies involved in the conception, implementation and administration of quality standards publishing and associated regulatory functions, including the changes to these functions over time.

The continued evolution through time of the evidence-base that forms the basis of quality standard specifications designed to support the best interests of citizens.

We suggest such matters are essential aspects of burden reduction. The publishing of such contextual information needs to re-enforce coherent, inter-related and simple messages for service stakeholders, the public and citizens in general. Thus, we have been interested to assess whether there were any appreciable differences in the way Published resource materials and Acts of Parliament are cross referenced in each of the three standards. One of the examples we took was the Children, Youth and Families Act, 2005.

What we found was that there is significant cross-referencing of the Children, Youth and Families Act across all levels of components that make up the FS-OHC standard. To a lesser extent some reference is made to this Act in the Housing sector, but interestingly no reference is made to this Act in the Disabilities standard. We suggest that this matter might require some significant investigation because it is not clear why this legislation might not have some influence on the shape of Disabilities standard as it relates to children with a disability.

We were also interested to investigate the variability of external referencing from different standards. We chose to focus specifically on improving the capacity of delivering culturally competent and inclusive services. The examples of the published resources we chose were the Aboriginal Cultural Competency Framework (Department of Human Services, 2008b) and the Cultural Diversity Guide (Department of Human Services, 2006). These visualisations are outlined in Figures 17 and 18.

It is clear that there has been a much greater emphasis on specifying the requirement for culturally inclusive services across the FS-OHC sector than in Disabilities and Housing. Thus, we concluded that any move towards an integrated standard needs to strengthen an approach to such matters across all three sectors.
Figure 17. Cross referencing of the Aboriginal Cultural Competency Framework (Department of Human Services, 2008b)

Figure 18. Cross referencing of the Cultural Diversity Guide (Department of Human Services, 2006)

One of the most challenging parts of this BISQAS project was to understand the myriad of organizations involved in the conception, oversight and administration of the implementation of quality standards across the three sectors. Our experience has shown that not only are the content of quality standards themselves fragmented, but so too are the audit requirements and responsibilities. The standards themselves do not contain this information on a consistent basis. Nor is this type of information easy to access from the public websites across the different Victorian Government Departments.

2.5.3 Can regulatory interventions be framed around reflexive knowledge processes?

In our proposed regulatory knowledge system, partnership frameworks between Government, sector stakeholders and citizens would allow for scrutiny and review of quality standards – as ‘theories about what works in the world’. This gives rise to a form of collective falsification and review. Thus regulatory systems would be designed to be reflexive, allowing for regulatory interventions to continuously emerge through time. These same networks systems could allow appropriate forms of collaborative monitoring at different levels – State, Regional and local levels as required. Protocols for data sharing that are in line with privacy legislation could be promulgated as part of these oversight
frameworks. One example of a network governance model of relevance to the Victorian Community sector is hypothesised in Figure 19.

**Figure 19.** Network structure for reflexive knowledge processes: Example of the Victorian Community Services sector

The functions of this human and digital (ICT) network would be to:

- Catalyse the development of appropriate support systems to publish different standards used across the Victorian Community sector;
- Catalyse technology development, brokering and skills transfer to support uptake of appropriate technology solutions, including the integration of different standards into the information systems of individual CSOs;
- Provide the hosting for editorial working groups to ensure standards are constantly reviewed and are in line with up to date research, evidence and reflective practice;
- Provide a forum for the involvement of auditing bodies as part of the overall regulatory framework;
- Catalyse the development of “whole system” monitoring of different catchments in partnership with State and Commonwealth Government initiatives. This could extend to piloting new approaches to impact analysis, including the capturing of consumer and citizen centric narrative capture.
- Facilitate integrated approaches to rural, regional and mega-city knowledge capacity development formation and know-how.
2.5.4 New skill requirements for the promulgation of regulatory knowledge systems

We are suggesting in this paper that the harmonising of disparate quality standards requires a new type of information management skill. We call this semantic publishing and this skill builds upon ideas associated with contextual information management as outlined in Section 1 of this paper. Examples of this type of publishing are observable from the mixture of textual representations and visualisation outputs included in this paper. Through semantic publishing there are opportunities to better understand the network connections between the different instruments of regulation available to all Governments.

We are also suggesting that the rise of semantic publishing activities would be best serviced if there was a parallel commitment to the notion of public knowledge, public knowledge assets and the web publishing space within which these assets are published – what we call a public knowledge space. The creation of a public knowledge space would allow for the emergence of sustainable knowledge ecology relevant to the needs of the Victorian Community sector. We claim that a necessary component of this approach is that the appropriate publishing and application of quality standards remains an important responsibility of Government – whether this be at State or Commonwealth levels. This publishing act creates a shared context within which:

- Citizens can be assured of receiving reasonable and safe services based on their best interests, within the resource constraints associated with policy positions of all levels of Government
- Victorian Government ministers know, on balance, that appropriate practice are codified to the extent that these minimize the likelihood of illegal acts or acts of neglect in the delivery of services to those less advantaged in the State of Victoria.
- CSOs can know what they need to know in terms of quality compliance and auditing requirements.
- Evidence specifications are kept as simple as possible, whilst at the same time ensuring minimum standards are being upheld.
- Multiple stakeholders including competing stakeholder groups can collaborate because of their active interest in the dual objectives of supporting the well being of citizens and the creation and distribution of public knowledge assets.

3 Conclusion

In the first section of this paper, we have cited the emergent domain of practice called knowledge based development. We have also explored the notion of ‘resilient knowledge’ and how such knowledge might be catalysed through the introduction of a regulatory knowledge system. By implication we explore how such an approach to building resilience might offer a way of extending the reach of the knowledge based development domain of practice.

In teasing out this notion of resilient knowledge, we have discussed in some detail the problem of information management and the long term storage of radioactive waste. We suggest this particular challenge presents as an archetypal knowledge management problem because it draws attention to the problem of the epistemic loss of knowledge over time. We explain that this loss occurs where there is inadequate preservation of the knowledge necessary to explain the context, structure and meaning of information through time.

We claim a knowledge based development approach has significant relevance to the management of cities – because there is no turning back once we embark on the journey
of a knowledge society. We need to keep re-skilling each generation of custodians of knowledge cities so they are adequately equipped to manage our cities and associated resources on an on-going basis.

In exploring these challenges through the eye of this archetypal knowledge management problem, we sow the seeds of a proposed archetypal solution. Archetypal in that the solution can apply across a wide range of sectors – we think our ideas have merit in relation to health and community services, infrastructure and waste management services, natural resource management and even regulatory pathways to transition towards a post carbon economy. We have shown there are two features of our proposed solution. The first is the gradual adoption of a new type of information management domain of practice – what we call contextual information management. Such a practice involves the use of digital entities to act as surrogates for entities that exist in the world and the ability to create relationships between these entities. Through the use of a contextual information management framework, we suggest what emerges is an information network that allows for the navigation both within the information objects and across the socio-technical networks that surround the creation and evolution of these objects. The second feature involves the idea that we turn the notion of epistemic knowledge loss on its head and focus on the dynamics of knowledge acquisition and evolutionary possibility.

In advancing this approach, we suggest there is potential to reframe current regulatory interventions such as the use of quality standards as part of day to day contractual relationships with Government. Thus, in Section 2 of this paper, we highlight how the combined use of contextual information management practices and what we call semantic publishing can be used to support distributed problem solving and enhanced evolutionary possibility. We suggest these regulatory knowledge networks have the potential to evolve across multiple sectors in organic ways through time, because they are in alignment with current policy directions associated with national institutions such as the National Library and the Public Records Office of Victoria (PROV). The National Library is a repository for the nations published resources and can provide a way of systematically harnessing an evolving evidence-base associated with any particular sector and its regulatory priorities. PROV has a statutory obligation to ensure appropriate records management protocols are implemented where any agency receives Government funds within the State of Victoria.

Currently, there remain considerable challenges associated with promulgating regulatory interventions across both State and Commonwealth areas of jurisdiction. We claim that this new domain of practice called knowledge based development and the associated use of contextual information management and semantic publishing practices could do much to allow for the emergence of harmonised knowledge systems across State and Commonwealth areas of jurisdiction. We suggest this could do much to avoid the turf warfare of top down (political) and bottom up (grass root) approaches. A focus on regulatory knowledge systems and allowing for the dynamics of knowledge acquisition and evolutionary possibility could avoid the very worst aspects of duplication of resources across different levels of government. In contrast, such an approach could help fashion our rural and regional centres and our cities and city cultures to realise the benefits of environmental sustainability, human well being and Australian invention – thereby ensuring we can do much more with less.

As we highlight, these matters represent no small challenge. We claim, that in fact they form part of a similar transformation process that occurred in the one hundred year period after the invention of the printing press by Johannes Gutenberg in Strasburg Germany in 1440’s. We are less than thirty years into this significant paradigm shift away
from Gutenberg’s era of visual text markup. The Victorian community sector could do much to amplify the positive, democratic, inclusive and vibrant aspects of an open society that is now possible through the rise of semantic web publishing, the emergence of derivative information architectures and the ability to harness and respond to citizen-centric perspectives and interests.

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Hume global learning village: a creative learning community

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Structured Abstract

Purpose – The purpose of the paper is to document the development of the Hume Global Learning Village from the establishment of the Safe City Task Force, the building of the Hume Global Learning Centre, the development of the Hume Global Learning Village Concept, the academic and other partnerships, research and learning activities that this supports. It outlines the vision and learning strategies that underpin the development of the HGLV, and concludes with factors that have contributed to keeping Village members involved and provides an indication of future developments.

Design/methodology/approach - The approach is a practical outline of a local government partnership with higher education in the context of a geographic learning community that has lead to the development of a 20 year strategy for learning.

Originality/value – The value of this paper is that it provides an opportunity to stimulate thinking about local government and its role in learning which is not a traditional role. The key to this is the linkages with higher education especially in terms of access to research capacity and learning which contributes to policy about relevant topics such as lifelong learning, social and emotional learning, youth, secondary school regeneration, active ageing and so forth.

Practical implications - The outcomes of the HGLV development demonstrate the strong link between economic development and the practical applications for those communities where education results are lower than average. Increasing the participation rate of the population involved in learning contributes to economic development and provides a more socially inclusive society.

Keywords – learning community, Hume Global Learning Village, lifelong learning.

Paper type – Practical Paper
1 Introduction to Hume City

Hume City is located on the urban-rural fringe, just 20 kilometres north-west of Melbourne, Victoria. Its 504 square kilometres comprise approximately 65 percent rural land, 25 percent urban land and 10 percent occupied by the Melbourne Airport. It covers the regions of Sunbury, Craigieburn and Broadmeadows. Within those regions there are a number of industries including Melbourne International Airport, freight, engineering, automotive manufacturing, steel, plastics, electronics, communications and tourism.

It has a population of 164,000. It has a very culturally diverse population with over 140 nationalities speaking 125 languages other than English at home, with 28.8% of the population being foreign born. In addition, the indigenous community is 0.6% of the population which is higher than the Melbourne average (HCC 2006). The City has a large number of young people, with 32.5 percent of its residents aged 19 years and under, while 8.1 percent are aged 65 years and above. It is also a multi-faith community, with many religions practised in Hume.

Within the City of Hume, the Broadmeadows SLA has significantly lower levels of educational attainment when compared to the metropolitan Melbourne Statistical Division (MSD). Almost one in five residents has only completed secondary college to Year 8 (age 14) or less. Factors such as lower levels of education, cultural and language barriers, other inequalities and barriers such as higher levels of disability and significantly lower levels of home internet access are strong negative contributors to this demographic.

Nonetheless, it is noted in the report Melbourne’s North – a New Knowledge Economy that Hume City is a growth area. It enjoys rapid population growth and has new opportunities to emerge as a knowledge economy, while including the retention of a high-tech manufacturing base. By 2030 the population of Hume City Council is predicted to climb to 242,000. The suburb of Broadmeadows has been identified by the State Government of Victoria as one of 5 Central Activities Districts around Melbourne and is targeted for substantial CBD type growth including several hundred new white collar jobs, while the outer areas provide Greenfield site opportunities for incubator developments (NIEIR, 2009). The challenge is to ensure that local citizens benefit not only in terms of having the skills to take advantage of employment opportunities, but that regard is given to an inclusive society and one that values the environment. These are the drivers of Hume City as a creative learning community.

2 Hume City as a Learning Community

Australia now has a decade of practice in the development of Learning Communities of Place and Hume City and the Hume Global Learning Village is often quoted as a good practice example in the development of a Learning Community in Australia (Kearns, Longworth et al. 2008). In fact, during this time, led by the Safe City Taskforce, chaired by Frank McGuire, Hume City took a radical and positive approach to community building by focusing on learning as the key to social and economic wellbeing for all citizens. McGuire notes that the three foci of attitude, education and opportunity and “having a go” are what underlie the spirit of the Hume Global Learning Village (HGLV) today.

McGuire secured key partnerships and funding to establish the Hume Global Learning Centre (HGLC) and HGLV with the support of the Victorian Government, the Pratt Foundation, The Age and the Ford Motor Company.

A founding feature of the HGLV was the establishment of the first public library in Broadmeadows known as the Hume Global Learning Centre. It has become a beacon of
learning for Hume City. As the Federal Minister for Calwell, Maria Vamvakinou MP, noted in a speech to Parliament in 2009 this building is a wonderful and unique example of a genuine community centre of learning, and hence social inclusion. It is an iconic building that visibly celebrates learning. At the same time, other community infrastructure such as a health services hub around maternal and childcare, the Visy Cares Learning Centre in Meadow Heights was also established.

An important factor is that the HGLV development has been driven at the Local Government level. The Hume City Council’s vision for Hume is a prosperous, sustainable and vibrant city; renowned for social justice, lifelong learning and community inclusion. Hume was the first Council in Australia to adopt a Social Justice Charter and a Bill of Rights. The Council takes the view that economic and social development issues are inextricably linked, and that partnerships and innovative collaboration benefit the community.

The learning vision articulated for Hume City in the Council Plan 2030 is to;

Enhance life experience, employment opportunities and contributions to the community by inspiring and facilitating the participation of Hume residents in lifelong learning, regardless of age, ability or ethnicity, resulting in reduced disadvantage and improved quality of life.

The vision was developed by Hume City Council, residents and members of the Hume Global Learning Village (HGLC) and emphasizes the importance of valuing learning in all its forms (formal, informal and non formal) and embedded in many different settings – the family, the community, the school and the workplace. Learning involves change which is undertaken on an individual basis or as a social activity (Wheeler and Faris, 2006).

Lifelong learning fosters the lifespan and life-wide learning, that is, all the phases of life from early childhood, to school years, to the adult learner and the older learner, and all areas of learning. It cultivates democratic values and according to Faris should build human and social capital including aboriginal value and knowledge base (Faris 2006). The operation of Hume City’s lifelong learning agenda is through the Hume Global Village Network.

3 Hume Global Village Network background

The HGLV is a collaboration of over 700 organisations with an interest in learning in Hume City, representing schools, neighbourhood houses, libraries, TAFE’s, universities, council officers, job services providers, businesses, community and sporting groups, government departments; trainers, tutors and individuals. The Hume Global Learning Village (HGLV) was established on 30 May 2003 and members began work on creating a shared strategy to increase learning opportunities and encourage lifelong learning in Hume. The role of the HGLV is as the catalyst, facilitator, leader and driver of the shared vision for Hume as a learning community.

The work of the Village members, the HGLV Advisory Board and Council has been defined by a number of strategies including the Social Justice Charter, two, three-year learning strategies - Learning Together 1 (LT1) and Learning 2 (LT2) covering the period 2004-2010 and Board and Committee Terms of Reference.

In particular, the development of each learning strategy has involved Council, residents and members of the HGLV in a creative process of consultation. The first strategy (LT1) contained 8 themes with 56 projects. At the end of 2006, before drafting LT2, HGLV members reflected on what they had learnt about working with Council on community education over that period. The enthusiasm of the Village members was
noted and one factor that was recognised was the leadership shown by Hume City Council and especially the partnership with the Learning Community Department and the Research Department to improve the evaluation process to ensure that data was relevant, timely and more targeted to meet the reporting requirements to Council and Councillors as an evidence base for future development.

The second learning strategy (LT2) became a key reference for all forms of learning opportunities in Hume for the period 2007-2010. It documented what had been successfully learnt so far, how those key findings could be improved upon and introduced new learning opportunities (HCC 2007). It incorporated five key learning themes which reflected a phases of life approach based on a German model that Kearns noted appeared relevant to Australia (Kearns 2005). The themes are:

- Inspiring lifelong learning in Hume
- The Hume Global Learning Village network
- The early years
- The school years
- The adult years
- The older years

Each theme had an outcome, a context and details of learnings so far. Each outcome had one or more Key Performance Indicators (KPI). The Hume City Council Research Department worked directly with the HGLV Research Action group on an evaluation framework that included the most effective means of collecting data including the use of resident surveys on learning. The information has informed the Learning Community Department’s reporting requirements to Council.

While the data collection has become much more streamlined, the real story and the creativity lie behind the statistics. For example, a recent HGLV Advisory Board Briefing to Council noted the following achievements. This is by no means a comprehensive list.

- Increasing lifelong learning opportunities, for example, HGLV forums, Four Seasons of Learning, Festivals of Learning, Learning Advocate Program, Bilingual Story time, Home Library Service, an Annual Research Conference, HGLV Members and Residents Surveys.
- Promotion of life-wide learning, for example, Baby First Book Bag, Best Start, Bilingual Storytelling, homework clubs, Hume Youth Leadership program with Leadership Victoria, Active Aging in Hume.
- Promoting new and innovative ways of bridging the digital divide, for example, computer clubs, NetHelp, purchasing 22 laptops to take out into community locations for internet training, the Hume i-tech Challenge awards targeted at schools.
- Celebrations of learning, through the Four Seasons of Learning and Learning Festivals.
- Establishment of new learning facilities, for example, the Broadmeadows Schools Regeneration Project, Community Hubs, the proposed learning centre at Craigieburn.
- Recognition of learners and educators in the community has heightened awareness of those involved in the daily work of teaching (for example, Inspiring Teachers Scholarships) and those learners who inspire us all (for example, Inspiring Story Ambassadors).

A small sample of the activity is highlighted in the HGLV Progress Report January to March 2010 which notes that during this period an average of 28,325 people per month walked into the Hume Global Learning Centre and an average 114,674 loans per month were made. The Bilingual Storytime program was delivered to 1,241 adults and 2,761
children in languages covering Arabic, Assyrian, Turkish, Vietnamese, Sinhalese while 614 First Book for Baby Bags were distributed and 624 students accessed Your Tutor Online Homework Assistance.

The work of the Village members and Hume City Council has been widely recognised at state and national level awards including in 2005 achieving the Prime Ministers Awards for Excellence in Community Business Partnerships.

3.1 Twenty year strategy

The work of Village members, residents and the Hume City Council in this area has been resoundingly endorsed by Councillors with adoption of the 3rd Generation Learning Strategy which will be a 20 year strategy, aligned with the Council Plan 2030. This longer time frame allows for innovative approaches to be developed to tackle generational issues in a more aspirational way. Within this strategy there will be a series of shorter term (3-4 year) plans which will allow for specific reporting requirements relating to time specific and tangible outcomes. The diagram below represents this intent.

**Figure 1. Third Generation Learning Strategy**

Source: HGLV Advisory Board 2010

3.2 Academic partnership

The partnerships with universities and the local TAFE college have been particularly important in the development of a sustainable learning community framework. As discussed in an AUCEA position paper, university-community engagement is a collaborative relationship which should lead to beneficial outcomes (AUCEA 2006). There are real benefits to universities in working in partnership with a community at all levels of endeavour, that is, research, learning, teaching, the student experience and social inclusiveness. University representatives from RMIT, Victoria University, The University of Melbourne and Kangan Institute have been involved in the HGLV from the beginning, in all areas. Academics and practitioners undertake research about their work in Hume. Hume City Council and the Village have provided work integrated and service learning experience for university students. Academics have incorporated visits to HGLV as part
of their course structure. Universities are also represented on the HGLV Committee and HGLV Advisory Committee.

This partnership is leading innovation and creativity. In particular, currently discussion is underway about:

- The development of post-secondary education in Hume including a Multiversity concept for the provision of higher education in Hume, aimed at increasing participation rates of Hume residents in higher education.
- The establishment and fostering of international bilateral links between the HGLV and like-minded initiatives around the world.
- The promotion of lifelong Social and Emotional Learning in Hume City.
- The Hume Broadband Initiative intended to provide more equitable access to low cost high speed broadband internet for residents, health, education, Not-for-Profits and small businesses.

At the grass roots level, Village members have been able to reflect on their own practice by becoming members of a Research Action Working Group - a sub-committee of the HGLV Committee. Established in 2004, the aim is of the group is through an action learning/action research approach to monitor, coordinate and disseminate research findings from the Village. Village members can also be co-opted for particular expertise.

The annual Hume City Research Day is one way academics and practitioners can disseminate their work. Presentations must be about research and practice that is happening in Hume City and be linked to the current learning strategy. It is an action learning/action research process and each year the quality of presentations has improved.

It has gone from an initial information gathering and networking exercise, to one of exploring themes of relevance to Village members, for example, this year’s theme is creativity and innovation while last year’s theme was social inclusion.

Now in its fifth year, it has become a fixture on the HGLV calendar and as far as we know Hume City Council is the only local government in Australia to sponsor an annual research day on learning. This year’s research day was held on 27 August and the program reflected the diversity of activity that is happening. The day commenced with a keynote speaker to enthuse members and this year Tania de Jong AM, Founder of Creativity Australia and Executive Producer Creative Innovation 2010 is talking about “The Artful Human – Creativity and Lifelong learning”. Village members presented on work in early childhood, youth attainment and transitions, bi-lingual story time, community hubs, the future of tertiary education in Hume City, Australian public libraries and universities in partnership, accessing training and education opportunities for CALD communities in Hume, online learning and work with disadvantaged youth.

Last year’s keynote, Rhonda Galbally, AO, (CEO Our Community) really inspired participants and praised the City of Hume for investing in its learning community and congratulated Village members on the work they do. Galbally believes that an investment in learning communities can have a huge impact on the health and well-being of a community. It is about building hopeful communities, belonging communities and in control communities. The learning community can take on a number of forms - a geographic place, a network of learning organisations within that place and can also include online communities and the HGLV is developing all of these frameworks. There are structures for learning, people learning shoulder to shoulder, a sense of hope, belonging and of control.

1 For more information on The Annual Research Conference visit the research subcommittee’s web site at [www.humegloballearning.vic.gov.au](http://www.humegloballearning.vic.gov.au)
The other major role of the HGLV Research Action Working Group is to assist the Hume City Council Research Department develop and monitor the Key Performance Indicators (KPIs) for the current learning strategy (LT2). To date this has involved assistance and advice on the KPIs, the production of two Hume Residents’ Learning Surveys (2008 and 2010) and a HGLV Members’ Survey (2009). This work contributes to the sustainability of the learning community development and informs reports back to the Council and the rate payers.

The work on evaluation and the research day are ways that academics and community members can work together on the development of the Village concept. It is an opportunity to build the knowledge base, to provide impetus to move the HGLV agenda forward and to provide the latest knowledge in the field (local and international) and to challenge our thinking. It has been a challenge to evaluate such a complex network structure such as the Hume Global Learning Village.

3.3 What is a creative learning community?

Florida (2003) argues that creativity comes from the people. Transformation will happen when there is a mix of diverse, tolerant people open to creativity. “Creativity must be motivated and nurtured in a multitude of ways by employers, by people themselves and by communities where they locate (Florida, 2003, p5).”

Faris as an early adopters of the learning community concept notes that a learning community of place is one in which lifelong learning is explicitly used as an organizing principle and social/cultural goal in order that the learning resources across five different sectors (civic, economic, public (museums, libraries, social and health agencies), education and voluntary/community), are mobilized so that sustainable economic development and social inclusion are attained in the emerging knowledge-based economy and society (Faris 2001, 2004, 2006).

Hume City Council has now had six years of building on the Faris definition and putting the HGLV learning community concept into operation and some key factors that have been identified by Kearns and others that contribute to the sustainability of a learning community are:

- An identified community need.
- Passionate entrepreneurs with vision that inspire action and build partnerships.
- Key leadership role of local government.
- A management structure and strategies in place to support this.
- Clear performance targets and measurements.
- Communications strategy that keeps people not just informed but contributing and participating (Wheeler, Phillips et al. 2005; Kearns, Longworth et al. 2008).

These factors also incorporate the 3 Ps – partnerships, participation and performance as mentioned by Cara et al as critical in the development of learning communities (Cara and Ranson 1998; Faris 2001).

Kearns et al (2008) noted that learning communities provide frameworks for partnerships and innovations in communities and regions which contribute to building social, human, identify and economic capital in communities. In doing this, learning communities contribute to both inclusion and productivity objectives and widen learning opportunities for members of those communities. They note that learning communities need to develop sustainable strategies that will drive ongoing innovation, creativity and benefits. By developing a 20 year 3rd Generation Learning Strategy Hume City is putting
in a timeframe that will allow for innovative approaches and partnerships in tackling longer term learning issues.

4 Conclusion

Hume City Council plays a stewardship role in driving the learning community vision forward which is backed by significant resources. However, it cannot achieve creativity and innovation without the support of key partners, Village members and residents. The HGLV Board noted that the HGLV and Hume City Council relationship is highly interdependent. It is transforming from a hierarchical relationship to one of a network of cooperation involving Councillors, Council staff, Village members and other key stakeholders in a mutually respectful, but energetic and productive relationship. In doing this, Council is reframing the role of Local Government with regards to the learning community concept. It is the people within those networks and partnerships that are the heart of the Hume Global Learning Village as a creative learning community.

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Modelling the contribution of architect-designed cultural icon projects to urban development

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Structured Abstract

Purpose – Despite that the ongoing existence of many cultural institutions relies on support from public funds and private donations, these institutions have faced a huge difficulty in communicating their benefits to the funding bodies and the urban community. The economic impact model approach has been the most common valuation method in the arts and there is a growing reliance on this type of assessment by cultural institutions when lobbying for private and public support. This upward focus on the economic type of contribution is accompanied by little interest in non-market valuation methods. However, financial figures are rarely their strongest argument. This paper looks specifically at powerful and unique cultural projects - Architect-Designed Cultural Icons (ADCI) and introduces a conceptual model by which the total contribution of these cultural institutions can be determined. Comparing with many other cultural projects, the ADCI contribution to urban development is typically of a larger scale and, thus, can be easier to explore. To date, few critical assessments have been undertaken to demonstrate the ADCI contribution to urban development and while ADCIs have been showing attempts at self-evaluation, they commonly encounter methodological problems.

Design/methodology/approach – This article introduces a Conceptual Modelling Matrix (CMM) that enables a holistic assessment of ADCI projects’ contribution to urban development. The CMM was developed from and is based on two major elements - the Three-level Contribution Model and the Sustainable Performance Framework, which have been specifically designed for this research. The Three-level Contribution Model establishes the scale of the ADCI contribution to urban development. It operates on three levels: (i) the direct contribution of an ADCI as an institution; (ii) the indirect contribution of an ADCI as a catalyst to urban development; and (iii) the overall urban performance as the result of the city-wide development process with an ADCI component. The Sustainable Performance Framework offers a simple methodology for analysing ADCI aims, roles and objectives in urban development.

Originality/value – The introduced in this paper CMM is an original methodological approach to the holistic assessment of the contribution of ADCI projects to urban development. It may also have wider applications to other cultural projects. The CMM can be deployed to define, assess and communicate contributions of ADCI projects as well as to identify and manage the detriments these projects may face. The CMM secures the holistic assessment of the ADCI contribution by integrating economic, social
and environmental assessment methods to evaluate diverse ADCI objectives on multiple levels of ADCI contributions. An original integrative model, the CMM combines previously developed methods and analytical frameworks. The CMM’s design is such that it allows for adjusting ADCI objectives that evolve with changing urban challenges.

**Practical implications** – The potential users of the CMM are ADCI institutions, local and municipal governments (or other funding bodies) and the academic community. The CMM offers a set of parameters and formulas for assessing the contribution of ADCI projects to urban development. These parameters and formulas are generic and can be adapted to fit any ADCI project. They can be modified to suit local conditions and circumstances. The CMM serves as a strong methodologically-grounded basis for further developing a locally-conscious evaluation tool for ADCI projects. The CMM also maps a wide spectrum of ADCI contributions to urban development, which allows decision-makers when evaluating specific ADCI projects to see at a glance whether there already has been sufficient research undertaken of certain ADCI contributions and where such research is still lacking; and, thus, certain ADCI contributions are not known. The CMM can also be adjusted in order to be applicable to other cultural projects.

**Keywords** – culture, architect-designed cultural icons, assessment, contribution, urban development

**Paper type** – Academic Research Paper

1 **Introduction**

Since the 1980s, local cultural resources have been becoming increasingly exploited by intensified marketing and tourism campaigns in order to increase urban attractiveness and address urban competitiveness threats. This search for urban distinctiveness has created a push for urban cultural capital to be seen as a money-making mechanism with an emphasis on cultural industries. The role of urban cultural capital has been progressively seen as a device intended to create new market niches in the anticipation that culture and/or the arts would act as a magnet for visitors and residents, thereby growing consumption and attracting investments (Evans, 2005; Hawkes, 2003; Johnson, 2009; Jones & Wilks-Heeg, 2004; Miles & Paddison, 2005; WCCD, 1996).

Not surprisingly then, when cultural institutions lobby for private and public support they attempt to rely on economic evaluations to demonstrate their economic contribution. Little evidence exists apart from this type of contribution. As a result, to date, little evidence exists apart from this type of contribution. Few critical assessments have been undertaken to demonstrate their wider social and environmental contributions of cultural institutions to urban development; and there is a need to demonstrate such evidence in a transparent and methodologically grounded way.

2 **The contribution of cultural capital to urban development**

Utilising urban cultural resources with the single aim to create unique city selling points to provide fast growth to urban economies usually means a focus on short-term incentives without a considered approach to long-term objectives. Yet, radical growth does not always equal wealth or equate with a higher standard of living for most urban residents (Savitch & Kantor, 2003). There seems to be a constant conflict between profit-orientated “cultural” developments and social equity, social exclusion, safety, heritage and maintenance of local culture and so on.
At the same time, culture’s ability to be seen as more than just a commercial source is somewhat diminished. The position of culture, however, cannot simply be reduced to a position of a promoter of economic growth and economic development. Urban development and the economy themselves form only part of people’s culture (WCCD, 1996). The non-economic values that are especially important in the arts cannot be ignored (Evans, 2005; Klamer, 2003); and over-focus on economic benefits of cultural institutions diminishes their cultural quality (Miles & Paddison, 2005; Snowball, 2008). Diminishing cultural quality in turn can lead to financial losses as there may be no incentive for visitors to visit an area with lost cultural connections (Snowball, 2008).

Despite the fact that the ongoing existence of many cultural institutions relies on support from public funds and private donations, these institutions have faced a huge difficulty in communicating their benefits to the local community.

3 Architect-designed cultural icons

This paper looks at cultural projects through the lens of purpose-built architect-designed cultural icons (ADCIs). These are powerful and unique forms of urban cultural capital that can be represented by such examples as the California Academy of Sciences, San Francisco, the US (Renzo Piano Workshop); the Fukuoka Prefectural International Hall, Fukuoka, Japan (Emilio Ambasz and Associates); Swiss Re building, London, the UK (Foster & Partners); the Tjibaou Cultural Centre, Noumea, New Caledonia (Renzo Piano Workshop); the Eden Project, Cornwall, the UK (Nicholas Grimshaw); the Beijing National Stadium, Beijing, China (Herzog and de Meuron); the Museum of Contemporary Art Kiasma, Helsinki, Finland (Steven Holl); the Reichstag Dome, Berlin, Germany (Norman Foster); and Tate St Ives, Cornwall, the UK (Evans and Shalev).

The realisation of the cultural sector’s great potential for economic development brought ADCIs to the forefront of urban development strategies. Simply put, the ambition that drives cities to undertake these projects all over the world is to build the world’s great architecture and to become a “world city” because of it. These projects are largely financed and managed by the public sector. Local or metropolitan governments are usually the major stakeholders and initiators to undertake these projects. It is, however, not unusual for other levels of government to become involved.

Due to a belief that such projects can bring about substantial benefits to urban development, cities have been committing substantial amounts of public funding producing their own ADCIs. ADCI projects are usually developed and supported by public funds. Investments required to implement these projects are primarily publicly-sourced. Financial soundness is an important issue for ADCI projects and many of these projects face budget problems in their operational stage. There is also a significant and continued need to subsidise running costs and reconstruction costs that are usually largely financed by additional public funds. Special features that can differentiate ADCIs from other cultural projects can be noted. It is arguable that political reasons have more to do with the initiation of ADCI projects than many would care to acknowledge; as these projects may become a political opportunity for voters support before the elections (Baniotopoulou, 2001; Hall, 1980). Because ADCI projects are funded from different funding sources; their objectives and, consequently, their outcomes may become influenced by the agendas of those who deliver the funding. Often, these political agendas become the major drivers of ADCIs, possibly at the cost of losing their initial aims and objectives. The situation only worsens when there are no established benchmarks or
measurements by which the progress and the outcomes of such developments can be understood. As a result, these projects follow aims and objectives which have little to do with what was initially expected from them by the local community to whom these projects had been originally sold through these projects’ promotion campaigns.

Governments often seem to prefer fast-tracking these projects without voters’ input (Baniotopoulou, 2001; Hall, 1980; Henderson, Bowlby, & Raco, 2007; McNeill, 2000); to the extent that ADCI projects do not follow the established planning process. These developments are isolated from public scrutiny as major interest groups, residents and businesses are often excluded from the planning processes (Smith, 2007). Development of these projects tends to become an extremely “top-down” process with manipulations in the decision-making and a very limited role given to residents and local businesses. It can be concluded, then, that ADCI projects lack transparency to the public sector and democratic accountability.

Yet, the appropriateness of spending significant public funds on prestige and grand cultural projects in areas with many social, economic and environmental problems is often questioned by local communities. There are concerns as to whether these projects can deliver better benefits than other non-cultural investments (e.g. social housing) or other cultural opportunities, such as small-scale art and cultural projects (Baniotopoulou, 2001; Evans & Shaw, 2004; Hall, 1980; Henderson et al., 2007; McNeill, 2000). The benefits associated with these developments appear to be quite narrowly spread as they are often leveraged by new high-income residents, investors and tourists coming to the area and not by the original residents and tax payers. The major arguments against ADCI projects are, then, that they are claimed to be unable to provide for the distribution of benefits to all levels of society and improve quality of life (QoL) for all urban residents. It is also claimed against ADCI projects that they may even contribute to poverty and inequality (Doucet, 2007; Miles & Paddison, 2005; Stevenson, 2004).

Gaps in understanding cultural projects’ contribution to urban development have been identified (Doucet, 2007; Evans & Shaw, 2004; Miles & Paddison, 2005), the real problem in understanding the contribution of ADCIs to urban development is that the theoretical arguments for and against these projects are not sufficiently supported by empirical evidence and few critical assessments have been undertaken in this area to date.

4 Existing evidence

The little evidence on how ADCIs contribute to urban development that actually exists is predominantly focused on visitor numbers, visitor expenditure and investment levels generated by new developments. In recent years, in order to capitalise on the “merchandising of urban culture”, ADCI projects have tried to demonstrate their economic benefits by producing economic impact analysis (Access Economics, 2004, 2007; Guggenheim Museum Bilbao, 2001, 2007, 2009). For better or for worse, all that we currently know about these projects’ contribution to urban development, and, thus, to urban QoL, come from these economic evaluations. Other benefits are typically defined as “intangible” and at best may be listed in such reports’ appendices.

A similar tendency can be observed in overall cultural projects. The economic impact model approach has been the most common valuation method in the arts (Crompton, Lee, & Shuster, 2001; Seaman, 2003). There is also a growing reliance on this type of assessment by cultural institutions when lobbying for private and public support, on the basis that cultural institution improves economic activities in an area, city or region. This
upward focus on economic impact studies is accompanied by little interest in non-market valuation methods (Klamer, 2003; Snowball, 2008). The logic is simple: it is important to put the contribution into numbers because funding decisions would be based on such numbers.

However, relying on financial figures alone to lobby for culture and arts support can be a dangerous game for cultural institutions because financial figures are rarely their strongest argument (Crompton et al., 2001). Economic impact studies are not designed to calculate all direct and indirect impacts associated with an event or a cultural institution (Tyrrell & Johnston, 2001). When cultural projects are compared solely in economic terms with other industry projects that have different objectives in urban development, they may not appear as attractive investments (Snowball, 2008).

Given the scale of investment required, and the political and economic stakes, the absence of robust assessment to justify ADCIs existence may seem to be odd. Nevertheless, there are at least a few reasons that can be stated in response to this. ADCIs are, firstly, part of urban cultural capital; and, secondly, part of wider urban development programs. These two dimensions of ADCIs describe their very nature but also explain why there have been a few barriers in understanding their contribution to urban development. First, there is no tradition of including cultural assessments which are practically absent from evaluation criteria. This is because the rationale for measuring cultural impacts in relation to regeneration is often not sufficiently understood or valued by stakeholders (Evans, 2005). Culture is rarely recognised in urban policy and urban performance indicators and, thus, is not part of urban development evaluation criteria (Evans and Shaw, 2004; Evans, 2005).

Second, cultural institutions encounter significant problems following formally structured assessments due to their lack of experience in this area as well as the costly and time consuming nature of this exercise (Evans and Shaw, 2004). Third, there also seem to be methodological problems. In this regard, the key issue for measuring economic contribution of cultural industries, according to Throsby (2004), is the definition of industry boundaries. Statistical data for whole economies or parts do not generally contain a sufficiently detailed breakdown of the arts and cultural industries to be useful in analysing these activities. It is rather common for the arts to be included in broader categories, such as ‘recreation’, ‘leisure’ or ‘other services’. In practice, often, only application to these broader categories enables analysis of the contribution of the cultural industries (Throsby, 2004, p. 190).

Another methodological problem in assessing cultural projects is the limited statistical data to monitor spatial changes within the city, such as authority district level data. Urban development programs and their components, such as ADCI development interventions, operate at different spatial levels. The data for assessing urban performances is commonly gathered at global, national and city levels but not disaggregated at district or neighbourhood levels (Smith, 1999). Additionally, indicators to measure and monitor urban performances are also frequently formulated at global, national and city levels; and there is a need for spatially relevant indicators to monitor spatial urban changes (Martinez, 2009).

Regarding wider urban development programs, there are few evaluations and periodic reports that can provide information on the contribution of cultural investment to urban development programs, especially in the long-term. Urban development programs are long-lasting and continuous processes that may take many years; while the majority of evaluations provide short-term and one-off evidence (Evans and Shaw, 2004).
At the same time, few existing indicators of the wider urban development programs have been mostly focused on addressing solely sustainable economic criteria. Limited attention has been given to social, cultural and environmental sustainability criteria. There is a need to expand the focus from the economic contribution of the arts towards other types of contributions of the arts and culture. Such approaches could provide for better evaluation, better rationalise these cultural investments and could define contributions that are not reflected in market transactions (Johnson and Thomas, 2001).

Another reason is that, although, some evidence may exist, it is not necessarily published or made available to the public, or may not be analysed in terms related to culture (Evans, 2005). There is also a concern that there is no evidence from the perspective of urban residents on how local residents view and use ADCIs (Doucet, 2007). And it is yet to be known to what extent cultural projects can contribute to diverse social groups (Miles and Paddison, 2005).

Overall, it seems that the aims and objectives of ADCIs in urban development have not been fully recognised; and, thus, what these institutions aspire to achieve for their cities does not seem to be clear. This is one of the reasons why issues may arise around the distribution of benefits of ADCI projects; and why these projects may fail to deliver contributions that could be expected from them. Clarification of ADCIs’ objectives and understanding how to evaluate the progress towards these objectives could address this problem.

Because most existing assessments deal solely with the economic contribution of ADCI projects, it can be argued that the full potential of such projects has never been fully understood and some of their contributions have been overlooked. The aims and objectives of ADCIs may not be clear to the community due to the highly political nature of these projects. Economic advantages and disadvantages of ADCIs and other cultural institutions must be analysed and communicated to the public in conjunction with their other advantages and disadvantages – social and environmental. Currently the holistic picture of the ADCI contribution to urban development is missing.

Despite a variety of assessment methods that currently exist and can be applied to cultural projects most existing evaluation toolkits and assessments provide only patchy information on ADCI contributions. No integrated approach to assess ADCI contribution to urban development holistically has been developed. To date, few critical assessments have been undertaken to demonstrate the contribution of cultural institutions to urban development and there is a need to demonstrate such evidence in a transparent and methodologically grounded way. When ADCIs attempt self-evaluation initiatives they encounter significant difficulties in this area.

5 Proposed conceptual modelling matrix

This article introduces a Conceptual Modelling Matrix (CMM) that was developed as part of the Master's thesis “The Contribution of Architect-Designed Cultural Icons to Urban Development: A Conceptual Methodological Approach” at the Faculty of the Built Environment, the University of New South Wales, Sydney, Australia. The CMM enables a holistic, comprehensive assessment of ADCI projects’ contribution to urban development. The CMM was developed from and is based on two major elements - the Three-level Contribution Model and the Sustainable Performance Framework, which have been specifically designed for the above mentioned thesis. The CMM not only assesses the economic objectives of ADCIs but also their social and environmental
objectives. This makes an assessment of their total contribution to urban development possible.

ADCI projects do not come into being isolated from overall urban development processes. Typically initiated by local, regional or state governments, they are normally undertaken as strategic components of local development programs; and, on an even wider scale, as part of the entire development process. Thus, their own aims and objectives must be aligned to aims and objectives of the meta-level aims and objectives of strategic urban development.

The contribution of ADCIs to urban development must therefore be viewed within the framework of their contribution to the local and city-wide development processes. The Three-level Contribution Model is based on this understanding. The Model establishes the scale of the ADCI contribution to urban development. It operates on three levels: (i) the direct contribution of an ADCI as an institution; (ii) the indirect contribution of an ADCI as a catalyst; and (iii) the overall urban performance as the result of the city-wide development process with an ADCI component. Figure 1 schematically represents the Three-level Contribution Model for ADCI projects.

![Figure 1. The three-level contribution model for ADCI projects](image-url)

The Sustainable Performance Framework offers a simple methodology for analysing ADCI aims, roles and objectives in urban development. The Framework has three steps to follow. Step I clarifies major concepts on what constitutes the ultimate aim of urban development and, thus, ADCIs, which is achieving a better QoL. Step II focuses on establishing roles of ADCI projects. Being part of the urban cultural capital, ADCI projects have three major roles in urban development; these are - economic, social and environmental roles. In Step III, a simple analytical framework Pressure-State-Response (PSR) is employed to establish objectives that need to be met by ADCIs. Here, urban problems that affect QoL and that can be addressed by ADCI projects are analysed. Objectives of ADCI projects would be in line with challenges that cities face. All objectives set up the terms by which ADCIs can be assessed. The Sustainable Performance Framework is diagrammatically represented in Figure 2.
Figure 2. The sustainable performance framework diagram

The CMM comprises a matrix of parameters that need to be assessed in order to establish a holistic picture of the total contribution of ADCI projects to urban development. The CMM integrates the Three-level Contribution Model and the Sustainable Performance Framework. Thus, the CMM assumes that there are three levels at which ADCIs contribute to urban development of the ADCI contribution to urban development; and that the contribution must occur in accordance with the ADCI’s aim of achieving better QoL; in line with the ADCI economic, social and environmental roles in urban development; and in such a way so as to achieve the ADCI objectives.

The CMM then extrapolates these objectives into a number of parameters which can be practically assessed. The direct and indirect contribution of ADCIs to urban development and the overall urban performance need to be assessed for each of the ADCI objectives. These parameters are interrelated and can be interpreted to determine the final outcomes of the CMM – the total contributions of ADCI projects to urban development ($Y_i$). This is done with the help of formulas specifically designed for each of the ADCI objectives. The formulas demonstrate interrelations between the proposed CMM parameters.

Figure 3 gives a schematic representation of the CMM.
Figure 3. The CMM: integrating the three-level contribution model and the sustainable performance framework

The contribution of ADCI projects can be understood with the help of (i) economic, social, environmental direct and indirect impact studies and (ii) assessment methods that deal with urban systems and cities and can be applied to assess the overall urban changes. The contribution and impact studies have distinctly different metrics. The contribution studies look at the gross changes in urban development attributed to projects; and the impact studies look at the net changes in the urban development attributed to projects and that would not occur if the projects had not been implemented.

A more detailed description of the CMM is provided below.

5.1 Direct contribution of ADCI projects to urban development (1st level)

This part of the CMM offers the direct-contribution-level parameters to assess the ADCI economic, social and environmental objectives.

The direct contribution of ADCIs to urban development assumes analysing these projects from the institutional level. As a place-based initiative – an ADCI project is viewed as a building or collection of buildings and spaces in between them; as a people-based development intervention – people working in or visiting the ADCI institution (employees, presenters and visitors) need to be in the focus of assessments; and from the industry-based perspective – economic activities of the ADCI institution need to be
analysed. The direct contribution of ADCI projects can be understood via direct gross impact studies. Social, economic and environmental impacts may have different scales and vary from the positive to adverse.

The **direct economic contribution** of an ADCI to urban development can be assessed the same way as the gross direct economic impact of any cultural institution. On this level a cultural institution is viewed as a private cultural good – an ADCI organisation and a business entity. (Crompton et al., 2001; Snowball, 2008; Throsby, 2001; Throsby, 2004; Tyrrell & Johnston, 2001).

The **direct social contribution** of an ADCI project can be assessed, through the assessment of the social impact of the ADCI institution on people who work in or visit this ADCI institution or participate in activities provided by it. Likewise, the direct social contribution can be assessed via micro-social impact assessments that focus on “a number of individuals, their goals and their behavioural choices” (Becker, 2001, p. 316).

The **direct environmental contribution** of ADCI projects can be understood via assessment of the direct impact of ADCI buildings and spaces on the urban environment. To assess the impact of the built environment the environmental impact of buildings as products can be undertaken (Crawley & Aho, 1999); this involves “identifying and quantifying of the environmental impact of the construction, use and eventual dismantling of a building in a given location and time span” (p. 300). The direct environmental impact of the ADCI institution relates to attempts of these institutions to reduce their own negative environmental impacts on ecosystems; and, ideally, by achieving net positive development, which means increasing positive environmental impacts (Birkeland, 2008).

### 5.2 Indirect contribution of ADCI projects to urban development (2nd level)

The outcome of the indirect contribution part of the CMM is the number of parameters that need to be assessed in order to understand the indirect ADCI contribution to their economic, social and environmental objectives.

The indirect contribution of ADCI projects is associated with their roles as catalysts to urban development in urban areas (place-based contribution), communities (people-based contribution) and urban industries (industry-based contribution). The catalyst effect of ADCI projects is seen when these projects become drivers of regenerative effects in their respective urban environments and when they function as foundations for the environmental, economic and social regeneration in the urban area and the urban economy for the urban community (Baniotopoulou, 2001; Doucet, 2007; Evans & Shaw, 2004; Evans, 2005; Garcia, 2006; Henderson et al., 2007; Keating & Frantz, 2004; Kunzmann, 2004; Miles, 2005; Miles & Paddison, 2005).

The scale of the indirect contribution of ADCI projects can be defined as follows. As place-based development interventions, ADCIs contribute to the area/quarter/precinct/district of the ADCI location. The area boundaries are usually determined by local development plans and strategies. As people-based interventions, ADCIs contribute to the local community or people who live, work in or visit the area of the ADCI location. Finally, as industry-based development interventions, these projects contribute to the urban industries impacted by ADCI activities.

The **indirect economic contribution** of ADCI projects can be understood via indirect economic impact studies. Injections of new money into a city create successive rounds of spending in the area and generate what is called “indirect impact” (Snowball, 2008, p. 66). The indirect economic impact centres more on economic “contribution” than...
“impact” and implies uncovering interactive relationships between the arts and other sectors (Throsby, 2004). Throsby asserts that an assessment of the indirect impact is possible, because what is measured here is the impact of an exogenous shock affecting the industry (2004, p. 189). Regional input-output models and multipliers, adjusted to the specific urban area, need to be employed to calculate the indirect economic contribution of ADCI projects.

Successive rounds of spending occurring within the impact area happen due to a multiplier effect (Snowball, 2008, p. 66). The size of multiplier can be determined by the level of imports in the impact area and depends on the leakages from the economy (the amount of money taken out from, and spent outside, the host economy). The multiplier concept implies that the initial direct expenditure by visitors would stimulate economic activity and generate additional turnover, personal income, employment and government revenue in a city (Crompton et al., 2001, p. 81). The visitor spending is multiplied depending on the number of visitors. Consequently, accuracy in calculations of visitor numbers is important in the indirect economic impact studies (Snowball, 2008, p. 58) as the multiplier size would depend on these numbers.

The indirect social contribution of ADCI projects depends on the changes in the local community that can be attributed to ADCI activities and that affects people’s wellbeing. The indirect social contribution can be assessed with the help of the indirect social impact studies. Indirect social impacts are those caused by direct social impacts; and, as a result, they usually occur after and farther away than the direct impact (Burdge et al., 1995, p. 30). The indirect social contribution relates to social consequences of the ADCI project implementation.

The indirect social contribution can be evaluated via meso-social impact assessments (Becker, 2001). This type of social impact assessments focuses on an organisation or a social network; “impacts on the behaviour of collective actors, such as organisations and social movements” need to be assessed (Becker, 2001, p. 316-317). Activities and perceptions of people who live, work or used to live and work in urban areas of ADCI location (existing and indigenous communities), people who visit these areas and people who employed in the urban industries impacted by ADCI activities need to be analysed here.

The indirect environmental contribution can be assessed with the help of the indirect environmental impact studies. The difficulties in identifying indirect environmental impacts have been acknowledged by Emilsson and Hjelm (2007, p. 76) “since it is experienced as being abstract and complex and there are no general guidelines for managing this kind of environmental impact”. The authors provide the following definition of the indirect environmental impact:

Indirect environmental impact constitutes any change to the environment, whether adverse or beneficial, wholly or partially resulting from an element of an organization’s activities or products or services, influencing other actors’ prerequisites to perform their activities (Emilsson & Hjelm, 2007, p. 82).

Indirect environmental impacts of ADCI institutions relate to their ability to change other actors’ behaviours and attitudes (the ADCI catalyst effect). This can be achieved by ADCI institutions through bringing awareness to people who experience them indirectly - employees, presenters, visitors, residents and business owners based in the area of ADCI locations. ADCIs can contribute to changing other actors’ behaviours and attitudes by promoting advanced environmentally sustainable practices, raising awareness on ADCI
environmental performance, taking a leadership position in minimising resource degradation, and consumption on and increasing the ecological base and the public estate.

5.3 Changes in the overall urban performance (3rd level)

The CMM offers a number of parameters to demonstrate the overall urban economic, social and environmental changes that occurred as a result of a wider urban development process with different integrative components, including an ADCI.

On this level, an ADCI project is considered as part of the city-wide development process, particularly as part of a wider urban development program. Urban development programs are usually large urban programs that extend over large urban areas and are implemented during lengthy periods of time. They incorporate in themselves local development projects, strategies and plans. Thus, overall urban economic, social and environmental changes in urban development occur due to combined effects and as a sum result of the overall urban development process, including an ADCI component.

The scale of the overall urban changes as a result of the urban development process with an ADCI component is limited to the area in the city boundaries (place-based), the urban community (community-based), and the urban industries (industry-based).

Analysis of the overall urban performance is necessary because boundaries of the direct and indirect contribution may be difficult to determine as the impacts of cultural institutions would occur on local, regional and national levels. Additionally, data limitations, e.g. in case of cultural industries or cumulative social impacts, make it difficult to analyse urban changes that could be attributed to ADCI projects. It could appear, then, that significant areas of ADCIs’ contribution to the urban development would not be assessed and, thus, understood.

Assessment methods that deal with urban systems and cities need to be deployed on the overall urban performance level. These methods need to demonstrate the economic, social and environmental impacts on the urban scale. Because impact assessments are employed to assess the direct and indirect ADCI contribution, the overall urban performance can also be evaluated via impact studies.

5.4 Total ADCI contribution to urban development

Formulas for the total economic, social and environmental contributions of ADCI projects to urban development are proposed for each of the ADCI objectives. It is, however, commonly recognised that it is difficult to come up with accurate direct and indirect impact figures and, therefore, direct and indirect contribution figures. To address this, additional conditions are set up with equations and inequalities that help to define the scale of the total contribution.

6 How does it work in theory

In their progress towards sustainable development, cities may deploy ADCI projects in order to address such urban challenges as urban inequality, social exclusion, crime and violence, and so on. ADCI projects can be employed by urban authorities to address these urban challenges partly or even entirely. For instance, urban authorities can make a decision to undertake an ADCI project with a purpose to improve local economic conditions - through its ability to reactivate urban economy, diversify economic activity, creating employment opportunities and bring a symbol of change to the local community.
Twelve ADCI objectives were identified as a result of application of the Sustainable Performance Framework. These are divided into three groups according with the ADCI roles in urban development:

Economic role:
- Sustainable income
- Increase of employment
- Economic restructuring and diversification of economic activity

Social role:
- Social equity
- Social inclusion
- Urban safety
- Urban community’s participation in decision-making and community empowerment
- Sense of community
- Enhancing local, regional, national and international reputation and strengthening urban identity

Environmental role:
- Improved ecosystem integrity, carrying capacity and biodiversity
- High quality urban design and sustainable land use
- Improved physical access

The CMM extrapolates these objectives into a number of parameters which can then be practically assessed. Table 1 lists the CMM parameters that need to be assessed in order to assess the total ADCI contribution to urban development. A set of formulas specifically designed for each of the ADCI objectives helps to translate these parameters into the final outcome of the CMM – an assessment of the total contribution of ADCI projects to urban development. This process is demonstrated below with an example of one of the identified ADCI objectives – “sense of community” (ADCI Objective 8).

<table>
<thead>
<tr>
<th>Objective 1: Sustainable income</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st level</td>
<td>P1: Direct economic contribution to personal income created by the ADCI institution.</td>
</tr>
<tr>
<td>2nd level</td>
<td>P2: Indirect economic contribution to personal income generated by the ADCI activities in the urban industries.</td>
</tr>
<tr>
<td>3rd level</td>
<td>P3: Changes in city GDP.</td>
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</tbody>
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<thead>
<tr>
<th>Objective 2: Increase of employment</th>
<th>Parameters</th>
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<tbody>
<tr>
<td>1st level</td>
<td>P4: Direct economic contribution to employment created by the ADCI institution.</td>
</tr>
<tr>
<td>2nd level</td>
<td>P5: Indirect economic contribution to employment generated by ADCI activities in the urban industries.</td>
</tr>
<tr>
<td>Contribution level</td>
<td>Parameters</td>
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<tr>
<td><strong>Objective 1: Sustainable income</strong></td>
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<tr>
<td>3rd level</td>
<td>• P6: Changes in overall urban employment level.</td>
</tr>
<tr>
<td><strong>Objective 3: Economic restructuring and diversification of economic activity</strong></td>
<td></td>
</tr>
<tr>
<td>1st level</td>
<td>• P7: Employment changes in the urban industries due to the ADCI direct economic contribution.</td>
</tr>
<tr>
<td>2nd level</td>
<td>• P8: Employment changes in the urban industries due to the ADCI indirect economic contribution.</td>
</tr>
<tr>
<td>3rd level</td>
<td>• P9: Desirable urban employment composition by industry for the urban economy.</td>
</tr>
<tr>
<td><strong>Objective 4: Social equity</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 1st level | • P10: Differentials in income of highest to lowest quintile of the jobs created as a result of the ADCI direct economic contribution.  
• P11: Employment created as a result of the ADCI direct economic contribution by ethnicity, gender and age. |
| 2nd level | • P12: Differentials in income of highest to lowest quintile of the jobs created as a result of the ADCI indirect economic contribution.  
• P13: Employment created as a result of the ADCI indirect economic contribution by ethnicity, gender and age. |
| 3rd level | • P14: Differentials in income of highest to lowest quintile of the urban population.  
• P15: Urban employment distribution by ethnicity, gender and age. |
| **Objective: 5 Social inclusion** | |
| 1st level | • P16: City residents who believe that cultural and educational facilities and services provided by the ADCI institution are accessible to them.  
• P17: ADCI visitors, employees and presenters who believe that the ADCI institution supports, integrates and promotes local culture through its activities. |
<p>| 2nd level | • P18: City residents who believe that educational options to participate in the urban industries impacted by the ADCI activities are accessible to... |</p>
<table>
<thead>
<tr>
<th>Contribution level</th>
<th>Parameters</th>
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<tbody>
<tr>
<td>Objective 1: Sustainable income</td>
<td>them.</td>
</tr>
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<td></td>
<td>• P19: City residents who believe that the ADCI contributes in promoting, integrating and supporting local culture in the urban area/quarter/precinct/district of its location.</td>
</tr>
<tr>
<td>3rd level</td>
<td>• P20: City residents who believe that urban cultural and educational facilities are accessible to them.</td>
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<td></td>
<td>• P21: City residents who believe that the urban development process promotes, integrates and supports local culture.</td>
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<tr>
<td>Objective 6: Urban safety</td>
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<tr>
<td>1st level</td>
<td>• P22: Real and perceived safety from crime within the ADCI buildings and spaces.</td>
</tr>
<tr>
<td>2nd level</td>
<td>• P23: Real and perceived safety from crime associated with the ADCI activities within the area/quarter/precinct/district of the ADCI location.</td>
</tr>
<tr>
<td>3rd level</td>
<td>• P24: Real and perceived urban safety from crime.</td>
</tr>
<tr>
<td>Objective 7: Community participation in decision making and community empowerment</td>
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<tr>
<td>1st level</td>
<td>• P25: Citizens’ participation in decision-making regarding the ADCI project as stakeholders.</td>
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<td></td>
<td>• P26: Private sector’s participation in decision-making regarding the ADCI project as stakeholders.</td>
</tr>
<tr>
<td></td>
<td>• P27: Citizens’ participation in programs and activities offered by the ADCI institution to the community (commitment of the city residents to the ADCI institution in terms of participation).</td>
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<tr>
<td></td>
<td>• P28: Private sector’s participation in philanthropy programs offered by the ADCI institution (commitment of the private sector to the ADCI institution in terms of participation).</td>
</tr>
<tr>
<td>3rd level</td>
<td>• P29: Citizens’ participation in decision-making regarding the ADCI project as stakeholders.</td>
</tr>
<tr>
<td></td>
<td>• P30: Private sector’s participation in decision-making regarding the ADCI project as stakeholders.</td>
</tr>
<tr>
<td>Contribution level</td>
<td>Parameters</td>
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| **Objective 1: Sustainable income** | stakeholders.  
- P31: Citizens’ participation in programs and activities offered by the ADCI institution to the community (commitment of the city residents to the ADCI institution in terms of participation).  
- P32: Private sector’s participation in philanthropy programs offered by the ADCI institution (commitment of the private sector to the ADCI institution in terms of participation). |
| **Objective 8: Sense of community** |  
**1st level**  
- P33: Sense of community experienced by employees, presenters and visitors (urban residents) to the ADCI institution.  
**2nd level**  
- P34: Sense of community experienced by urban residents who live, work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location that is attributed to the ADCI activities.  
**3rd level**  
- P35: Sense of community experienced by the urban residents. |
| **Objective 9: Enhancing local, regional, national and international reputation and strengthening urban identity** |  
**1st level**  
- P36: Share of positive references in the overall (positive and negative) local media references on the ADCI project.  
**2nd level**  
- P37: Share of positive references in the overall (positive and negative) regional, national and international media references that cite both the city that initiated the ADCI project and the ADCI.  
**3rd level**  
- P38: Share of positive references in the overall (positive and negative) regional, national and international media references that cite the city that initiated the ADCI project. |
| **Objective 10: Improved ecosystem integrity, carrying capacity and biodiversity** |  
**1st level**  
<table>
<thead>
<tr>
<th>Contribution level</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Sustainable income</td>
<td></td>
</tr>
<tr>
<td>2nd level</td>
<td>• P40: Ability of the ADCI to create a change in the attitude of the urban community towards environmentally sustainable practices.</td>
</tr>
<tr>
<td>3rd level</td>
<td>• P41: Average urban environmental performance.</td>
</tr>
</tbody>
</table>

| Objective 11: High quality urban design and sustainable land use | |
| 1st level | • P42: ADCI performance in design quality and land use. |
| 2nd level | • P43: Ability of the ADCI to change the attitude of the urban community towards improving design quality and land use. |
| 3rd level | • P44: Overall urban performance in design quality and land use. |

| Objective 12: Improved physical accessibility | |
| 1st level | • P45: Accessibility of the ADCI institution by environmentally-friendly access means. |
| 2nd level | • P46: Ability of the ADCI to change the attitude of the urban community towards increasing the use of environmentally-friendly access means in the urban environment. |
| 3rd level | • P47: Urban accessibility by environmentally-friendly access means. |

It is important that ADCI objectives and associated parameters and equations need to be understood in their interrelation to each other. Thus, the total ADCI contribution that relates to the ADCI economic objectives have to be considered in conjunction with the total ADCI contribution to the ADCI social and environmental objectives and vice versa; e.g., low income and low participation in the labour market (economic objectives) are generally seen as the main risk factors for social inequity (a social objective).

An extract from the Master's thesis “The Contribution of Architect-Designed Cultural Icons to Urban Development: A Conceptual Methodological Approach” is provided below in order to demonstrate the application of the CMM to assessing one of the twelve established ADCI objectives – the sense of community objective.
6.1 **Objective 8: sense of community**

Changes in built and natural environments have an impact on a sense of community. Public spaces, as an example, create opportunities for informal social interaction (Young, McKiernan, Copeland, & Ambrose, 2005). Consequently, their enhancement or decline would improve or reduce social interactions and alongside it, will affect sense of community.

ADCI projects and urban development programs can push up property prices and cause displacement of local resident communities through gentrification. Separation from the physical spaces that have emotional connection to people through political planning decisions can have a dramatic impact on people’s sense of community (Butterworth, 2000).

The search for urban distinctiveness with the help of ADCI projects may sometimes take a course that could undermine or even threaten the local sense of community. Engaging world name architects and large international consultant teams, application of standardised technologies and the “most effective way” approaches, create a danger of diluting the intrinsic sense of place and the sense of community.

It is then important that the development of ADCIs establishes an objective to support and enhance the local sense of community in their cities. Sense of community can be defined as:

- a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together… Sense of community reflects the symbolic interaction in which people engage as they use aspects of the physical environment (Butterworth, 2000, p. iii).

Thus, people’s relationship with the places they know constitutes the sense of community and contributes to their sense of identity, wellbeing and sense of belonging. The perceptions of the sense of community can reveal if urban places are meaningful, accessible to all community members and if there are strong connections between the people, their personal lives and their place.

According to Chavis and Wandersman (1990, p. 56) sense of community is characterised by "the relationship between the individual and the social structure". In terms of community development a sense of community relates to three domains: (i) the perception of the environment, (ii) one’s social relations, (iii) perceived control and empowerment. A sense of community also acts as a catalyst to mobilise these three components (Chavis & Wandersman, 1990).

McMillan and Chavis (1986) propose four criteria for defining and theorising the sense of community. Those are membership, influence, integration, and fulfilment of needs and shared emotional connection (p. 8-14). McMillan and Chavis also highlight the significance of a shared symbol to increase the sense of community suggesting that sense of collective identity may be provided by a symbolically meaningful landmark, “symbols for a neighbourhood may reside in its name, a landmark, a logo, or in architectural style” (p. 11). The authors use the findings of Warner and Associates (1949) on common symbol systems that stress that any community needs to build a common symbol system so as to attain integration and functioning in its social life (McMillan & Chavis, 1986, p. 10). Authors claim that “understanding common symbols systems is prerequisite to understanding community” (McMillan & Chavis, 1986, p. 10). ADCI projects are often aimed to play such role of collective identity facilitators. Place representation is one of
the main ADCI features as ADCIs tend to become “the major sign of a people and a place” (Barthes, 1997, p. 4); and they do so by providing a shared symbol.

The proposed CMM parameters that need to be assessed in order to understand the total contribution of ADCI projects to sense of community are summarised in Table 2.

The discussion further includes the introduction to the parameters and the description of possible assessment methods that allow for evaluation of the total ADCI contribution to sense of community.

Table 2. Three-level parameters for the sense of community objective

<table>
<thead>
<tr>
<th>Contribution level</th>
<th>Contribution type</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st level</td>
<td>Direct contribution of an ADCI as an institution</td>
<td>P33: Sense of community experienced by employees, presenters and visitors (urban residents) to the ADCI institution.</td>
</tr>
<tr>
<td>2nd level</td>
<td>Indirect contribution of an ADCI as a people-based catalyst</td>
<td>P34: Sense of community experienced by urban residents who live, work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location that is attributed to the ADCI activities.</td>
</tr>
<tr>
<td>3rd level</td>
<td>Changes in the overall urban performance Contribution of an ADCI as a part of the city-wide development process</td>
<td>P35: Sense of community experienced by the urban residents.</td>
</tr>
</tbody>
</table>

The parameters can be calculated in the number of people via a survey of the “sense of community” perceptions of people.

The proposed set of parameters requires assessing people’s perceptions. This can be done with the help of questionnaires. Responses to questionnaires are to be sought from randomly selected (i) ADCI employees, presenters and visitors; (ii) ADCI visitors; (iii) urban residents who live or work in the urban area/quarter/precinct/district of the ADCI location; (iv) urban residents who used to live or work in the urban area/quarter/precinct/district of the ADCI location; (v) urban residents who visit the urban area/quarter/precinct/district of the ADCI location. Questionnaires may vary from simple, such as the ones measured as a single construct, to complicated, such as the Brief Sense of Community Index (BSCI) and the Sense of Community Index (SCI).

Only the sense of community experienced by the urban community (urban residents) needs to be assessed. City visitors experience the city and ADCIs only for a short time,

\[1\] Can be calculated for both or for “old” and “new” communities separately.
while urban residents experience ADCIs in the long term and continuously. City visitors (non-urban residents), then, have to be excluded from calculations.

The three-level parameters for the sense of community objective are described below.

6.2 Direct contribution (1st level)

Parameter 33: Sense of community experienced by employees, presenters and visitors (urban residents) to the ADCI institution.

The direct contribution of an ADCI project to sense of community can be understood through the perspective of people who experience that ADCI as an institution. This means perceptions of (i) people who work in the institution permanently and temporary, including staff and presenters; and (ii) urban residents who visit the ADCI institution as customers in order to consume its products and services.

6.3 Indirect contribution (2nd level)

Parameter 34: Sense of community experienced by urban residents who live or work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location that is attributed to the ADCI activities.

To assess the indirect ADCI contribution towards the sense of community objective, the perceptions of people who experience or used to experience an ADCI as part of a particular urban area, quarter or district need to be analysed.

The perceptions of people who had been living or working in that urban area before the ADCI project was initiated (the indigenous or “old” community) and residents and workers who moved to the area after (the “new” community) are equally important to assess. It can be necessary to assess the parameter separately for both - the “old” and the “new” community. In this case the difference in the sense of community perceptions between “old” and “new” community can show the divide within that community.

6.4 Changes in the overall urban performance (3rd level)

Parameter 35: Sense of community experienced by the urban residents.

Assessment of the parameter allows understanding the overall urban performance towards the sense of community objective as a result of the urban development process. The perceptions of urban residents on sense of community need to be assessed on this level.

6.5 Total ADCI contribution to sense of community

The total ADCI contribution to sense of community is defined by the ratio, $X_{\text{sense}}$, which can be calculated using the following formula and inequality

$$X_{\text{sense}} = \frac{A_{\text{sense}} \times \alpha + B_{\text{sense}} \times \beta}{\alpha + \beta}$$

$$X_{\text{sense}} > C_{\text{sense}}$$

where
\(A_{\text{sense}}\) denotes the proportion of ADCI employees, presenters and visitors (urban residents) who experience sense of community, in dimensionless ratio;

\(\alpha\) is the number of ADCI employees, presenters and visitors per day\(^2\);

\(B_{\text{sense}}\) denotes the proportion of people who live, work (and who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location and who believe that the ADCI contributes in building sense of community in that area, in dimensionless ratio;

\(\beta\) is the number of people who live, work (and who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location per day.

Higher values of \(X_{\text{sense}}\) indicate a higher sense of community. Because there can be significant differences in sense of community experiences of (i) those who visit the ADCI and the area of its location and (ii) those who work and/or live there, the calculations can also be done separately for these two groups. Otherwise, this can be addressed when undertaking questionnaires in groups that can be formed accordingly with the proportions (by the number of people) of visitors, residents and workers.

Sense of community experienced by urban residents \underline{without} the direct and indirect ADCI impact, which is denoted as \(C_{\text{sense}}\), needs to be known in order to define the scope of the ADCI total contribution. It can be determined using the following formula

\[
C_{\text{sense}} = \frac{C_{0\text{sense}} \times \chi - A_{\text{sense}} \times \alpha + B_{\text{sense}} \times \beta}{\chi - \alpha + \beta}
\]

where

\(C_{\text{sense}}\) denotes the proportion of urban residents who experience sense of community \underline{without} the direct and indirect ADCI impact on sense of community, in dimensionless ratio;

\(C_{0\text{sense}}\) denotes the proportion of urban residents who experience sense of community \underline{with} the direct and indirect ADCI impact on sense of community, in dimensionless ratio;

\(\chi\) is the number of urban residents overall.

When the number of overall urban residents, \(\chi\), significantly exceeds the number of ADCI employees, presenters and visitors, \(\alpha\), and people who live, work (and who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location, \(\beta\), then the proportion of urban residents who experience a sense of community \underline{without} the direct and indirect ADCI impact, \(C_{\text{sense}}\), would be very close to the proportion of urban residents overall.

\(^2\) Calculations need to be done on per day basis. Monthly or yearly basis would only affect the number of visitors and not the number of people who live or work in the area of ADCI location or the number of ADCI employees and presenters. This may cause that the weights for sense of community of visitors would be disproportionally higher than those for residents and workers.
residents who experience the sense of community \( \text{with} \) the direct and indirect ADCI impact, \( C_{\text{sense}}^{0} \), or \( \{ C_{\text{sense}} \ C_{\text{sense}}^{0} \} \).

The condition
\[
X_{\text{sense}} > C_{\text{sense}}
\]

means that the total ADCI contribution to sense of community is positive; and the sense of community impacted (directly and indirectly) by ADCI activities is higher than the sense of community that urban residents would have otherwise experienced if there were no ADCI. Otherwise, if \( X_{\text{sense}} \leq C_{\text{sense}} \), the ADCI has no contribution to sense of community \( \text{when } X_{\text{sense}} = C_{\text{sense}} \); or has adverse impact on a sense of community, the total ADCI contribution is negative \( \text{when } X_{\text{sense}} < C_{\text{sense}} \).

7 How does it work in practice

In the earlier mentioned thesis the CMM model was applied to several well recognised ADCIs – the Sydney Opera House, the Guggenheim Museum Bilbao, and the Lowry Centre Salford. This allowed the identification of “blind spots” in the understanding of a holistic picture of the ADCI contribution to urban development. Generally the evidence that is available on these development interventions consists of patchy data and partial assessments of ADCI projects’ results. The assessment mapping exercise showed that there is no awareness among the stakeholders of certain types of ADCI contributions, especially regarding social and environmental ADCI objectives. In the majority of cases this is why data have not been collected or assessments have not been undertaken. ADCI contributions to urban development that have not been determined thus far can, however, be assessed with the help of the proposed CMM.

This section demonstrates the application of the CMM using an example of assessing the total ADCI contribution to the sense of community objective.

7.1 Direct contribution (1st level)

Parameter 33: Sense of community experienced by employees, presenters and urban resident visitors to the ADCI institution.

The data on sense of community within ADCIs is needed in order to assess the parameter. Even though addressing the sense of community issue is a real challenge for ADCI projects, the research shows that the sense of community experienced by employees, presenters and visitors to ADCI institutions is predominantly understudied; and there is very little specific data available to assess the parameter.

The experience of Bilbao and its Guggenheim Museum demonstrates the sense of community challenge that an ADCI may face. The role of the Guggenheim Museum Bilbao has been primarily seen in attracting new visitors but not necessarily in delivering benefits to Bilbao residents (Del Castillo & Haarich, 2004). Although the Strategic Plan for Revitalization of Metropolitan Bilbao (1989) mentioned the improvement of QoL for local people, there were no proposals in the plan for how this could be achieved (Baniotopoulou, 2001). The Guggenheim Museum’s position towards local artists demonstrates this point. As a museum with an international orientation, the Guggenheim Museum Bilbao has never prioritised the promotion of Basque culture. The Guggenheim gives little support to local culture and artists; and local and regional artists are only
marginally represented in the museum’s collections (Del Castillo & Haarich, 2004); and, thus, the commitment of the museum to provide for the local sense of community in Bilbao can be doubted.

Yet, a few references exist that can help paint a picture of the sense of community experienced by local residents. The interviews (Henderson et al., 2007) showed that many Ordsall residents (customers) do not see the Lowry as a valued facility. The Lowry Centre has some outreach to local people. However, the Lowry’s dominant focus on commercial success means that the Centre can offer only little time or few cheap facilities to the local community by this ADCI. Furthermore, there are concerns that some local people feel unwelcome:

People in Ordsall and Langworthy don’t think it’s their facility, it’s not their heritage… but there’s also a feeling and quite a bit of anecdotal evidence that not only are they not welcome there but they’re made to feel uncomfortable (Ordsall Neighbourhood Co-ordinator, Salford City Council, personal communication, in Henderson et al., 2007, p. 1458).

The research shows that customer satisfaction surveys or customer market research are normally undertaken by ADCIs and can be obtained in annual reports produced by ADCIs, or specialised surveys, such as customer research. Sense of community experienced by visitors (customers) is not a main focus of these surveys. For instance, the Sydney Opera House undertakes an onsite conversion study aimed to gain an understanding into “people’s behaviour patterns onsite, understand any barriers to purchase, navigation issues, product awareness and their overall experience” (Sydney Opera House Trust, 2009, p. 56). This study is both quantitative and qualitative and involves an online survey of recent customers; intercept onsite (mix of local, interstate and overseas residents); focus groups discussions (regular and sporadic visitors); and in-depth phone interviews among sporadic visitors. This study is an example of a market research, which focuses on customer satisfaction but does not aim to develop understanding on the sense of community experienced by visitors to this ADCI.

No references to sense of community experienced by the employees or presenters of ADCIs have been found. Although there could be presenter satisfaction surveys. The Sydney Opera House, for example, undertakes Presenter Satisfaction Measurement Surveys, where feedback is sought on event process, technical services, front of house services, building facilities, safety, catering and other services provided by the ADCI (Sydney Opera House Trust, 2008). These surveys can be seen as ways to improve services provided by the ADCI to presenters; there is, however, no mention of the sense of community in these surveys.

7.2 Indirect contribution (2nd level)

Parameter 34: Sense of community experienced by urban residents who live or work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location that is attributed to the ADCI activities.

In order to assess the parameter, the data on people’s sense of community perceptions needs to be available. How much and in what way these perceptions have been impacted by the existence of ADCI also needs to be determined. This can be done with the help of questionnaires where interviewees (those who experience the urban area/quarter/precinct/district of the ADCI location) are asked to define the scale of the impact that the ADCI has made on their sense of community.
The research shows that studies on sense of community experienced by people in the area/quarter/precinct/district of the ADCI location have not been undertaken. Yet, occasional references on sense of community impacted by new developments in these areas can be found.

From the beginning of the development Salford City Council adopted the view that Salford Quays “would increase the aspirations of local people” (Henderson et al., 2007, p. 1460) These increased aspirations in their turn would contribute to stronger connections within the community. In reality this approach of aspiration building did not differ from any trickle-down development approach (Raco, Henderson, & Bowiby, 2008).

For existing long-term residents in Salford, new developments were often perceived as a threat to existing social relations (Raco et al., 2008). The perceptions of local communities of the Salford Quays development were that “they [developments] were an encroachment on existing places and ways of life” (Raco et al., 2008, p. 2667). Additionally, the interviews showed that people felt they had no control over the development and there was a strong belief that existing communities would eventually be forced to move out of the area (Raco et al., 2008). “Old” residents felt that, despite the success of the Salford Quays development, this development did not happen to include them (Henderson et al., 2007).

At the same time, the “new” community complained that their social needs have been ignored and that the area contained too little social infrastructure to encourage them to stay in the longer term, in particular there was a lack of family infrastructure (Raco et al., 2008). The comments from the incoming residents were such as “we wanted this to become a little village, we want a community like anybody else does, but what we tend to get is the downside of the tourist location ... families do not want to live here” (Raco et al., 2008, p. 2668).

Both, “new” and “old” communities, felt that the Salford Quays development was detached from their local needs and that in case of the commercial success of the development this detachment tendency would intensify even further (Raco et al., 2008).

There was also little social or economic integration between the residents of Ordsall (a neighbouring area) and those in Salford Quays. The interviews (Henderson et al., 2007) showed that residents were concerned that achieving a mixed community is problematic and that coexistence of two divided communities took place (Henderson et al., 2007, p. 1458).

7.3 Changes in the overall urban performance (3rd level)

Parameter 35: Sense of community experienced by the urban residents.

Different indicators can be found on the city level that can describe, partly or inclusively, the sense of community experienced by urban residents. For example, the Social Capital Survey was undertaken by EUSTAT for Bizkaia province in 2007. Bilbao, where the Guggenheim Museum Bilbao is located, is the capital of Bizkaia province. The survey was designed as a set of social participation and relationship dimensions that included the size of the friends and family network, their uniformity, trust in general and in the institutions, virtual networks, safety, social cohesion, and so on. Province residents aged 15 and above were interviewed for the survey by telephone, Internet, visit and mail (Eustat, 2007).

One of the results of the Social Capital Survey shows the uniformity of the friends’ network. The friends’ network uniformity was obtained by counting positive answers to
questions about their beliefs, nationality, ethnical or racial group, social position and political trends, and the result is deducted from 10 to give it an appropriate meaning (Eustat, 2007). It scored an average of 6.01 for the Bizkaia province in 2007, which means that nearly two thirds of people only had friends who were the same as them in terms of religious beliefs, nationality, social position or political trends. The friends’ network uniformity parameter, relates to the membership criteria for the sense of community as defined by McMillan and Chavis (1986), where membership is associated with a feeling of emotional safety and identification with the larger collective.

7.4 Total ADCI contribution to sense of community

Because there is no real data available to assess the total ADCI contribution to sense of community, to demonstrate the assessment process, approximate data has been manufactured (see Table 3).

Table 3. Manufactured data used to demonstrate the assessment process for the total ADCI contribution to sense of community

<table>
<thead>
<tr>
<th>Equation elements</th>
<th>Number of people</th>
<th>Proportion of people who experience sense of community</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADCI employees, presenters and visitors per day</td>
<td>( \alpha = 4,000 )</td>
<td>( \frac{a \times A_{\text{emp, sense}} + b \times A_{\text{visit, sense}}}{\alpha} \approx 0.68 )</td>
</tr>
<tr>
<td>- ADCI employees and presenters</td>
<td>( a = 1,000 )</td>
<td>( A_{\text{emp, sense}} = 0.6 )</td>
</tr>
<tr>
<td>- ADCI visitors</td>
<td>( b = 3,000 )</td>
<td>( A_{\text{visit, sense}} = 0.7 )</td>
</tr>
<tr>
<td>Urban residents who live or work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location</td>
<td>( \beta = 140,000 )</td>
<td>( \frac{c \times B_{\text{emp, sense}} + d \times B_{\text{visit, sense}}}{\beta} \approx 0.37 )</td>
</tr>
<tr>
<td>- Urban residents who live or work (and those who used to live or work) in the urban area/quarter/precinct/district of the ADCI location</td>
<td>( c = 100,000 )</td>
<td>( B_{\text{emp, sense}} = 0.4 )</td>
</tr>
<tr>
<td>- Urban residents who visit the urban area/quarter/precinct/district of the ADCI</td>
<td>( d = 40,000 )</td>
<td>( B_{\text{visit, sense}} = 0.3 )</td>
</tr>
</tbody>
</table>
Equation elements | Number of people | Proportion of people who experience sense of community
---|---|---
Urban residents | \( \chi = 1,000,000 \) | \( C^{0_{\text{sense}}} = 0.5 \)

In this assessment, it is assumed that sense of community perceptions were assessed separately for visitors, \( A^{\text{visitsense}} \) and \( B^{\text{visitsense}} \), and residents and workers, \( A^{\text{empsense}} \) and \( B^{\text{empsense}} \). If this is the case, then, the proportion of people who experience sense of community for both groups needs to be calculated. The proportion of ADCI employees, presenters and visitors (urban residents) who experience sense of community:

\[
A_{\text{sense}} = \frac{\alpha \times A^{\text{empsense}} + b \times A^{\text{visitsense}}}{\alpha}
\]

\[
A_{\text{sense}} = \frac{1,000 \times 0.6 + 3,000 \times 0.7}{4,000} = \frac{600 + 2,100}{4,000} \approx 0.68
\]

The proportion of people who live, work (and who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location and who believe that the ADCI contributes in building sense of community in that area:

\[
B_{\text{sense}} = \frac{c \times B^{\text{empsense}} + d \times B^{\text{visitsense}}}{\beta}
\]

\[
B_{\text{sense}} = \frac{100,000 \times 0.4 + 40,000 \times 0.3}{140,000} = \frac{40,000 + 12,000}{140,000} \approx 0.37
\]

Now, it is possible to determine the total ADCI contribution to sense of community.

\[
X_{\text{sense}} = \frac{A_{\text{sense}} \times \alpha + B_{\text{sense}} \times \beta}{\alpha + \beta}
\]

\[
X_{\text{sense}} = \frac{0.68 \times 4,000 + 0.37 \times 140,000}{4,000 + 140,000} = \frac{2,720 + 51,800}{144,000} \approx 0.38
\]

Because the number of urban residents \( \chi = 1,000,000 \) is significantly higher than the number of ADCI employees, presenters and visitors who experience the area/quarter/precinct/district of the ADCI location \( \alpha + \beta = 144,000 \), the proportion of urban residents who experience sense of community without the direct and indirect ADCI impact on sense of community, \( C^{\text{sense}} \), would be the same as the proportion of urban residents who experience sense of community with the direct and indirect ADCI impact on sense of community, \( C^{0_{\text{sense}}} \).

\[
C^{\text{sense}} = C^{0_{\text{sense}}} = 0.5
\]

The following condition defines the scale of the total ADCI contribution to sense of community

\[
X_{\text{sense}} > C^{\text{sense}}
\]

\[
0.38 > 0.5
\]
The inequality, $X_{\text{sense}} < C_{\text{sense}}$, means that the ADCI direct and indirect contribution to sense of community can be considered as negative. The equation shows that the proportion of urban residents who experience sense of community without the direct and indirect ADCI impact, $C_{\text{sense}}$, is higher than with the proportion of people whose experience of sense of community has been impacted by ADCI activities, $X_{\text{sense}}$. While 50% of the overall urban residents experience sense of community; only 38% of ADCI employees, presenters and visitors and urban residents who live or work (and those who used to live or work) or visit the urban area/quarter/precinct/district of the ADCI location experience sense of community.

8 Conclusion

In recent years, ADCIs have become popular development interventions, many with only a generalised central idea to “put that city on the world map”. It is a commonly held belief that ADCIs can bring about substantial economic benefits. Many cities consider them as seemingly strategic attempts to appear culturally relevant. But research illustrating the contribution ADCIs actually make to their cities is scant. At the same time, there are numerous references in academic and non-academic literature that indicate direct and indirect contributions of ADCIs to urban development and QoL; though many of these references have not been supported by assessment-based evidence. While there are contribution areas that could be associated with ADCIs, these have never been duly assessed.

Many of ADCI contributions are for the public good and open to all in the community. There is then no necessity for the market to produce these goods; and, consequently, these projects have to rely on public support. Whenever public support is involved the issues of accountability and benefits and costs arise. In recent years, self-evaluation attempts have been made by ADCIs on their own initiative. ADCI institutions have been paying increased attention to estimates of the contribution ADCIs make to urban development. This is, not only to convince public authorities to continue to provide necessary funding, but also to better communicate their benefits to the urban community in order to receive support from the private sector and philanthropists, volunteers, local communities and visitors.

While undertaking these assessments may be seen as an expensive and time-consuming burden on ADCIs, especially in the case of long-term contribution studies, there is a clear need for a methodological approach to support those ADCI institutions that may wish to undertake them.

This paper introduced an original methodological approach, the Conceptual Modelling Matrix (CMM) that enables a holistic assessment of the contribution of ADCI projects to urban development. The CMM can be deployed to define, assess and communicate contributions of ADCI projects as well as to identify and manage the detriments these projects may face.

Assessment of the contribution of ADCI projects to urban development requires a holistic approach. This is because ADCI contributions to their respective cities may be considered as positive in some terms, e.g. increase in employment, but as dubious in other terms, e.g. social inequity and limited physical accessibility. The CMM secures the holistic assessment of the ADCI contribution by integrating economic, social and environmental assessment methods to evaluate diverse ADCI objectives. The Sustainable
Performance Framework allows for comprehensive identification of ADCI objectives, ensuring these are in line with the overall ADCI aim, QoL, and the three roles of ADCIs in urban development, economic, social and environmental. The holistic methodological approach of the CMM is also secured by integration of the Three-level Contribution Model that enables assessment of multiple levels of ADCI contribution - the direct contribution, the indirect contribution and the changes in overall urban performances.

The CMM allows for assessing ADCIs according to their specified objectives. These objectives must be aligned to those of wider urban development programs. In the long term, urban development objectives need to respond to new urban challenges and, thus, have to evolve. During their lifespan, ADCIs must continue adjusting their objectives according to existing urban challenges in order to be able to maintain their contribution to urban development and QoL. The CMM’s design is such that it allows for adjusting ADCI objectives that evolve with changing urban challenges.

The multidimensional nature of ADCI projects (as public and private goods), different scales of ADCI contribution and differences in local data require the application of various assessment methods rather than a single method when assessing the ADCI contribution. The CMM combines previously developed methods and analytical frameworks, both qualitative and quantitative. An original integrative model, it predominantly operates with different scale impact studies and the Multi Criteria Analysis to establish a hierarchical structure for assessment criteria of ADCIs.

The greatest strength of the proposed CMM is also the greatest barrier to its application. While the CMM was developed to provide a holistic assessment of the comprehensive ADCI contribution to urban development, this is a very data-intensive model. At this stage it is unlikely that there is any ADCI project that could have undertaken the entire scale of assessments to fulfil the CMM requirements.

The potential users of the CMM are ADCI institutions, local and municipal governments (or other funding bodies) as well as the academic community.

The CMM offers a set of parameters and formulas for assessing the contribution of ADCI projects to urban development. These parameters and formulas are generic and can be modified to suit local conditions and circumstances to fit any ADCI project.

The CMM not only answers the question of “what to measure” but also builds the basis for an evaluation tool, which could provide a response to the question of “how to measure”. The CMM, thus, serves as a strong methodologically-grounded basis for further developing a locally-conscious evaluation tool for ADCI projects. Further applications and development of this evaluation tool for ADCI projects could be seen as a fruitful direction for future research.

It is also possible to apply the CMM to other cultural projects. In this case, the CMM has to be adjusted to the specific objectives of these projects. The potential is that this would allow a comparison of results between ADCIs and other cultural projects. As there is currently little understanding of the relative contributions of different types of cultural interventions.

The CMM maps a wide spectrum of ADCI contributions to urban development. In practical terms, decision-makers when evaluating specific ADCI projects are able to see at a glance whether there already has been sufficient research undertaken of certain types of ADCI contributions and where such research is still lacking.

Due to political reasons and funding schemes that involve different funding sources ADCI objectives in urban development have not always been clearly defined. The CMM

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could alert authorities to look at certain types of ADCI contributions that have never been explored before.

The CMM could assist ADCI institutions as well as local and municipal governments to select studies and methods that could be applied to ADCI projects in order to meet ADCI objectives, address ADCI goals and meet the ADCI aim, QoL. The application of the CMM allows systematising existing assessments and available data; it could also expose a need for additional data and additional assessments that need to be undertaken.

It has been found that some ADCIs are becoming increasingly aware of their potential to become flagships for urban sustainability for their cities and have been making attempts to secure such a position in their respective urban environments. The application of the proposed methodological approach could allow stakeholders to determine whether ADCIs have been successful in this ambition. Comparing assessment results of the first- and second-level CMM parameters with the third-level CMM parameters (when translated into per area unit or per capita basis) would show whether ADCI achievements are comparable and ahead of city standards and average urban progress; and, thus, whether an ADCI project can claim the status of a flagship for urban sustainability.

The CMM builds up an understanding of how ADCI projects could change their cities; and, most importantly, how such development interventions contribute to the wellbeing of people who live in those cities. The proposed CMM enables a holistic assessment of ADCI projects’ contribution to urban development. This would allow for better communication of benefits to interest groups and bring deeper understanding of how the benefits are distributed among stakeholders. The research findings can bring more sophisticated awareness to ADCI institutions, academic community, urban authorities and policy-makers of the rationale of these cultural investments.

References


Urbanization, industrialization and building of knowledge cities in China

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Structured Abstract

Purpose – The purpose of the paper is to examine how to apply knowledge-based strategy to accelerating industrialization and urbanization process in developing countries
Design/methodology/approach – The study uses empirical approach mainly based on data of statistics information of Shenzhen
Originality/value – In resent years, the knowledge cities theories and practices offer us a new and unique route to industrialization and urbanization. However, we noticed that most of knowledge cities theories and practices are derived from Western countries, with the purpose of overcoming the post-urbanization and post-industrialization problems, when urbanization and industrialization process have been accomplished. As a result, how to apply the knowledge cities theories and practices in China’s context is a matter of concern. This paper examines the characteristics of China’s urbanization and industrialization as well as their differences compared with those of Western counties, so as to find out what knowledge cities theories and practices can be appropriately applies to China, thus facilitating the process of establishing of knowledge cities in China.
Practical implications – The authors come up with a model for industrialization, urbanization and knowledge city for developing countries, which serves as guideline for developing countries’ industrialization and knowledge cities building.
Keywords – knowledge-based development, industrialization, urbanization, developing countries, culture.

Paper type – Practical Paper

1 Introduction

The knowledge city theories aim at solving problems of post-industrial time for developed countries. It is a question of concern how to apply knowledge city theories and practices to the industrialization and urbanization process in developing countries.
Thirty years ago, Shenzhen, under the guideline of Deng Xiaoping, became the first Special Economic Zone in China. With thirty years of development, Shenzhen which was once an impoverished village has established itself as one of the main economic centers in China and built up a mature modern industrial system with hi-tech industry and high-end service as mainstay. Huawei, ZTE, Mindray and Tencent have won international fame in specific area due to their innovation ability and outstanding R&D outcomes. Besides, Shenzhen sets an example to cities home and abroad for cultivating knowledge and promoting the creation and dissemination of knowledge, not only in industrial development, but in every aspect of lives. Apart from the title of "Outstanding Developing Knowledge City", Shenzhen was elected as "Capital of Innovation" which is awarded by UNESCO, "International Garden City" and "City of Libraries". Knowledge has been the driving force of this city. However, at the early phase of its development, Shenzhen was plagued by a weak industrial foundation, a simple industrial system, lack of innovation and self-developed technology and other problems based on labor-intensive industries. It is a question of concern that how this city relied on knowledge to push forward the industrial development and industrial upgrading, thus ushering in a new pattern of city development based on knowledge.

This article focuses on how Shenzhen as an emerging city increases the knowledge intensity of industries in the process of industrialization and at the same time fosters knowledge in the city in an all-around way. In addition, the article also looks into how the knowledge, in turn, facilitates the industrialization and urbanization process.

The authors begin the paper by addressing theories of industrialization and knowledge city, with emphasis on what is different between Western industrialization pattern and industrialization pattern for developing countries and how to apply knowledge city theories to industrialization process for developing countries. In the next part, the authors review the course of Shenzhen's industrialization and see how Shenzhen used knowledge-based strategy to facilitate industrial and city upgrading. The city nourishes knowledge which in turn promotes city's development. This pattern leads Shenzhen to a sustainable way of development.

2 Literature review on industrialization and knowledge city

2.1 Evolution of industrialization and knowledge-based development

Industrialization is the process in which the portion of output value of industry and people involved with industry keep increasing. (Chenery, 1960; Zhang, 2001) Since the first industrial revolution in 1960’s, industrialization keeps evolving, which economists generalized and forecasted from different perspectives. Kuznets came out with Kuznets Rules through statistics analysis on national income and distribution of labour forces. He held that portion of agriculture in national economy keeps decreasing while that of industry keeps increasing, which defines the trend of the change of portion of agriculture and industry. Chenery divided the industrialization into three stages, and industry takes on a trait of “slow rise—fast rise—decrease”. (Song, 2008) Hofmann (1958) took the ratio of output value of consuming industry and that of capital industry as the measure, and divided the industrialization into four stages, demonstrating the phenomenon that the portion of capital goods keeps growing. Rostow (1960) divided the industrialization into six stages, and the replacement of dominant industry is the symbol of the change of stages.
In the 20th century technology rises dramatically in industry, and an increasing number of scholars share a view that knowledge is the driving force for post-industrial time.

Peter Drucker is the first scholar that put forward the concept of “knowledge worker”. He held that the biggest challenge for company is to enhance the efficiency of knowledge workers (Drucker, 1959). In 1996, Organization of Economy, Cooperation and Development officially came up with “the knowledge-based economy”--- "an economy which is directly based on the production, distribution and use of knowledge and information”(OECD, 1996). Arbonies and Moso (2002) analyzed the change brought about by knowledge economy. They held that the focus of modern companies shift from technology to innovation, and then from innovation to the ability of innovation.

Knowledge has influence on industrial structure and the productivity in post-industrial time as well as on the society. Many scholars viewed the shortcoming of traditional industrialization from the perspective of urbanization, and came up with solutions. Carrillo(1999, 2002,2004) held that the traditional industrial society requires large amount of input for production and large-scale production centre, and produces large amount of output and waste. He thinks the city would grow bigger and bigger on scale in this pattern, and corrupt due to exceeding the limit. Malone and Yohe(2002) held that knowledge helps to stabilize the society and the economy. They think the traditional industrialization pattern leads to gap between poor and rich, and knowledge is a key factor for a prosperous, fair and stable society. Metaxiotis (2005) held in knowledge economy time, not only enterprise, but every individual should keep a close eye on their knowledge capital. The ability of learning, adapting and changing has been the core competency.

2.2 Industrialization pattern of developing countries and building knowledge city

The industrialization theories mentioned above are applied well to developed countries that followed the industrial process step by step. For this reason, their industrial pattern is comparatively simple. As for developing countries, the industrialization pattern is complicated. Many developing countries began their industrialization by accepting the transfer of industry from developed countries. Many economists gave explanations to the motive of industrial transfer (Arthur,1954; Vernon,1966; Prebisch,1981; Akamatsu,1962): developed countries have advantage of capital and technology while developing countries have advantages of labour. Developed countries take R&D in international division of labour while developing countries take manufacture. In the process, the need for capital and technology are satisfied in less advanced countries while the economic structures are improved and industries are upgraded in more advanced countries. But this kind of development pattern sends developing countries back to the road of traditional industrialization and causes a lot of urbanization problems. Besides, developing countries would be dependent to this pattern, aggravating the problems.

Developing countries want to take a great-leap-forward development, driving the economic, social and environmental progress while averting the problems of traditional industrialization and urbanization. The first thing to be taken care of is choice of strategic industry, which drives the economy of the area (Hirschman, 1958). Knowledge-intensive hi-tech industry not only leads to innovation system of an industry, but also leads other aspects of society in a knowledge-based way. To develop hi-tech industry, the city needs to introduce the technology and capital from developed countries, and cultivate the ability
to innovate and learn. The key is the city’s environment and mechanism for fostering knowledge. In knowledge economy time, knowledge should be considered as a strategy to manage (Ergazakis, Metaxiotis, and Psarras, 2006). This mechanism and environment offers momentum for increasing technology and knowledge in industry, and enhances citizens’ learning ability, preventing and eliminating problems in the process of industrialization and urbanization.

With reference to the definition of knowledge city (Chatzkel, 2004), we come up with a model for industrialization, urbanization and knowledge city for developing countries.

![Model for industrialization, urbanization and knowledge city for developing countries.](image)

**Figure 1.** Model for industrialization, urbanization and knowledge city for developing countries.

3 **Rise of Shenzhen and building of knowledge city**

3.1 **Accumulation at the early at the stage of industrialization and the beginning of knowledge City**

Shenzhen is located in the coast of South Sea along Guangdong Province, and covers an area of 1953 square kilometres. Shenzhen, under the guideline of Mr. Deng Xiaoping, became the first economic special zone in China in August 26, 1980, with a population of less than 300 thousand and GDP of 270million Yuan in the beginning. Thanks to its geographical advantage of being in close proximity to Hong Kong and special strategic position, Shenzhen evolved from a border town into an emerging modern city with international popularity after 30 years of development. By the end of 2008, Shenzhen has had 8.7683 million residents and GDP of Shenzhen in 2009 hits 820.1 billion Yuan, ranking fourth in the country. Per capital GDP of Shenzhen in 2009 reached 13581 US dollar, surpassing all other cities in China (not including Hong Kong, Macao and Taiwan). Import-and-export volume of Shenzhen remained the first place in China for 17 years in a row, totalling 270.1 billion US Dollars in 2009. Hi-tech, finance, logistics and culture industries are four pillar industries of Shenzhen, and hi-tech industries are of great importance.
significance. The output value of hi-tech products hits 850 billion Yuan in 2009 and 59.5% of it are hi-tech products with intellectual property right, valuing 506.2 billion Yuan.

Before the establishment of special economic zone, Shenzhen had a very backward industrial system consisting of a few companies with simple and old machines. In 1979, value of industrial output of Shenzhen was only 40 million Yuan, accounting for 20.5% of total GDP. Shenzhen special economic zone attracted large amount of capital from home and abroad by its favorable policies and cheap labour cost, and attached much attention to developing the enterprises that process raw materials on clients' demands, assemble parts for the clients and process according to the clients' samples. Since the land price and labour cost of Shenzhen is low, such labour-intensive industries as textile, printing, garment and mental ware industries transferred their base from Hong Kong to Shenzhen. Capital and labour are two main factors for Shenzhen's economic growth at that time.

Shenzhen enjoyed a high speed economic growth in the first half of 1980's, thanks to the development of enterprises that process raw materials on clients' demands, assemble parts for the clients and process according to the clients' samples. Shenzhen gradually expended to a city with population of over one million from a village, and established export-oriented industrial system. (Hu, Yang, & Zheng, 2004) But at the same time problems arise such as population explosion, traffic jam and security problems. Although the concept of knowledge city has not taken shape at that time, Shenzhen began to think about these problems and seek for new pattern of industrial and social development.

Shenzhen aimed to shift the labour-intensive industrial system into technology-intensive industrial system, and imposed a ban on heavily-polluting, high-energy-consuming companies. In 1985, a national-standard "Shenzhen technology industrial park" was established and in the same year, 126 companies in high-tech field ware set up, with total value of industrial output of 1.25 billion Yuan. Shenzhen's high tech industry took off.

The issue of 1990-2000 Science and Technology Development Plan of Shenzhen marked Shenzhen's determination in developing hi-tech industry as its strategic focus. Shenzhen's hi-tech industry experienced a rapid growth from 1990 to 2000, with the proportion of its output value rising from 12.2% in 1992 to 51.06% in 2003.

The increase in the number and quality of scientific talents is an important reason for the rapid growth. Nowadays, there are more than one million people working in R&D field in Shenzhen. Higher education is attached much importance in Shenzhen: Shenzhen University is founded at the very early stage of economic special zone, when the budget was very tight. Later, large amount of capital is designated for introducing famous universities home and abroad to form Shenzhen University Town and Shenzhen digital University Town. All these universities and institutes offer continuous knowledge flow to industrial development.

In the midst of the rapid growth of hi-tech companies, Shenzhen's innovation system took shape. This system consists of over 30000 hi-tech companies, 400 of which are

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1 A table corresponding to this information is available at the web site of Shenzhen Statistics Bureau: http://www.sztj.com/main/xxgk/tjsj/tjnj/200911202483.shtml
2 Excerpt is from Chen et al (1993)'s finding
3 This information is available at the web site of Shenzhen Statistics Bureau: http://www.sztj.com/main/xxgk/tjsj/tjgb/gmjjhshfzgb/200804101586.shtml
companies with output value of over 100 million Yuan. Electronics, biomedicine, new material and optical-electro companies locate in specific industrial clusters in favor of dissemination of knowledge. Nowadays Shenzhen’s developed a regional innovation system characterized by market-orientation, industrialization and integration of teaching, production, research and official administration. Another outstanding trait of hi-tech industries in Shenzhen can be quantitatively concluded as four “90%”s---90% of R&D institutes are set up in companies; 90% of research staff are working in companies; 90% of R&D funds are concentrated in companies; 90% of patents for invention are generated in companies.

Reviewing the course of industrialization of Shenzhen over the past 30 years, we can conclude that an important reason is its emphasise on innovation and R&D, as well as creation and dissemination of knowledge. In the early 1990's, Shenzhen had been aware of the shortcoming of traditional industrial development pattern and set hi-tech industry as its strategic focus. The government issued many preferential policies to attract talents and improve the R&D ability. These sound conditions not only serves as good environment for the development of knowledge-intensive industry and fostered many world brand, but also influenced many aspects of city life and laid a foundation for building knowledge city in an all-around way.

3.2 Rise in taste of knowledge in an all-around way

Apart from cultivating knowledge in industry, knowledge city fosters the taste of culture. Culture here refers to literature and art, including the fine art, sculpture, painting, music, drama, movie and so on. These activities not only have knowledge, but also have aesthetic value, which improve one's mind, quantity and sense of happiness. A city with profound culture stimulates citizens' inner feeling and innovation. Besides, brilliant culture of a city attracts knowledge workers to work and live in the city.

At the early stage of Shenzhen's development, there are many workers who wrote articles about their lives and feelings. This spirit of entrepreneurship and combination of cultures of migrants from every part of the country gradually formed the culture of this young city.

Culture needs accumulation over time, and also needs exploration. Shenzhen inspires citizens to deepen the culture by education, training and exhibition. Shenzhen takes culture as strategy of the city's development. The culture industry in Shenzhen formed 50 clusters, Overseas Chinese Town, Dafen oil painting village have been selected as National Cultural Industry Exemplary Base. China (Shenzhen) International Cultural Industries Fair (CICIF) has been successfully held for six times, facilitating cultural exhibition and cultural trade. Volume of business this year reached 108.8 billion Yuan, increasing 23.6% than last year. CICIF along with cultural clusters and cultural financing platform form a sound development environment for the cultural industry. Knowledge and innovation, instead of natural resources, becomes the driving force of economic growth in a sustainable way.

Shenzhen's public cultural facilities take a lead in the country, with wild variety of options and high-quality service. Library is the place and tool for dissemination of knowledge. There are 617 libraries in Shenzhen, with 14.95 million books. Furthermore,

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4 Statistics is from Zha (2007)’ finding
5 Excerpt is from Zhang, Peng,(2010).
Shenzhen developed 24-hour automatic library system in communities, offering service to over 500,000 people. Guanshanyue art gallery, Shenzhen Museum and 10 other cultural facilities are free to citizens. Shenzhen Concert Hall regularly holds cultural activities, putting on opera, symphony and drama performance. These activities satisfied citizens' cultural need at different level.

One important trait of a knowledge city is emphasising on exchange and dissemination of knowledge, through which knowledge is upgraded. Forum, seminar and community activities facilitate exchange and communication. As an "Outstanding Developing Knowledge City", Shenzhen holds cultural activities at a regular basis, of which "Shenzhen Reading Month" is the most influential one. In its ten years course, Shenzhen Reading Month has hold over 1000 cultural activities, in form of reading, painting, calligraphy, photograph, design, debate, drama, exhibition and so on, and involves over 100 billion person-time. Some of them are communication between citizens; others are dialogue between masters and citizens. An increasing number of citizens are attracted to attend these activities by such concepts as "City values reading which, in turn, changes city". On one hand, the citizens improve their learning abilities through exchanges, and on the other hand, this activity serves as a cultural brand of Shenzhen, increasing its cultural glamour. Shenzhen Reading Month, along with other cultural activities such as "Scientific Popularization Week", "Innovation December", "Citizen Cultural Forum" forms a cultural chain, breeding the fashion of learning and respect for knowledge.

3.3 Knowledge for building a global city

Accumulation of knowledge not only enhances the growth of hi-tech industry and innovation industry, but also accelerates the process of Shenzhen being a global city.

Information Communication Technology (ICT) is an important aspect of knowledge city, and improvement of ICT facilitates governance as well as the usage of knowledge among citizens. There are 1 broadcasting station, 2 TV stations, 3 broadcasting and TV centers and 20 cable TV stations in Shenzhen, and the coverage rate of TV and broadcasting reaches 100%. Shenzhen has complete communication infrastructure with 2 million netizens, and is going to upgrade the communication infrastructure with combination of telecommunication network, broadcasting and TV network and computer network.

Shenzhen was selected as "World Garden City" by UNESCO, and never stops its pace in environmental preservation with high technology. In 2007 there were 32 green buildings in Shenzhen; pilot recharge station for electronic vehicles in part of Shenzhen. Newly developed Shen-Guan-Hui Eco Industrial Zone is going to be a exemplary eco zone at national level, with clean energy, mobile smart grid and other state-of-art technology to achieve sustainable development. Development of recycle economy, low-carbon economy has been written down in Shenzhen's master plan for next phase. Citizens' awareness of environmental protection is very high: refuse classification, energy-saving bulb have integrated into their daily lives.

Shenzhen's experience for cultivating knowledge has been approved by the world. Apart from the "Outstanding Developing Knowledge City", Shenzhen also won the title

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6 Excerpt is from He (2010)
7 Excerpt is from Shenzhen Yearbook 2007, pp. 231.
8 Excerpt is from Shenzhen Yearbook 2007, pp. 57.
of "Innovation Capital" by UNESCO, and China (Shenzhen) International Hi-tech Industry Fair and China (Shenzhen) International Cultural Industry Fair are also appraised home and abroad. Theses honors not only encourages Shenzhen's knowledge-based economy, but also identify Shenzhen as a knowledge city, attracting knowledge workers from home and abroad to work and live here.

4 Conclusion

Knowledge played an important role in Shenzhen's rise. At the early stage of industrialization, Shenzhen abandoned the traditional industrial development pattern, and fostered hi-tech industry and established innovation system. At the same time Shenzhen cultivated city's culture in an all-around way. Cultural activities and facilities satisfied citizens' cultural needs, which also help to form a fashion of learning and respect for knowledge. The cultural environment is a cradle of cultural industry, which is now another economic growth pillar for Shenzhen.

The output of knowledge is applied to the development of the city: every citizen becomes a knowledge worker, offering knowledge capital to the industrial development. High technology and knowledge is used in forming the living environment for citizens, and beautiful environment attracts talents of home and abroad to come to Shenzhen.

Shenzhen’s knowledge-based development can be concluded as an upward spiral—"the city fosters knowledge which in turn promotes the city". The road for Shenzhen's development grows wider and wider.

References


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Sustainable cities and embedded knowledge

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Structured Abstract

Purpose – The purpose of this paper is to demonstrate that several scholarly and artisanal activities are converging. This is resulting in a transformation of how professionals and other workers organise and share knowledge. Increasing pressure to design and operate buildings and cities that are environmentally sustainable puts the onus on workers in the architectural, engineering and construction (AEC) industries to share their expertise. A further purpose of the work is to demonstrate how the creation and sharing of knowledge is mediated by computers, but it is essential that the information produced can be effectively used. This requirement gives rise to the idea of information as narrative. It is shown that if cities are to be sustainable this can be achieved by promoting arborescent, or disciplinary knowledge, but this must be leavened by recognising the benefits conferred by a decentralised, serendipitous or rhizomatic approach to knowledge. It is suggested that this can be achieved by government regulations and market forces that result in businesses and professions thriving only if they share knowledge from a wide range of sources.

Approach – The approach adopted is to survey contemporary trends that are shaping the AEC industries. Many of these trends are being driven by developments in computer software and hardware, as well as external societal issues such as climate change. It is shown how the emerging technique of parametric design is providing architects and other designers with the opportunity to generate large numbers of designs that can then be evaluated for their aesthetic qualities, say. It is further demonstrated that the principles of multiphysics which are embedded in readily accessible computer software enable issues
concerning the design of buildings to be addressed, and that this is already extending beyond the physical sciences to form an omni-scientific view of knowledge. When designing and operating sustainable buildings technical knowledge is complemented by other knowledge including clients’ needs and economic information. To ensure that this knowledge is recorded, shared and its interactions understood has led researchers to develop a Narrative approach that is highly verbal and visual.

**Originality** – The originality of the approach results in part from the syncretisation of architecture and engineering. The work was initiated when a course was planned to teach environmentally sustainable design to third year architectural engineering students. The idea was to combine teaching the principles of engineering science with architectural design. This concept has subsequently developed to encompass parametric design techniques that have given rise to the concept of archoids that enable building sites to be developed. The authors report how parametric design techniques have been used to design a two tower building complex, and to develop a building site in China that accommodates multiple buildings.

**Practical implications** – The work has practical implications in several areas. From a pedagogical point of view it indicates that professionals in the AEC industries must continue to be educated in disciplinary areas. However, this approach needs to be tempered by an education that ensures that scientific and engineering professionals are sensitive to the needs of, and trends in society. This may be facilitated by adopting a narrative style of team work. The work also demonstrates that a syncretic approach in the AEC industries has been able to reap real benefits including the development of new design algorithms for individual buildings and building sites. It is shown that buildings regulations not only reflect the prevailing Zeitgeist, but they influence it. For example community leaders can encourage the development of cadres of multidisciplinary professionals in which key knowledge is embedded. Such cadres will be required to design and run sustainable knowledge cities.

**Keywords** – architecture, engineering, knowledge, syncretic, omni-science, multiphysics.

**Paper type** – Academic Research Paper

### 1 Introduction

For the first time in history, more than half of the people on the planet live in cities. Over 3.5 billion people have adapted themselves to city life, and they will be joined by a further 2 billion over the next 25 years (Brugmann, 2009). The UN projects that the world’s urban population will have grown from 2.86 billion in the year 2000 to 4.98 billion by 2030; and two-third of the world’s population will be living in towns and cities in the next 50 years (Yuen & Ooi 2010). There is therefore a growing emphasis on the need to design and build environmentally sustainable cities.

Thaylor (1994) defines a sustainable city as ‘a place where human communities, resource uses, and the carrying capacities of surrounding ecosystems can all be perpetually maintained.’ The move to sustainability is driven by a combination of government regulations, tax incentives and market forces. In the Australian state of Victoria it is mandated (Victorian Government, 2010) that all new houses must satisfy increasingly stringent limits on energy and water consumption, and in some US cities, such as Cincinnati, new and refurbished buildings are exempt from property taxes if they meet specified environmental targets (City of Cincinnati, 2007). It is claimed that the running costs of environmentally sustainable buildings are lower than conventional
buildings and this, along with a certain cachet associated with environmental sustainability, may increase the value of properties that have been certified as satisfying officially recognised environmental criteria.

Neuman (2005) emphasises the intellectual traditions from which the concept of sustainability can be drawn as: 1) Capacity: the carrying capacity of a place to support a certain number of living beings, 2) Fitness: the mutual interaction and adaptation between species and environment, 3) Resilience: the flexibility to absorb both internal and external forces of change, 4) Diversity: the variety of members in a community and the positive and constructive disposition of relations between them, and 5) Balance: the equilibrium of the system. He argues that the common theme running through the aforementioned points are: a) the emphasis on long-term and dynamic process, b) the quest for health for both the ecosystem and human society, c) the concern for place-specific conditions, or the context, and finally d) the recognition of interrelationships and connections.

The design and construction of sustainable cities requires knowledge across a broad spectrum of disciplines. Some of the knowledge may be classified as being deep or arborescent. This is typified by the engineering science required to estimate energy flows though building elements and to implement advanced computational techniques used to calculate the microenvironments in buildings on very refined spatial and temporal scales. The contributions of other branches of learning such as law, economics and sociology are also crucial in the design, construction and operation of sustainable cities. Deleuze and Guattari (1980) contrast arborescent knowledge with a rhizomatic approach to knowledge that is in some ways unstructured, serendipitous and multidisciplinary. One of the arguments in this paper is that civic and educational leaders must nurture both arborescent and rhizomatic forms of knowledge if knowledge cities are to be successful, and in this work we pay particular attention to designing for sustainability.

Computers and information technology are helping to mediate these various strands of knowledge. For example, the Victorian government has developed software that evaluates the energy consumption of domestic houses. It is written to be used by a range of professionals and sub-professionals employed in the building construction industry, and it is based on a deep knowledge of engineering science, computer software and professional practice. Although the software is quite user friendly, an accredited building-energy assessor must demonstrate an understanding of physical concepts such as the definition of energy, aspects of solar radiation, shading and air movement. In addition, assessors must also be computer literate, be conversant with preparing reports, and optimisation and costing; would-be assessors must also be conversant with elements of professional practice such as liability and insurance, fair trading, regulation and a code of conduct.

As we design, build and inhabit increasingly sustainable cities it is likely that a broad spectrum of members of the construction industry will become knowledge workers. If they are to stay in business they will require not only specialised knowledge, but be capable of contextualising their knowledge within a wide number of disciplines - sustainable cities will inevitably embed knowledge, and cadres of knowledge workers will become distributed throughout towns and cities. This may well catalyse innovations based on soundly based and well argued ideas. This paper elaborates some of the arguments outlined above.
2 The convergence of knowledge

The rapid speed of developments of software used in the architectural, engineering and construction industries is palpable. Newly available techniques enable architects to generate a very wide range of designs very quickly and then evaluate them using their professional judgement. The facility of being able to rapidly develop many designs arises from parametric methodologies that enable designers to change a variable, such as the fraction of the area of glazing on the façade of a tall building, and computer programs automatically adjust the amount of glazing. Furthermore, the designer can apply constraints to ensure that the dimensions of the glazing comply with those required for easy manufacture. Gane and Haymaker (2007) have used parametric methods to evaluate the aesthetic appeal of twisting the structure of Infinity Tower, a tall residential building being constructed in Dubai. Gane (Pers. Comm.) has pointed out that the use of parametric modelling reduced the architects’ input to the project by about two-thirds which emphasises the increase in productivity that is achievable using modern parametric design methods. Kashuk and Thorpe (unpublished) have described parametric methods to design the façade of a mixed two tower residential project being constructed in the Binhai New Area in Tianjin, China. The two towers are set on a podium that houses an hotel, retail outlets, a business club, restaurants, conference and business centres, a swimming pool, spa and gymnasmium and the façades of the towers are united by continuing them on the podium. The architectural idea was to design façades that evoke the impression that they have been woven as illustrated in Figure 1. The façades must be constructed in such a way that the vertical extremities of the planar surfaces align with supporting

Figure 1. An aerial view of the Zovie towers.
Columns, they are structurally sound and that their linear dimensions are multiples of 250mm to ensure that they can be manufactured economically. After applying sufficient constraints such as requiring the same pattern of façade on each tower a total of 216 options was produced that could be evaluated for aesthetic appeal by the design team. This exercise illustrates the convergence of knowledge that will be increasingly important, and that must be fostered. In this case we combine experience from the visual arts, mathematical computing and manufacturing disciplines.

When developing building sites in urban settings it is essential to comply with local regulations such as those that dictate the distances buildings should be set back from roads, limitations on the proximity of buildings and so on. If these constraints can be formulated they can be manipulated by parametric design software. As a step towards this Kashuk and Thorpe (unpublished) imagined that buildings being placed on a building site follow rules analogous to those obeyed by birds when they flock. For example, birds must be aware of each other and avoid collisions in the same way that buildings may have to maintain certain separation distances. Birds must not leave the flock in the same way that buildings are restricted to the site. Buildings must also comply with other rules such as their heights being dependent on the distances they are set back from roads. So that buildings may be located on building sites Kashuk and Thorpe (unpublished) have adapted flocking algorithms and proposed the concept of archoids that are architectural objects that can be arranged on building sites so that a number of configurations can be evaluated, all of which comply with the local regulations. The idea of archoids has been used successfully to locate four serviced apartment towers, an office tower, one small office/home office (SOHO) tower and a retail and commercial building mounted on a podium on a building site located in the central business district of Wujin, a city located in the eastern maritime Chinese province of Jiangsu. A result of applying the archoids algorithm is shown in Figure 2 that portrays a rendition of the proposed complex. This approach is an explicit example of applying knowledge developed in one field, namely biology, in an entirely different context.

Figure 2. A view from the north of a proposed multipurpose development in Wujin, China, designed with the assistance of the archoids algorithm.
As noted above there are increasing regulatory and cost pressures to design buildings that are environmentally sustainable. This goal is achieved principally by applying to the design of buildings the laws and constitutive equations of engineering science such as law of the conservation of energy that states that energy can be neither created nor destroyed, and Fourier’s equations that quantify the rate of conduction of heat. These laws and mathematical relationships have been codified in computer software that enables problems of multiphysics to be solved. Such software enables problems to be addressed that arise not only from individual branches of physics such as heat transfer and the properties of materials, but how the different phenomena interact. Multiphysics is an archetypal example of the convergence of knowledge – in this case manifest as software packages. For example, multiphysics software enables the not only the structural integrity of a building to be investigated, including detailed analyses of how it may be affected by wind forces due to its local environment, it also enables detailed analyses of the thermal performance of the building to be predicted. This latter ability arises using a technique known as computational fluid dynamics (CFD) that reflects the inexorable progress in engineering science that enables physical phenomena to be analysed in ever increasing spatial and temporal detail. The technique allows the temperature, humidity, air velocity and so on in an architectural space to be resolved on fine length scales, and this in turn enables conditions that are conducive to human comfort to be estimated and manipulated on length scales of 10 mm, say. The spatial resolution in the vicinity of solid surfaces such as walls, floors and ceilings has to be on the order of 1 mm, and it is phenomena that occur on this length scale that may ultimately determine the thermal performance within a room. Because this large range in length scales must be considered several days of computer operating time may be required before reliable solutions can be obtained. This is not a new feature of engineering computation – the degree of complexity of problems attempted always increases to make full use of the computing power available. A feature of multiphysics software is that it is commercially available and as a result it is becoming easy to operate because it is comprehensively documented, the same standardised graphical user interfaces are used for each of the branches of physics being studied, and extremely powerful graphical output facilities are available that help practitioners to interpret the results.

There is a convergence of chemistry and physics at the most fundamental levels of biology, and this is reflected in genomics. However, there is often an intersection of the physical sciences and the more traditional biological sciences that occurs in technological domains such as postharvest technology in which one of the main aims is to manipulate the microenvironments in buildings used to store agricultural produce to maintain its freshness. Thorpe (2010) has referred to this confluence of the sciences as omni-science.

Some commercially available building software encapsulates some of the attributes of omni-science. For example, at least one widely used building information model incorporates models of the growth of vegetation on ‘green’ roofs. The model is based on the research of Frankenstein and Koenig (2004) who studied the effects of variables such as the area of leaves per unit area of soil, the emissivity of vegetation, the degree of wetness of soils, plants’ stomatal resistance to moisture transfer and so on. Again, this represents an example of the convergence of knowledge that will characterise the nature of work in the future.
3 The mediation of knowledge

Whilst projects are increasingly omni-scientific, omniscience is an ideal. We may therefore speculate on how knowledge will be organised, analysed and acted upon when designing buildings for sustainable cities. AEC projects are inherently multidisciplinary as they are likely to involve architects, structural engineers, fabricators, lighting engineers, air conditioning engineers, accountants and possibly biological and social scientists. To achieve the goal of designing and constructing a significant building the design team needs access to vast amounts of information that includes the expectations of the clients, design options, analyses of alternative designs, properties of materials, human behaviour, cost information and so on. Haymaker’s school at Stanford University has developed a way of integrating this information into an intellectual framework that Haymaker (2006) describes as a Narrative. A narrative is generally a story of interconnected facts, and narratives are characterised by having intellectual coherence and they often have a certain intellectual drive. As Dawkins (2004) has pointed out compared with some of their literary counterpart scientists (and engineers) usually have something useful to say, and they never run out of good stories. When introducing engineers to the art of spoken and written communication one of the authors (GRT) suggests two mantras, namely “Why before What” and “Tell a story”. Whilst these mantras may be adequate for communication that is essentially one-way the successful operation of teams requires more than this – it requires the sharing of knowledge by the team members, they need to be cognisant of the interaction of knowledge, changes that any of the team members make to a design and they need to record the sources and evaluation of knowledge. In many ways the Narrative reflects the petites histoires espoused by Lyotard that are generally problem-specific, and they result from, and in agonistic discourses that ensure a range of views is expressed. Haymaker and his co-workers have concentrated on teams engaged specifically in the AEC industries and they suggest that the Narrative approach should be:

- Generic in that it is not problem-specific
- Expressive so that it can describe the many kinds of information that practitioners need, and it must be able to describe how one set of decisions affects all other aspects of a design.
- Formal to facilitate communication between different members within the design team, and to lend itself to automation.
- Simple so that team members can understand, accept and use the information. Simplicity must be retained as a project evolves and new information and its effects are incorporated into the project.
- Visual to promote ease of understanding and to facilitate collaboration.

It seems that an advantage of the Narrative approach is that it is a vehicle for enhanced creativity because it formalises interactions between professionals and artisans that have different backgrounds. One of the aims of the Narrative approach is that knowledge generation, transfer and application is mediated by computer, and it seems that this aspect of AEC projects will assume increasing importance over the next couple of decades.
4 Promoting the development of knowledge for sustainable cities

If existing and new buildings within a city are to be sustainable it is essential that cadres of highly skilled and creative knowledge workers in the AEC industries be developed. The knowledge workers in these industries will be different from their counterparts today. It is likely that the role of architects will change, although their importance as creative workers will not be diminished. We have already noted that parametric design methods have reduced the architectural time input to designing large buildings by about two-thirds, and the resulting designs can be aesthetically very adventurous. Hence, architects will need to become more conversant with digital media. Furthermore, Soebarto (2005) reports that when graduate architectural students are provided with the easy-to-use architectural modelling software they find it difficult to interpret the results. They are also unable to locate and interpret technical data on the physical properties of materials such as thermal conductivity and specific heat. As there is an increasing demand for buildings that are environmentally friendly it seems clear that the training of architects must be deepened. Thorpe and Kashuk (2010) remind us of Deleuze and Guattari’s (1980) admonition to be cognisant of “Transversal communications between different lines scramble the genealogical trees. Always look for the molecular, or even sub-molecular, particles with which we are allied” and they have gone as far as pointing out the benefits of architectural professionals understanding phenomena that occur on the molecular scale. In a similar vein, Sanguinetti (2009) points out that many architectural schools have recognised the importance of a multidisciplinary approach to design, but they have resorted to teaching how to use computer programs. Sanguinetti (2009) contends that this is a misguided approach as the schools should concentrate on teaching core subjects in which she includes heat transfer. It appears that in the knowledge city of the future it will be important that tertiary education must balance the teaching of arborescent forms of knowledge with a rhizomatic approach.

4.1 Catalysts for change

The above changes to the education system and the fostering of a critical mass of knowledge professionals in the AEC industries will occur only if there are appropriate drivers. It has been noted that there are analogies between the Haymaker’s Narrative approach to knowledge and Lyotard’s petites histoires that characterise science. It is possible that governmental policies that aim to assess the quality of research may encourage promote the development of disciplinary knowledge that can be best used by professionals working in multidisciplinary teams. However, disciplinary knowledge must be leavened with an appreciation of cultural and other societal issues. This is in keeping with the emergence of the Third Culture in which empirical scientists are au fait with contemporary issues that confront society and who are also expert communicators. This kind of approach is well suited to the development of effective teams of professionals because as Brockman (1995) writes “There is no canon or accredited list of acceptable ideas. The strength of the third culture is precisely that it can tolerate disagreements about which ideas are to be taken seriously.” This again reflects Lyotard’s idea of discourse being agonistic. It may be that the entrepreneurial and competitive nature of contemporary universities promotes the engagement of scientists and technologists with trends in society.
4.2 Government regulation

Government regulation is a powerful driver of change, and it often has significant impact on all aspects of society including the education sector. The Victorian government in Australia has mandated that from May 2011 all new homes and major renovations must be Six Star rated. This can be achieved by taking measures such as ensuring that living areas face northward, roofs are coated with material that have low absorptivities of solar energy but have high emissivities of infrared radiation, have a thermal inertia that is appropriate for the local climate and this requires suitable choices of construction materials. Recognising that all members of the AEC industries involved in designing and building domestic dwellings must be suitably trained the government has provided funds to assist tradespeople to acquire the necessary skills. Furthermore, the Victorian government has commissioned the writing of easy-to-use software that enables the star rating of houses to be calculated. Again recognising that if buildings are to be environmentally benign it is essential that a cadre of well informed professionals and artisans must be trained, and this is facilitated by encouraging the offering of training courses in the use of energy analysis software. These initiatives are contributing to the establishment knowledge based industries that will be required if cities are to become sustainable.

5 Conclusions

Knowledge from a range of disciplines is converging. This is likely to have a significant impact on the performance and organisation of many professions and trades, and in this work we have concentrated on those concerned with the architectural, engineering and construction (AEC) industries. Examples have been drawn from the application of parametric design methods that produce a vast array of alternative designs that are presently evaluated using the aesthetic judgment of architectural professionals. This approach has been illustrated by considering the design of a façade for a two tower complex being constructed in China, and the design of a twisting tall tower constructed in Dubai. Both projects syncretise the disciplines of design, engineering science and manufacturing. A further example of the convergence of knowledge in the AEC industries is the concept of archoids that is inspired by the mechanisms of how birds flock, but that has been applied to the location of buildings on a building site in China. The convergence of knowledge is particularly evident in engineering and the physical sciences where it manifests itself as multiphysics, and it is suggested that this will be expanded to encompass other sciences and transform into omni-science. This is already happening in AEC software that accounts for not only parametric modelling, but also structural and thermal analysis and in some cases it can be used to model the egress of people from buildings and the biological growth of plants on and around buildings.

It is proposed that this knowledge will be mediated by computers. However, the knowledge will have to be interpreted and this will be achieved by multidisciplinary teams, and there must be some formal mechanism for the knowledge to be transmitted and shared. Researchers have suggested that this can be accomplished by encapsulating the information as a narrative, the details of which are recorded and can be interrogated. The narrative could have a high degree of visuality.

Participants in the knowledge economy will benefit from being well schooled in disciplinary, or arborescent forms of knowledge but this must be tempered by a certain rhizomaticity. This is presently reflected in the Third Culture in which usually well
trained empirical scientists engage the general public and which perhaps reinforces the benefits of having expertise in at least one scientific or technical discipline. An effective vehicle for developing sustainable cities that are influenced by leading practitioners in the AEC industries is by regulation and this is being achieved in Australia. This leads to the embedding of cadres of highly trained professional and artisanal knowledge workers who are integral to design and continuity of sustainable knowledge cities.

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An environmental assessment model for knowledge-based urban development

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Structured Abstract

Purpose – In recent years, knowledge-based urban development (KBUD) has introduced as a new strategic development approach for the regeneration of industrial cities. It aims to create a knowledge city consists of planning strategies, IT networks and infrastructures that achieved through supporting the continuous creation, sharing, evaluation, renewal and update of knowledge. Improving urban amenities and ecosystem services by creating sustainable urban environment is one of the fundamental components for KBUD. In this context, environmental assessment plays an important role in adjusting urban environment and economic development towards a sustainable way. The purpose of this paper is to present the role of assessment tools for environmental decision making process of knowledge cities.

Design/methodology/approach - The paper proposes a new assessment tool to figure a template of a decision support system which will enable to evaluate the possible environmental impacts in an existing and future urban context. The paper presents the methodology of the proposed model named ‘ASSURE’ which consists of four main phases.

Originality/value – The proposed model provides a useful guidance to evaluate the urban development and its environmental impacts to achieve sustainable knowledge-based urban futures.
Practical implications - The proposed model will be an innovative approach to provide the resilience and function of urban natural systems secure against the environmental changes while maintaining the economic development of cities.

Keywords – knowledge-based urban development, environmental assessment

Paper type – Academic Research Paper

1 Introduction

Earth’s environment has changed at local (air, soil, and water pollution), regional (greenhouse effect, land degradation) and global (climate change, loss of biodiversity) scales over the last-half century. The atmospheric concentrations and distributions of greenhouse gases, aerosols and their radiative forcing have changed by human activities (IPCC, 1996). Water quality and soil fertility in many regions of the world have been severely degraded due to population growth and the biotic system has been altered, depleted and endangered by increasing human demands (Ojima et al., 1994). As a consequence of globalisation, cities become engines of population, economic growth and innovative improvements. As stated by Yigitcanlar and Velibeyoglu (2008), rapid urbanisation and its immense effects on the environment have raised the importance of urban sustainability, and necessity of the need to adjust urban and economic development in the knowledge era.

While developing knowledge-based development strategies, it is important to provide a good quality of life with various lifestyle options in a healthy and physically attractive environment (Yigitcanlar et al., 2007). A knowledge-based approach needs to be environmentally sustainable and, therefore, requires holistic environmental sustainability assessment to monitor the urban metabolism and help the decision-making authorities and actors to control it. This paper presents the role of assessment tools for environmental decision making process of knowledge cities. This paper also introduces a new assessment tool (ASSURE) to figure a template of a decision support system which will enable to evaluate the possible environmental impacts in an existing and future urban context. Additionally, it will be an innovative approach to provide the resilience and function of urban natural systems secure against the environmental changes while maintaining the economic development of cities.

2 Knowledge cities and sustainable urban ecosystems

Even though cities are the ‘engines’ for economic development, the impacts of rapid urbanisation and industrialisation provide a threat to the health of human beings, as well as environmental quality and productivity. As a result, knowledge city is introduced as a new strategic development approach for the regeneration of industrial cities. Knowledge city defined as a city designed to support the nurturing of knowledge towards the aspects of social, economic and cultural life of the city. A city which knowledge is accessible to all citizens through a network of communication technologies, public libraries, schools, civic centres and cultural services that is available to other cities’ citizens (Edvinsson, 2003; Barcelona City, 2003). It aims to upgrade institutional and organisational capacities while creating innovative, educational, creative and adaptable environments (Knight, 1995).

As society becomes increasingly knowledge-based, the natural environment of the city changes due to economic activities required different conditions and environments (Knight, 1995). While nations develop technologically, their level of consumption and
waste increase, their ecological footprints expand due to their advanced economies. Economy is a self-regulating mechanism which produces energy consumption and material flow of ecological services. These services are called natural capital and they are generated by human-made capital which refers to factories, buildings, roads and other physical artefacts. Each of them demands an environment of space for shelter, reproduction and waste assimilation. However, the degradation of environment and its services are irreversible and no type of human-made capital can substitute for them. In this sense, there is a need to balance the increasing human demands on the natural systems (Rees, 1992; Cleveland, 2003).

Environmental sustainability has strong relations with the foundation stones of knowledge city formation in terms of providing urban diversity, social equity, sustainable communities and urban ecosystems (Yigitcanlar et al., 2008). A sustainable urban ecosystem manages its natural resources in a “closed loop” by minimizing the risk of environmental damage while controlling flows of resources and reduces its energy, materials and information losses. It ensures environmental justice in the shared use of urban ecosystems while balancing environmental quality against resource use (Mourao & Cuchi, 2007). Examining the city as an ecosystem enables to investigate the flows of energy and material in the ecological systems along with the interactions between human and non-human parts of the system (Alberti, 2008). Because change is an inevitable result of human activities, the capacity of urban ecosystems to respond and adapt these changes is an important factor to take into consideration in creating environmentally sustainable knowledge city.

3 Indicator-based environmental assessment

Improving urban amenities and ecosystem services by creating sustainable urban environment is one of the fundamental components for knowledge-based urban development (KBUD). In this context, environmental assessment tools play an important role in adjusting urban environment and economic development towards a sustainable way. They support KBUD by providing several functions. They define the current environmental situation of an urban area by assessing the impacts of economic and social development pressures on natural resources. They provide environmental data to explore the areas which have particular ecological characteristics that need to be protected. Furthermore, they assess the probable effects of proposed plans on the quality of urban environment and makes comparisons with the effects of alternative options (RCEP, 2002).

Environmental assessment is performed by applying different approaches and tools ranging from indicators to comprehensive models. An environmental indicator, as defined by US Environmental Protection Agency (2010), is a numerical value based on quantitative measurements or statistics of environmental condition that are tracked over time at a wide variety of geographic scales from local to regional and national levels. Environmental indicators are powerful tools for assessing the environmental impact of human activities, highlighting emerging problems and revising the effectiveness of current policies. They are considered as a subset of sustainable development indicators which are meant to help policy makers in decision-making, benchmarking for environmental performance and monitoring progress or changes in environmental systems to implement improvements or for policy making (Giannetti et. al., 2009).
Recent years, an increasing number of environmental assessment tools have been developed to track and measure the sustainability of urban environment. Although they are derived from different indicator datasets, their common framework is based on addressing these questions: (1) What is happening to the state of natural resources; (2) Why is it happening, and; (3) What is being done about it. Environmental assessment provides a basis to assess status and trends in ecological systems and diagnose the causes of the problems across a wide range of spatial scales. It also helps to assist local and national policymakers to improve their action towards sustainability. Briefly, the city considered as an urban ecosystem requires a holistic environmental assessment tool to monitor the urban metabolism and help the decision-making authorities and actors to control it (Alberti, 1996; Dakhia & Berezowska-Azzag, 2010).

4 The ASSURE model

The city as a place where ‘nature and artifice meet’ (Lévi-Strauss, 1961), is a dynamic biological organism consists of people, built-up environment and infrastructure that are highly dependent on nature. To understand the interactions between urban development and environmental change we need to consider cities as heterogeneous ecosystems with its biological and physical complexities which are all interacting with each other (Alberti, 1999; Cadenasso & Pickett, 2008). When we look at the structure of an urban ecosystem, human behaviours are the major determinant on the ecosystem dynamics. They directly influence the biodiversity of land and the consumption of resources in an irreversible way. The most important human impact on the physical environment is land use and land cover change by increasing impervious surface areas. Imperviousness represents the imprint of land development on natural landscapes. In this context, impervious surface is a key environmental indicator for monitoring the sustainability of urban ecosystems (Schueler, 1994; Brabec et. al., 2002).

The focus of this study is to evaluate the relationship between the impervious surfaces and natural environment by measuring the carrying capacity of resources. In this context, the study aims to investigate the impacts of land cover change on urban ecosystems by developing a micro-scale index model to assess their indirect or consequential effects for environmental sustainability. Proposed model is entitled ‘ASsessing the Sustainability of URban Ecosystems (ASSURE)’. The structure of the ASSURE model is illustrated in Figure 1 below. The model is developed by following four steps: theoretical framework; indicator selection; model development; model testing and policy development. These parts of the model will be explored in more detail below.
Humans affect urban ecosystems at extraordinary rates through alteration of land and resource consumption. These effects are both obvious (e.g., Pavement) and subtle (e.g., Conversion of forest to agriculture and then to suburbs, acid rain), both immediate (e.g., Dams drown river valleys) and long-term (e.g., New intercity highways promote city growth on 20 to 100 year scales) (Alberti et al. 2003). Therefore, environmental sustainable development becomes an essential vehicle in order to protect and enhance the environmental conditions of urban ecosystems. The concept of environmentally sustainable development (ESD) which is defined as ‘the integration of human activities into natural systems with ensuring the long-term sustainability of these systems’ constitutes the theoretical framework of the model. As a subset of sustainable development, ESD ensures environmental justice in the shared use of urban ecosystems while balancing environmental quality against resource use (Weiland, 2000). The objectives of ESD are; (1) to enhance the economic development by safeguarding the welfare of future generations, (2) to provide the equity within and between generations and (3) to protect biological diversity by preserving essential ecological processes and life support systems (Commonwealth of Australia, 1992). As the dependent variable of the model, ESD will be used to evaluate environmental performance at a given area based on some indicator sets. Furthermore, it will provide decision-making support for establishing sustainable development strategies.

4.2 Indicator selection

As shown in Table 1, the indicator base of the model has been divided into three main categories regarding human, built and natural components of the urban ecosystems. These three categories are separated into 9 indicator sets and 26 indicators.
Table 1. Selected indicators of the ASSURE model

<table>
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<tr>
<th>CATEGORIES</th>
<th>INDICATOR SET</th>
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<tr>
<td>NATURAL ENVIRONMENT</td>
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<td>BIODIVERSITY</td>
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<td>RESOURCE USE</td>
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<td>Waste Generation</td>
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<td>Family Size</td>
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<td>Marriage Status</td>
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In terms of natural environment, impervious surfaces have negative impacts on human comfort and health in terms of decreased precipitation and evapotranspiration rates as well as increased surface temperatures. Built and paved surfaces impede rainwater infiltration and groundwater recharge that leads to increased stormwater runoff and pollutant load carried by stormwater into the waterways. Land cover change results in the form of air pollutant emissions from transport activity and noise pollution emitted by transportation systems. Furthermore, built environment directly affects habitats and ecosystems through consumption, fragmentation, and replacement of natural cover with impervious surfaces. The extent of land development, the type of development and the location of infrastructure have direct and long-lasting implications for ecosystems.

In terms of built environment, private households make significant contributions to environmental sustainability in terms of resource consumption. As impervious surfaces
collect solar heat in their dense mass, they raise air temperatures which lead to increased energy consumption resulting from the lighting, heating, and cooling of the buildings, water consumption and domestic wastes. Increased consumption of resources leads to increased demand for human needs and more intensive use of land. New dwellings bring about the development of large commercial and industrial areas as well as roads, utilities and other infrastructure. As development becomes more dispersed with increasing numbers of families living on large lots at the urban fringes and as jobs and housing become increasingly segregated from one another distances between destinations have increased. People are forced to make more trips by car which creates environmental problems including: greenhouse gas emissions, increased traffic noise and upstream impacts from activities associated with vehicle use.

In terms of socio-economic environment, accelerating rates of land cover change is associated with increased population densities within the region. This development has a negative effect on vegetation cover as land is cleared to support more people and infrastructure. The urban vegetation is associated with the social stratification among urban neighbourhoods in terms of disposable income and education levels. High income and higher education level have a positive relationship with vegetation cover due to a number of reasons such as ability to maintain elaborate gardens, migrate to desirable green areas, contribute to community green-space projects and reflect the level of knowledge of the environment and environmental problems. Lastly, researchers have found that lifestyle behaviour is an important predictor of land cover change indicating that household patterns of consumption and expenditure on environmentally relevant goods and services are motivated by group identity and perceptions of social status associated with different lifestyles.

The indicator sets of the index model need to be flexible enough to respond to the different needs of urban environment and trends of development at the different levels and scales of the urban system (Li et al., 2009). The validity, interpretability, and explanatory power of the index model depend on the availability and quality of the environmental data. Environmental data are difficult to come by compared to data for economic and social indicators. As environmental issues are complex and problems are multifaceted, it is virtually impossible to monitor and measure every aspect of the environment. Assessment and evaluation of environmental data is the combination and comparison of information that is often subjective and not able to be measured. For this study, data collection can be a major problem due to unavailability of data at parcel level. It should be emphasised that, for some indicators, the data will be provided by Census Collection District (CCD) level and then will be transferred into parcel level by a disaggregated method.

4.3 Model development

Monitoring of ecosystem or resource management requires a comprehensive data about the characteristics of a specific urban environment. Many of the existing environmental indices measure the sustainability of environment on macro-scales (national, regional, international). They may lead to an understanding of the general situation but may not be representative of a smaller area. Thus, the proposed environmental index model will give an opportunity to investigate the situation by doing observations on a micro-scale (parcel level) which brings out the general picture of the environmental problems.
The spatial analysis is the first phase of the proposed model. The main purpose of this phase is to estimate impervious and pervious fractions of the study area based on surface measurement that will be carried out through remote sensing data. At this stage, different type of land surfaces (such as paved, vegetated, water) will be evaluated by using satellite imagery. From visual and digital interpretations of the aerial photos, the total area of each land cover type within parcel will be measured. Then, all measured surfaces in the parcel blocks and surrounded roads will be summed up in order to give the total surface area in the border of a grid cell (Figure 2).

Figure 2. An example of a surface measurement in a parcel

In order to clarify the relationship between indicators, at the next step statistical analysis will be used for data reduction and correlation analysis. This step will assess the accuracy of the data set and provide an understanding of the implications of the methodological processes (e.g. weighting and aggregation) during the construction phase of the model. It designates whether the nested structure of the composite indicator is well defined and the set of available individual indicators is sufficient or appropriate to describe the phenomenon. At the next stage, parameter values of indicators will be allocated in terms of their minimum and maximum impacts on environmental sustainability. Parameter values will be assigned by reviewing various studies in the literature. However, for some indicators, it is inevitably hard to define parameters related to literature review. Therefore, expert survey will be conducted for the parametric classification of these indicators. Expert survey is a widely used method for gathering data from respondents within their domain of expertise in order to gain judgments on complex matters where precise information is unavailable. Expert survey will provide a rating for each indicator regarding its “environmental sustainability value” on different land cover types using a scale from 1 to 10. Respondents will be asked to designate a score between 1 and 10 which a value of 0 refers to the poorest level and 10 refer to the highest level.

Indicators are expressed in a variety of statistical units, ranges or scales. Normalisation is necessary to remove the scale effects of different units of measurement which cannot be integrated equally into the indicator framework in their original mode. There are a number of normalisation methods available such as ranking, standardisation, re-scaling, categorical scales, indicators above or below the mean and so on. The normalisation method should take into account the data properties and the objectives of the composite indicator. The issues that could guide the selection of the normalisation method include whether: (1) hard or soft data are available, (2) exceptional behaviour needs to be rewarded/penalised, (3) information on absolute levels matters, (4)
benchmarking against a reference country is requested, and (5) the variance in the indicators needs to be accounted for (Nardo et al., 2005). Before weighting and aggregation procedures, the values of each indicator will be normalised to render them comparable. Then, different weights will be assigned to indicators in order to identify their relative importance in the model by reflecting their significance for environmental sustainability. After weighting scores have been assigned to each indicator, these scores will be aggregated into a composite index. Lastly, a sensitivity analysis should be undertaken to assess the robustness of the index in terms of the mechanism for including or excluding single indicators, the normalisation scheme, the imputation of missing data, the choice of weights and the aggregation method (OECD, 2008).

4.4 Model testing and policy development

In order to test the performance of the model, Gold Coast City in Australia has been selected as the case study for this research. The model will be piloted within a particular area in order to test the capabilities and accuracy of the model. After piloting, the model will be recalibrated and applied in a number of suburbs of the Gold Coast. The case study areas will be divided into 100x100 meter grid cells. Each surface type in the parcel will be evaluated by selected weighted indicators for measuring their environmental sustainability. Then, these values of all indicators will be transferred into grid cells in a Likert scale from 0 (low) to 5 (high) that is indicating the sustainability level of each grid cell. A composite sustainability map will be prepared for all indicators produced by the GIS-based model. Figure 3 illustrates an example composite sustainability index structure of the GIS-based model. The findings of the testing and analysis process will be used to develop long-term environmental management policies for the improvement of environmental sustainability of an urban area contributing to a better quality of life. The proposed model will be a valuable tool to assist municipal authorities to measure and report on their environmental performance in terms of planning, management and protection of urban environments.

Figure 3. (A) An Example of 100x100 meter grid cell (B) An Example of Composite Sustainability Index

5 Conclusion

In recent years, knowledge-based development has resulted in many successful stories in transforming an industrial city to a socially, culturally, and economically sustainable knowledge city. This study will contribute practically by providing an environmental sustainability assessment tool that will be used for the decision-making process in KBUD. The proposed model will be a useful guidance to evaluate the urban development and its
environmental impacts to achieve a sustainable urban future. It will provide long-term environmental, economic and social benefits for cities. Environmentally, implementation of the model creates ecologically effective green areas, reduces ecological risks, and improves the quality of water, air and soil. Economically, it prevents urban sprawl and traffic congestion, provides better utilisation of existing infrastructure. Socially, it reduces health risks, improves the quality of urban life and city services (e.g. health, education, transportation, recreation). With all these benefits, this research will provide further opportunities in turning unsustainable problematic urban areas into potential sustainable urban ecosystems.

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Sustainable urban development: formulation of indicator-based residential sustainability assessment framework for local level

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Structured Abstract

Purpose – The purpose of this paper is to formulate a conceptual framework for urban sustainability indicators selection. This framework will be used to develop an indicator-based evaluation method for assessing the sustainability levels of residential neighbourhood developments in Malaysia.

Design/methodology/approach – We provide a brief overview of existing evaluation frameworks for sustainable development assessment. We then develop a conceptual Sustainable Residential Neighbourhood Assessment (SNA) framework utilising a four-pillar sustainability framework (environmental, social, economic and institutional) and a combination of domain-based and goal-based general frameworks. This merger offers the advantages of both individual frameworks, while also overcoming some of their weaknesses when used to develop the urban sustainability evaluation method for assessing residential neighbourhoods.

Originality/value – This approach puts in evidence that many of the existing frameworks for evaluating urban sustainability do not extend their frameworks to include assessing housing sustainability at a local level.

Practical implications – It is expected that the use of the indicator-based Sustainable Neighbourhood Assessment framework will present a potential mechanism for planners and developers to evaluate and monitor the sustainability performance of residential neighbourhood developments.

Keywords – sustainable urban development, sustainability indicator, residential development, assessment framework
1 Introduction

The concept of sustainable development has long received recognition among various disciplines, generated theoretical revelations among scholars and pioneered multiple applications on projects and developments, regardless of their magnitudes. Most commonly defined as ‘development that meets the needs of current generations without compromising the ability of future generations to meet their own needs and aspirations’ (WCED, 1987, p43), this concept has been at the forefront of almost the entire aspect of human interaction with and impact on ecosystems. The hugely ambiguous and difficult to define concept of ‘needs’, however, has paved the way for various interpretations and criticisms from both researchers and practitioners alike (Choguill, 1993; Wheeler & Beatley, 2004; Brandon & Lombardi, 2005). Nevertheless, the concept was among the first to generate immediate impact in the field of urban development within developed nations where sustainability issues and awareness were quickly gaining recognition. Again, sustainable urban development, as it is popularly known, is being viewed from different perspectives and with apprehension by professionals, including ecologists, economists and urban designers (Teriman et al., 2010), who each tend to view it with a different emphasis.

It is increasingly crucial to view sustainability from an urban development perspective as, for decades, it has been subject to scrutiny from sustainability conscious professional circles all around the world. These professionals have a valid reason in that urbanised area, especially in developing and developed countries, constitutes the largest concentration of economic and residential activity. As urban areas are currently home to slightly over half of the world’s 6.8 billion population (United Nation, 2008; 2009), concerns over its unsustainable development and settlement patterns have led to calls for more sensible forms of development to ensure the continued existence of our balanced ecosystems (Neufeld et al., 1994; Marcotullio, 2004; Becker, 2005). While interest in urban sustainability were mainly generated from global and national perspectives, the locality theorem (Camagni, 1998) suggests that it is best to face these issues from local perspectives where most sustainability issues originate from. This is in line with the estimated 60 per cent of the content of sustainability action programmes that constitutes measures targeted at local levels (Selman, 1996).

An important yet difficult area to apply this sustainability concept is in urban residential developments. This is partly attributed to the fact that, although occupying an increasing percentage of urban land uses, only recently has sustainability been actively considered in the field of human settlements, which directly impacts upon residential developments (Choguill, 1999; 2007). Additionally, even though the local housing developments are at the forefront of sustainability efforts, the inadequate attention to conceptualising its sustainable nature (Priemus, 2005) and lack of commitment to gauging its progress towards sustainability (Winston, 2009) further exacerbates this already difficult effort. Another notable uncertainty worth asking is how can sustainability progress be measured effectively? This paper formulates an indicator-based assessment framework using a combination framework classification to develop a sustainability evaluation method for residential development within a neighbourhood context. Potential sustainability indicators for the framework’s evaluation method are also highlighted.
2 Sustainability indicators

Almost all assessment methods; whether single or integrated, or using qualitative or quantitative data, adopt some form of indicator to assist in measuring output (Becker, 2005; Olalla-Tárraga, 2006). Indicators refer to some form of instrument that ‘communicate[s] information...[and] transcend[s] the direct meaning of data’ (Olalla-Tárraga, 2006, p3) or is a ‘representation of a measure...to indicate a condition’ (Becker, 2005, p205). They are widely used for their capability in transforming meaningless data into information (Hak et al., 2007), as well as complex systems of information into ordinary simplified expressions. Since the launch of Agenda 21, the importance of indicators in the development of human settlements has been well defined. Sustainable Seattle (1993, p4) defined urban sustainability indicators as ‘reflect[ing] something basic and fundamental to the long term economic, social or environmental health of a community over generations’. Maclaren (1996) cautions, however, that indicators are mostly simplified versions of complex phenomena; hence, should only be treated as something that gives an indication of a situation. Additionally, it should be noted that there is no such thing as a ‘one-size-fits-all’ indicator.

Various researchers have highlighted two related purposes for the measurement of these sustainability indicators: the purpose of planning tools for policy process and communication tools for policy assessment (Hezri, 2004; Gosh, 2006; Winston & Eastaway, 2007; Winston, 2009). Hardi et al (1997) adds a third distinction, which he calls performance and assessment tools. Maclaren (1996) outlines four key characteristics that urban sustainability indicators should possess: ability to be integrated, forward-looking, distributional and multi-stakeholder input. The author states that integrating indicators should work to provide good linkages among sustainability dimensions. Forward-looking indicators should indirectly inform of the potential future sustainability of a development path through the use of indicator targets and thresholds. Distributional indicators should be able to account for distributive effects of domain conditions across a geographical context. Additionally, they should also differentiate between local and non-local sources of environmental effects. The final key characteristic that all sustainability indicators must have, and the one that identifies it from other types of indicators, is stakeholder input in developing the indicators (Maclaren, 1996). The basic nature of indicators is that most are value-laden, and getting involvement from stakeholders is the best way of soliciting the most reliable and valid indicators.

In physical planning, indicators are crucial as they help decision-makers transform broad sustainability concepts into specific measures from which development progress can be evaluated. Barton and Buder (1995) classify these indicators into environmental indicators, accounting indicators and performance indicators. Performance indicators measure human influences on the environment by comparing a descriptive indicator with a reference value or target to determine progress towards sustainability (Becker, 2005). The author argues that the ability to measure progress is crucial because it operationalises and brings sustainable development concepts to another level. In the case of residential developments, such measures would help gauge the level of sustainability being achieved by residential neighbourhoods. Unfortunately, while much has already been written about the sustainability concept of human settlements (Cougill, 2008, p41; Bell & Morse, 2008, p203), a shortage of research contributions exists on the reflective experience of sustainability indicator use, as well as lessons pertaining to its experience (Bell & Morse, 2008).
3 Sustainability assessment framework

A framework typically refers to a conceptual structure or model depicting a process for developing indicators. While a framework in itself can assist in the indicator selection process, it cannot decide what should or should not be selected as an indicator (Hardi et al., 1997). Instead, it is the structured evaluation method within the framework that influences the indicator selection and reliability of the framework (Becker, 2005). The function of a framework helps increase this reliability by selecting only those indicators that fall within the framework’s boundaries and interpretations. Such a conceptual framework, according to Olalla-Taraga (2006, p4), ‘helps to structure indicator sets in a coherent manner, promotes interpretation and integration, reveals data gaps and guides the overall data collection effort’. This paper proposes an assessment framework to evaluate the sustainability levels of residential neighbourhood development. The framework design is based on a review of at least six general frameworks that are available for developing sustainability indicators (Maclaren, 1996; Olalla-Taraga, 2006). These are the domain-based frameworks, goal-based frameworks, issue-based frameworks, causal frameworks, sectoral frameworks and combination frameworks (Figure 1).

![Figure 1](image)

Figure 1. A typology of frameworks for sustainability indicator development (Adapted from Maclaren, 1996).

A domain-based framework contains key dimensions of sustainability (environment, economy and society) and identifies indicators for each. This framework is capable of widely covering the dimensions by including additional domains, such as governance (Maclaren, 1996). A goal-based framework identifies sustainability goals and then creates one or more indicators for each goal or combination of goals. A sectoral framework considers different sectors of economics or land use, including its indicator selection. A causal framework introduces the notion of cause and effect, similar to the pressure-state-response framework, with indicators classified into cause and effect. An issue-based framework works by identifying and listing key sustainability issues that the community faces and uses the issue, or a combination of issues, as indicators. A combination
framework (circle in Figure 1) encompasses other frameworks and can help to create a conceptual assessment model by bringing together two or more of the other general sustainability frameworks. This merger offers the advantages of several individual frameworks while overcoming some of their weaknesses (Maclaren, 1996; Olalla-Taraga, 2006).

The Sustainable Neighbourhood Assessment (SNA) framework formulated here was developed using the combination framework version to make use of the advantages it offers. Based on the nature of the research conducted, the selected combination framework used to formulate the SNA utilised the domain-based and goal-based general frameworks. Additionally, the SNA also utilised and extended the generic domains of the Triple Bottom Line (TBL) sustainability principle. TBL uses a suite of environment, economic and social domains (known as the three pillars of sustainability) to evaluate the sustainability level of a particular project or development. While acknowledging the usefulness of the TBL principle and assessment framework, research findings have shown an increasingly important role of institutional structures in promoting urban sustainability at a local level (UNCED, 1992; MMSD, 2002; Brandon & Lombardi, 2005). Institutions are ‘organisations which[sic] structure the choice of action of individual or corporate and other collective actors within a society…Organisation can also be described as systems of rules’ (Spangenberg et al., 2002, p71). Additionally, institutional sustainability can also be achieved whenever there are well-defined laws, participatory policy-making processes and public and private sectors working together to improve the livelihood of the poor (Ashley and Carney, 1999).

At international levels, institutional indicators play an important role in guiding political decision-making towards sustainable development (Spangenberg et al., 2002). The 1992 Rio Declaration, for example, puts the institutional domain as a precondition to achieving sustainability at the local level (UNCED, 1992), and should be added as an important fourth dimension (pillar) of urban sustainability (MMSD, 2002). Additionally, Brandon and Lombardi (2005) indicate that failure to incorporate institutional sustainability would create the biggest gap in the sustainability assessment of human settlements, which also extends to residential neighbourhood developments. Currently, however, there is a lack of specific indicator-based assessment frameworks for measuring the levels of residential neighbourhood physical layout within the context of the four sustainability pillars. Hence the SNA framework, developed by incorporating the integrated environmental, social, economic and institutional pillars, will be used to formulate a suitable method for evaluating the sustainability levels of residential neighbourhoods. Using this framework it is possible to assess, at least at a crude level, whether the physical arrangement of existing neighbourhoods meet the minimum level of sustainability.

4 Sustainability domains

Agenda 21 has defined sustainability as encompassing four dimensions or pillars: the environment, social, economic and institutional. It means that these pillars should be seen as related to one another, similar to the doctrine of the Triple Bottom Line (TBL). The TBL has received much public support for its strong advocate on balancing economy, society and the environment. However, given the increasingly important function of institution in working towards urban sustainability, these four sustainability pillars should
now be promoted as a standard requirement when formulating or evaluating urban sustainability, regardless of levels and jurisdiction.

The four sustainability domains cover a very wide and complex definition and context. Within the scope of the SNA framework, however, these domains are strictly defined within the local context of residential development. In formulating the evaluation method for assessing neighbourhood sustainability, the following definitions are adopted:

1. Environmental sustainability is defined as the quality of being in a place (neighbourhood) where the physical arrangement/design and ecological attributes are capable of providing for and supporting the existence of a healthy environment for the society and surrounding habitat.

2. Social sustainability is defined as the quality of being in a place (neighbourhood) that is capable of providing and maintaining, for social capital, quality of life (equity of access to key services), safety, cohesion and cultural integration, and participation of citizens.

3. Economic sustainability is defined as the quality of being in a place (neighbourhood) where resources are efficiently used, economic capital is provided and maintained, and human capital is utilised.

4. Institutional sustainability is defined as the existence of well-defined laws, participation of citizens in policy-making processes and continued cooperation/support for sustainability initiatives.

A graphical presentation of the SNA framework is shown in Figure 2. It shows how the SNA incorporates the four sustainability pillars (environmental, social, economic and institutional) into the domain-based category, each with its own set of goal-based subcategories. Each goal-based indicator sub-category is formulated within the definitional context of the four sustainability domains. Additionally, each sub-category incorporates a number of potential sustainability indicators derived from extensive literature reviews and input from professionals in urban development fields.

Figure 2. The combination framework-based SNA model
5 Sustainable residential neighbourhoods

Most people would want to live in a place of their choice where they know their neighbours and feel safe. In a physical context, a good sustainable neighbourhood would need to include good homes, nearby local shops, local services, amenities and infrastructure. A good education for children and young adults and nearby job opportunities are much needed additional advantages. This layman illustration is in line with the general definition, by the United States Green Building Council’s LEED-2009, for the Residential Development Report, which defines a neighbourhood as ‘an area of dwellings, employment, retail, and civic places and their immediate environment that residents and/or employees identify with in terms of social and economic attitudes, lifestyles, and institutions’ (USGBC, 2009, pxvi). The Charter of New Urbanism (CNU) characterises a neighbourhood as a compact, pedestrian friendly and mixed-use area (CNU, 1996). Jenks and Dempsey (2007) describe a neighbourhood as comprising both the physical and social elements: a district, representing an area where people live, and a community, representing the people themselves, who live in that particular area. On its own, a small neighbourhood is equivalent to a village, but when combined with other neighbourhoods it becomes a town or even a city. Size is, therefore, a critical factor in defining the features of a residential neighbourhood (Girling & Kellet, 2005); apart from other physical factors, such as the provision of infrastructure and amenities, which help determine whether the overall site layout of a neighbourhood would be considered as sustainable or otherwise.

The typical way of making a rough estimation of a neighbourhood size is based on a comfortable distance for walking from the centre of the neighbourhood to its edge. Clarence Perry, for example, outlined a neighbourhood as a centre surrounded by civic uses, parks, residential uses, a school, and retail at the edge, all within one-quarter mile (400 metres) from the centre, or about 5 minutes walk. This amounts to an area or pedestrian ‘shed’ of 125 acres, or, if the land area is a square, 160 acres (USGBC, 2009). In terms of population, most industry standards in the USA propose a minimum of 1500 households (3000–3500 people) to support a neighbourhood’s commercial establishments (Girling & Kellet, 2005). Additionally, the completeness of a neighbourhood refers to the extent to which daily and weekly needs are close to homes. Examples include grocery stores, banks, medical facilities, coffee shops, restaurants, hair salons, day-care centres, schools and parks. Compatible civic uses (schools and places of worship) should also be located nearby. For local stores and services to thrive, potential customers must be close enough to sustain them economically. The term ‘close’ should mean it can be easily accessible from home, within a 5 to 10 minute walking distance.

The SNA is being formulated to assess the extent to which residential neighbourhoods in Malaysia (case study area) meet the minimum standards of sustainable development. This assessment will be based upon, among other things, the qualities described above. Table 1 below lists a few examples of these qualities in more structured indicators, how they will be measured, and what the parameters and thresholds of these sustainability indicators are.
Table 1. Example of potential sustainability assessment indicators

<table>
<thead>
<tr>
<th>ENV1. LAND USE &amp; DENSITY</th>
<th>Measurements</th>
<th>Units</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Land use mix (diversity of compatible land uses)</td>
<td>Diversity of land use (within 800m radius): housing, retail, food, educational, recreation, offices, services, civic spaces.</td>
<td># categories present</td>
<td>Low: 2 or less, Acceptable: 3 uses, Preferred: 4 uses, Excellent: 5 or more uses</td>
</tr>
<tr>
<td>2 Gross dwelling density (residential &amp; amenities)</td>
<td>Total dwelling unit (DU) per neighbourhood area (inclusive of residential &amp; supporting uses)</td>
<td>DU/Area (ha) (DPH)</td>
<td>Low: Dwelling per Hectare (DPH) &lt;50, &gt;50, Acceptable: 10–15DPH, Preferred: 16–30DPH, Excellent:31–50DPH</td>
</tr>
<tr>
<td>3 Net dwelling density (residential only)</td>
<td>Total dwelling unit per designated residential area (single-family &amp; multiple-family)</td>
<td>DU/Area(ha)</td>
<td>Low: DPH &lt;15, &gt;70, Acceptable: 15–30DPH, Preferred: 30–50DPH, Excellent: 50–70DPH</td>
</tr>
</tbody>
</table>
| 4 Impervious surface (surface covered by roads, buildings, carparks, sidewalks, drainage etc) | Total Impervious Area (TIA) of land use types | % Impervious Area | Single resident: Low: >50%, Acceptable: 46–50%, Preferred: <40–45%, Excellent: <40%
Multifamily: Low: >80%, Acceptable: 76–80%, Preferred: <70–75%, Excellent: <70% |
| ENV2. NATURAL & BUILT FORM | | | |
| 5 Proportion of preserved natural terrain and vegetation | Average percentage slope value for a 10 m x 10 m grid from Digital Elevation Modelling (DEM). | % slope | Low: Slope <3%, >15%, Acceptable: 11–15%, Preferred: 5–10%, Excellent: 3–5% |
| 6 Avoidance of floodplain land/flood-prone areas | Percentage area located within 50yrs/100yrs floodplain areas (as defined by local drainage/flood mitigation plan) | % within floodplain or Yes/No | Low: >30% within floodplain; Acceptable: 15–30% floodplain, Preferred: 1%–14%floodplain; Excellent: 0% floodplain |
| 7 Proximity to rivers and catchment areas | Distance to river banks and/or catchments (minimum 100 m for rural dwelling, 20 m (M’sia-30m) for urban dwelling) | meters | Low: <20m, Acceptable: 20–50m, Preferred: 51–100m; Excellent: >100m |
| 8 Avoidance of high grade land | Percentage development on high grade land | % area or Yes/No | Low: >10, Acceptable: <6–10%, Preferred: 1–5%, Excellent: 0% |
| 9 Amount of public open space provision | Gross percentage of development area (minimum 10%) | % Green space | Low:<10%, Acceptable: 10–14%, Preferred: 15–20%, Excellent: >20% |
| 10 Proportion of solar oriented lots | Percentage lot with good solar orientation (plus minus of 15d geographical East-West) | % lots | Low: <50% lot, Acceptable: 50–75%, Preferred: 76–90%, Excellent: >90% |
6 Conclusion

Sustainable residential neighbourhood developments truly represent a major part of sustainable communities because they provide the basic, common platforms for sustainable communities through the physical layout design of houses and associated amenities, which are all located within an acceptable boundary. Within sustainable communities, people are able to live, work and enjoy quality time in a safe environment. However, despite these attractions, questions remain as to the extent that such a community can meet these sustainable visions. Similarly, despite its highly recognised importance in policy agendas, the development of indicator sets for measuring or monitoring residential sustainability is limited, and research into this area is still underdeveloped. Even though several authors have come up with conceptualising the nature of sustainable residential development, inadequate attention is still given to measuring its sustainability levels. It is envisaged that the formulation of the Sustainable Neighbourhood Assessment framework would shed light on the extent that existing residential neighbourhood developments are really sustainable. With such a framework, empirical comparisons can also be made between the different types of residential developments, such as conventional housing developments, traditional neighbourhood development patterns and residential developments in master-planned communities.

References


Structured Abstract

Purpose – This paper seeks to examine the complex relationships between urban planning, infrastructure management, sustainable urban development, and to illustrate why there is an urgent need for local governments to develop a robust planning support system which integrates with advance urban computer modelling tools to facilitate better infrastructure management and improve knowledge sharing between the community, urban planners, engineers, and decision makers.

Design/methodology/approach – The methods used in this paper includes literature review and practical project case observations.

Originality/value – This paper provides an insight of how the Brisbane’s planning support system established by Brisbane City Council has significantly improved the effectiveness of urban planning, infrastructure management and community engagement through better knowledge management processes.

Practical implications – This paper presents a practical framework for setting up a functional planning support system within local government. The integration of the Brisbane Urban Growth model, Virtual Brisbane and the Brisbane Economic Activity Monitoring (BEAM) database have proven initially successful to provide a dynamic platform to assist elected officials, planners, and engineers to understand the limitations of the local environment, its urban systems and the planning implications on a city. With the Brisbane’s planning support system, planners and decision makers are able to provide better planning outcomes, policy and infrastructure that adequately address the local needs and achieve sustainable spatial forms.
Introduction

Sustainable urban development and the liveability of a city are increasingly important issues in the context of land use planning and urban infrastructure management. Urban infrastructure is an important part of a city and a vital component of a complex urban system which is essential to support any urban developments.

In recent years, the promotion of sustainable urban development in Australia and overseas is facing various physical, socio-economic and environmental challenges. These challenges and problems arise from the lack of capability of local governments to accommodate the needs of the population and economy in a relatively short timeframe. The planning of economic growth and development is often dealt with separately and not fully included in the conventional land use planning process. There is also a sharp rise in the responsibilities and roles of local government for infrastructure planning and management under the pressure of rapid urban growth. Aside from managing the daily operational functions of a city, such as assessment of property development applications and maintenance of urban streetscapes, local governments are now also required to undertake economic planning; manage urban growth; be involved in major national and state infrastructure planning and even engage in achieving sustainable urban development objectives.

The increase in the responsibilities and roles of local governments have meant that local elected officials and urban planners have less time to make decisions, and so rely more on planning support systems that inform the decision making process and improve urban management practices. Planning support system has the capability of improving the handling of knowledge and information in planning processes. Better handling of knowledge and information means that urban planners and engineers should be more capable of handling the ever-increasing complexity of planning tasks.

In spite of the potential benefits, the use of planning support systems in planning practice is limited to the use of urban computer simulation models and spatial mapping programs. Many of these models and programs are generally ‘one-off’ applications with a single purpose, rather than multi-dimensional applications. As a result, many of them become obsolete in a relatively short period of time. A major problem contributing to the development and implementation of the planning support systems is the lack of understanding of complex relationships between urban planning, infrastructure management, and sustainable urban development of a city.

The aim of this paper is to examine the complex relationships between urban planning, infrastructure management, sustainable urban development, and to illustrate why there is an urgent need for local governments to develop a robust planning support system which integrates with advance urban computer modelling tools to facilitate better infrastructure management and improve knowledge sharing between the community, urban planners, engineers and decision makers.

The development of the Brisbane Urban Growth (BUG) Model, Virtual Brisbane (3D visualisation model) and Brisbane Economic Activity Monitoring (BEAM) database have proven initially successful for Brisbane City Council as the first step toward establishing a sustainable urban and infrastructure management framework. This new framework
which integrates with advanced computer models has significantly improved the effectiveness and efficiency of urban planning and infrastructure management. It is a better approach to facilitate sustainable urban development and infrastructure management than conventional land use planning approach alone.

2 Urban planning and urban infrastructure management

In the early 1950s, the term ‘urban infrastructure’ referred mainly to buildings and other permanent assets such as road and water networks (Gleeson, Dong, & Low, 2007). The definition of urban infrastructure has expanded since the 1960s. The term ‘urban infrastructure’ can now refer to many services, depending on the context in which it is used (Gleeson et al., 2007). It can generally be classified into physical and social infrastructure. Physical infrastructure, commonly known as ‘hard infrastructure’, includes storm water drainage; roads and transport facilities; telecommunications facilities; water and sewerage facilities; and other networked services (Gleeson et al., 2007). Social infrastructure, commonly known as ‘soft infrastructure’, includes educational and healthcare facilities; sport and leisure facilities; law and order; and public administration (Gleeson et al., 2007).

Contemporary land use and urban planning originated from the industrial revolution that began in the 1850s. Planning by public authorities was used as a tool for improving the health of the working population due to epidemics, water contamination and urban slums. The main reason for this action was to improve the health conditions of labour workers so that they could work harder and at the same time reduce the cost of supporting an unhealthy labour force and their families (Friedmann, 1987; Hall, 2002; Sies & Sliver, 1996; Taylor, 1998). Gradually local authorities took responsibility for providing urban infrastructure such as clean water, and the removal of domestic waste such as sewerage and garbage. Physical land use planning was used mainly to enable the separation of residential developments and industrial activities.

In modern times, greater emphasis on the decentralisation of urban governance structures has meant that the traditional roles of local governments in managing basic land use, infrastructure and services are no longer sufficient to meet the local community needs. Local governments are now increasingly involved in regional and national strategic planning initiatives and programs such as regional economic development, major road and public transport infrastructure projects, and management of urban growth (Atterton, 2007; Haywood, 2005; Stren, 1993; Worthington & Dollery, 2000).

As a consequence of more demand on local government in managing legislative requirements and meeting community needs, the roles of land use and urban planning had also evolved rapidly in the past several decades (Byrnes & Dollery, 2002; Cetinic-Dorol, 2000). Urban planners are now required to provide strategic advice on many urban growth and infrastructure management issues ranging from rezoning of land for community use to strategic distribution of public transport routes and infrastructure. Due to the demand on greater linkages and accountability between different projects, planners can no longer deal with such issues in isolation.

Contemporary land use planning approach such as land use zoning plans is often based on historic trends and abstract values without a total understanding of the urban environment and its systems (Brisbane City Council, 2008). It has been suggested that there is a constant mismatch between what is a planner’s view of a desirable spatial outcome and the realities of the evolving urban structures. Such a mismatch is a result of
our limited understanding of localised urban patterns (Forster, 2006; Gleeson & Randolph, 2001). Therefore, this brings forward the concept of developing an effective planning support system which integrates with advance urban computer models in the context of sustainable urban development and infrastructure management.

3 Knowledge management and the rise of urban computer modelling

Our urban environment is becoming increasingly complex and large in scale as local urban economies, social and political structures, transportation systems, and infrastructure requirements evolve. The sustainable and efficient usage of scarce resources, together with competing economic and social priorities, are now parts of everyday decisions required to be made by local governments (Andersson, Frenken, & Hellervik, 2006; Baccini, 1997; Berliant & Wang, 2004). Many mathematical, engineering and theoretical models have been used to attempt to develop an understanding of some aspects of urban systems, its structure, and its interconnection relationships (Fragkias & Seto, 2007; Jat, Garg, & Khare, 2008).

Knowledge management is an evolving discipline that has garnered interest from both academicians and practitioners. The early years of knowledge management were characterised by the development of computer database that stored information and knowledge (Sasson & Douglas, 2006). The use of geospatial, computer visualisation and simulation models as knowledge management tools to assist policy making, urban planning and management is not a new concept. Modern computer simulation models have been widely used in developed countries to evaluate major public and private urban development projects and forecast development patterns (Cheng & Masser, 2003; Ward, Stimson, & Murray, 2001; Wilson, Hurd, Civco, Prisloe, & Arnold, 2003). The steady expansion of local governments’ responsibilities as mentioned in earlier sections has also resulted in the development of multi-modal approaches to urban and transportation modelling, including mode choice, travel demand management, land use policies change, working hours, and congestion pricing (Marinoni, 2005; Waddell & Ulfarsson, 2004).

Current best practices in search of attaining integrated urban infrastructure management predominantly focus on the development of robust and integrated planning support systems which integrate advance computer simulation and visualization models to inform and enable greater public and private sectors engagement in the decision making process. The states of Oregon and Florida, for example, have implemented containment strategies with the use of robust land use and planning support system to inform urban planners and decision makers on the effectiveness of existing land use policies (Boyle & Mohamed, 2007; Nelson, Burby et al., 2004; Nelson, Dawkins, & Sanchez, 2004). As a result, decision makers have better knowledge and information and were able to regularly evaluate the impacts of their urban management policies, particularly in relation to the efficiency of public transport systems and other development infrastructure to meet the demand of urban growth. Nonetheless, current research on integrated infrastructure management to date have not fully explored the potential of a robust planning support system that can be further developed and integrated into local government authorities to facilitate sustainable urban growth and infrastructure management outcomes (Carnegie & Baxter, 2006; Hohn & Neuer, 2006; Mattingley, 1994; Reddel, 2002; Worthington, 2007).

An integrated planning support system for urban infrastructure management would have the potential to provide outcomes to evaluate land use policies, but also to be
integrated into local government systems to inform corporate decisions regarding estimates and benchmarks, future cost recovery of infrastructure charges, and human resource needs.

4 Planning support system and urban infrastructure management

Brisbane is anticipated to grow rapidly into the next 15 years as one of the fastest growing cities in the South East Queensland region of Australia. Various scales of brownfield redevelopment are already in progress. It is expected that the rate and scale of brownfield redevelopment will intensify further as the last remaining greenfield land in Brisbane will be fully developed while Brisbane continues to grow strongly as a major economic capital. At present, various planning documents set out planning priorities for Brisbane including urban renewal, neighbourhood plans, Transport Orientated Developments (TODs), major transport projects and other major developments. All these projects are closely related and urgently require an integrated framework to ensure that land use planning, local economic development and infrastructure provision is delivered to meet the needs and demands generated by the anticipated economic and population growth.

The unprecedented urban growth has prompted Brisbane City to develop a robust planning support system to provide strategic directions to planners and decision makers on the anticipated sequence and scale of future development clusters. The introduction of the Brisbane Urban Growth (BUG) model, Brisbane Economic Activity Monitoring (BEAM) database and Virtual Brisbane (3D visualisation model) by Brisbane City Council has successfully revolutionised the approach to forecasting developments and the planning of urban infrastructure.

4.1 Brisbane Urban Growth (BUG) Model

The BUG model is an advance oracle database linked to a GIS analytical and visualisation interface for analysing and identifying future development and its development sequencing (Brisbane City Council, 2008; Lau & Lister, 2006; Lister, 2004). Its prime data is extracted from the local government rate database. Local environmental constraints such as slope gradient, flooding and waterways corridors are included into the BUG model. The BUG model uses the information in the spatial database as well as other development factors such as property value, land value and conversion rate, to forecast development potential at property level for the city (Brisbane City Council, 2008). The model BUG model also uses information in the BEAM database to evaluate and forecast the demand for non-residential uses.

An improved version of the BUG model is currently being developed by Brisbane City Council. This new version has improved functionality to forecast non-residential and mixed uses development. This new version also uses new model simulation algorithm and integrate with the latest multi-modal transport accessibility model. The BUG model with its improved functionalities is anticipated to be the fundamental tool to assist planners to understand the limitations of the local environment, provide details local knowledge of the planning implications for a city. The results of the model outputs enable planners and decision makers to provide better planning, policy and infrastructure that adequately address the local needs and achieve sustainable outcomes and spatial form.

Figure 1 illustrates the conceptual framework of the latest BUG model. The operational framework of the BUG model consists of a variety of urban and property
development factors as well as transport accessibility factors to ensure the maximisation of future urban development along public transport nodes and corridors. The BUG model focuses on supply side information, uses a detailed bottom-up growth forecasting approach and provides a triple bottom line sustainability planning and policy approach for its municipal government. The Sub Lot Calculator uses information from the development factors and constraint data to generate potential development options for each parcel. The Development Option Evaluator then evaluates each option and determines which option will have the potential to generate a better development return.

In contrast to the conventional top-down rational comprehensive approach which focuses on delivering its objectives, the bottom-up approach focuses on exploring the local limitations, understanding the interconnection relationships between the urban systems and establishing sensible realistic solutions to revolve issues (Sabatier, 1986). However, this type of approach may not be the most time efficient method for solving
urban growth issues at a citywide level. The alternative to this approach is the collaborative or joined-up approach which utilises the strengths of the top-down and bottom-up approaches.

4.2 Brisbane Economic Activity Monitoring (BEAM) Database

The BEAM database is an occupancy database. It was originally created to monitor and track the progress of the non-residential activities across the city of Brisbane. In particular, it was established to monitor the variety of commercial and retail activities within shopping centres. The monitoring of the business occupancy was first started in 2007, with over 22 of Brisbane’s Activity Centres being surveyed. The data is stored in a spatial database which can be easily integrated with other spatial databases. The detailed information obtained through the survey has provided useful background data to support the planning of local community and urban infrastructure. The BEAM database is now also integrated with the BUG model to enhance the model’s ability to forecast non-residential developments.

4.3 Virtual Brisbane

From the introduction of computer graphics, the demand for visualisation techniques has grown continuously (Fritsch & Kada, 2004). The 3D visualisation industry continues to experience rapid expansion from architecture, to the gaming industry, the medical industry and feature films. Industry growth combined with software and hardware evolution has lead to the steady improvement of the production of 3D visualisation. “Visualisation is considered as much more than creating realistic images of what is or what might be, and much more than creating attractive charts and maps. Visualisation is concerned with foraging for data in a data rich environment made much more accessible by the World Wide Web. It is involved with transforming data to information, to knowledge, and into action” (Langendorf, 2001).

There are numerous visualisation tools available for decision makers, urban planners and community users to review, evaluate and simulate planning scenarios. These systems typically rely on the use of GIS maps, charts and technical reports to display the outputs or the consequences, but it is still insufficient for many non experts to fully understand spatial or scientific information. (Duy, 2008). Early planners created city models with cardboard from elaborate manual methods, while visually powerful were limited in the level of interactivity; 3D visualisation now offers a powerful and emersive tool for creating and visualising digital models of cities (Hu, You, & Neumann, 2003). Visualising urban design landscapes in a collaborative virtual environment is now a popular trend in the portfolio of urban planning literature. This requires the utilisation and integration of GIS, urban planning tools and 3D visualisation systems. Such systems demand sophisticated data conversion and intensive computation to transform a wide range of spatial data formats into the 3D data standards of various visualisation systems (Duy, 2008).

It is believed that technologies such as 3D geographical visualisation can assist planners in better communicating planning outcomes to decision-makers and to engage the public, and thus make better collective spatial planning decisions (Pettit, Cartwright, & Berry, 2007).

Until November 2006 Brisbane City Council maintained in its Central City Library a basic cardboard 3D model of the CBD area for the display of major Development
Application proposals and approvals in the CBD. In subsequent years, the model fell into disrepair and it was not considered worthwhile to carry out expensive repairs. Investigations proceeded into securing a computer-generated 3D model to replace the physical model. The move to a digital model was supported to enable Council to integrate with other agencies using 3D modelling and to respond to regular lobbying from the development industry for access to such a facility. Research identified that the standard and capacity of available technology for digital 3D modelling varied widely, with many potential suppliers in the market. Similarly, the pace of change in the digital modelling industry was and continues to be rapid, as model builders leverage off beneficial synergies with complementary technology such as computer gaming and digital photography.

A proposal was presented to Civic Cabinet along with a brief display of examples of currently available digital modelling. Strong support was immediately offered for the project to commence, under the stewardship of the Urban Futures Brisbane Board, Council’s independent advisory board on planning issues. The project was initiated from a competitive tender process for 3D built-environment modelling. Thus the Virtual Brisbane project was given its genesis.

The Virtual Brisbane 3D model is captured and created accurately from an aircraft mounted Pictometry multi-oblique 3D camera system providing a snap-shot in time which can be progressively updated providing an easy-to-access and centrally-located master record of the urban development activity across the inner city. Utilising Photogrammetry technology provides a visually accurate record unlike other simulated-textured models. Photogrammetry is a cost-effective means of obtaining large-scale, spatially accurate urban models. The technique utilises aircraft captured 2D images combined with LIDAR laser scanning to produce the 3D terrain and building models. The dataset provides an easy-to-access and centrally-located master record of the urban development activity across the city and urban areas.

The fully-textured 3D model features every building and structure in a 5km radius around the CBD and other extension areas including Chermside, Indooroopilly, Upper Mt Gravatt and the Racecourse Road Neighbourhood Planning Precinct. The model spans an area of approx. 100 sq km, and is the largest 3D city model in the southern hemisphere. The model is able to be used in an interactive way to visualize the existing urban environment as well as new planning strategies and development proposals in a real-world scenario.

The model software is based on The Open Scene Graph (OSG), a cross-platform C++ / OpenGL library for real-time visualisation. It has become a powerful alternative to traditional tools like Performer and is freely available (Fritsch & Kada, 2004). The library not only features high performance rendering capabilities and excellent support for PC graphics accelerators, but also offers stereo mode and a broad variety of loaders for many common data formats. The software offers the ability to page large 3D model datasets with varying level of texture detail for optimised navigation. For the purpose of moving through the datasets, there exist camera manipulators that simulate movement in a car or in an airplane. The drive camera manipulator even uses collision detection so that the virtual vehicle stays on the ground. OSG has been successfully used in non-commercial games and virtual reality applications (Fritsch & Kada, 2004).

Outputs from the Virtual Brisbane 3D model include High definition still imagery and animation flight-paths. It has the ability to produce Real-time shadow analysis of the entire scene or individual objects depending on the position of the sun in real-time. The
model also has the capability to undertake Real-time visibility analysis, allowing the calculation of visibility from point to point in the 3D scene. 3D CAD models can be linked to GIS datasets to display polygons, line-work and lookup table information visually in 3D. This provides not only a visualisation tool but complete integration with 3D modelling and GIS datasets. This combination provides a visually powerful tool with a wider range of potential applications than a static 3D model. Figure 2 illustrates an example of the Virtual Brisbane still imagery output of one of the future land use scenarios of the city.

![Image](image_url)

**Figure 2.** Land use scenario still imagery example of the Virtual Brisbane.

Virtual Brisbane provides residents with the ability to participate in decision-making for local neighbourhood areas by enabling the visualisation of different development scenarios in an intuitive manner based on the resident’s human perception of the built environment (three dimensional spatial perceptions). This helps Council plan for future development and identify practical and attractive designs for various projects. Development projects become easier to understand along with the changes that could occur in their city and the planning outcomes that can be achieved. Virtual Brisbane provides an effective way to visualise future land use and development patterns in an intuitive manner which are traditionally presented on a piece of paper. Virtual Brisbane is now an important part of Brisbane City Council’s urban planning processes. It has been successfully used on a range of planning projects such as neighbourhood plan, River City Blueprint and city’s new strategic plan. It also helps urban planners, engineers and city architects for the visualisation of proposed developments and scenic amenity in the development assessment process.
5 Planning support system and the integration with urban planning process

Over the last two decades, cities in Australia and overseas are taking a range of innovative sustainability initiatives to ensure that each step of the urban development process contributes to a reduction of the ecological footprint and to an improvement in the quality of life (Jones, 2005; Stimson & Simpson, 2001). Rational comprehensive planning is still one of the most influential urban planning methodologies in Australia and overseas (Gleenson & Low, 2000; Rosenhead, 1980). Many of the existing growth management approaches and policies are developed using this methodology. In this approach, urban planners and decision makers are making their rational decisions based on abstract values. These values are generally presented as agreed consensus and higher level agencies can expect the compliance of lower level agencies with their decisions (Rosenhead, 1980). This top-down approach emphasises management, measurement and control. But it often disregards local limitations, constraints and other externalities because its decisions are based on a set of abstract values (Sabatier, 1986).

Figure 3 illustrates the conventional local government process used by Brisbane City for the planning and delivering of urban infrastructure under a top-down approach. In this approach, the planning of infrastructure is often seen as a discrete exercise among different infrastructure providers. Planning studies are often carried out to justify a pre-made decision or objective, rather than to provide a factual recommendation.

Urban planning, infrastructure provision and management should be based on reliable information, knowledge and good understanding of the urban systems and their
interconnected relationships. A good planning support system has to integrate with practical planning process. The new urban planning and infrastructure management framework used by Brisbane City Council has taken full advantages of the planning support system which integrates the BUG model, BEAM database, Virtual Brisbane, and existing urban planning and infrastructure management practice. The Brisbane’s planning support system has the ability to provide an integrated solution that is not only visually powerful but also rigorous in analysis. The ability to pre-visualise future growth factors and the potential impacts of proposed development is a vital tool in the planning of future urban infrastructure. With this planning support system, reliable information and data are provided to the urban planners and decision makers to formulate realistic vision, provide better planning outcomes, policy and infrastructure that adequately address the local needs and achieve sustainable spatial forms.

Figure 4. Planning support system of Brisbane City Council

Figure 4 illustrates the planning support system of Brisbane City Council. The operation framework of the system consists of the BUG model, urban infrastructure database, BEAM database, Virtual Brisbane, and other Council’s spatial databases.
Demand and capacity analysis and development projections are now being carried out in a coordinated manner between different infrastructure providers and urban planners. Reliable information and data are provided to the decision makers to formulate a realistic vision and achievable development targets for the city. Strategic and neighbourhood planning are being carried out based on dynamic information of the integrated planning support system. Sustainable urban development and infrastructure management is achieved as a result of a clear understanding of the interconnected relationships of the local areas, rather than as a result of assumptions based on abstract values.

6 Conclusion

In conclusion, the roles and responsibilities of local governments are expanding beyond just the daily operational maintenance of a city and the assessment of property development applications. Local governments are now also required to undertake economic planning; manage urban growth; be involved in major national and state infrastructure planning and even engage in achieving sustainable development objectives. Delivering sustainable urban infrastructure and maintaining liveability of a city become increasingly important for local governments around the world.

The evolution of computer and internet technologies in the past decades has made public information more accessible and significantly improved the knowledge transfer process between government and the community; as a result, the performance of elected local officials and governments are constantly under the media spotlights. Local communities from both developed and developing countries have demanded greater transparency in public sector reporting, and there have been numerous examples of public inquiries regarding the poor performance and ill-informed decisions of local elected officials.

This paper has provided a brief insight of the Brisbane City Council’s new urban planning framework which is based on a reliable and dynamic planning support system. The BUG model, BEAM database and Virtual Brisbane are vital parts of Brisbane City Council’s planning support system. This planning support system has proven initially successful as an integrated knowledge management tool for improving the effectiveness and efficiency of infrastructure management, urban planning and community engagement through better knowledge management processes. It has also improved the accountability and transparency of the planning and delivering of infrastructure by providing an integrated development forecasting framework to facilitate sustainable urban development.

The Brisbane City Council’s planning support system is constantly evolving and integrating with new database, system and information to improve the planning, community engagement and development processes. Excellent urban planning and development assessment processes, transparent community engagement program and innovative planning supporting system are the key elements to ensure sustainable and well planned future of Brisbane.

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References


Assessing regional social sustainability: a case study on the Delmarva Peninsula, the United States

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Structured Abstract

Purpose – The purpose of this paper is to define social sustainability, describe the current method to measure regional social sustainability and to call attention to the missing links in the literature. Given that sustainability is an elusive concept in itself, social sustainability is equally as vague and tends to contradict the other two pillars of sustainability, environment and economy. Social sustainability is also the least researched pillar of sustainability, lending itself to wide contradiction within the field. A case study of Wicomico County, Maryland, USA, is used to illustrate the missing links.

Design/methodology/approach – We review current literature defining and measuring regional social sustainability. After examining the definitions associated with social sustainability, three multi-criteria analysis methods are analyzed showing benefits and weaknesses of each. We also discuss the difference in using quantitative versus qualitative data in sustainability research. Lastly, we review how conflicts may arise in a community trying to create a sustainability plan. Wicomico County, Maryland, USA is used as a case study to describe how a Comprehensive Plan may set up goals that the community members may disagree upon.

Originality/value – The methodology puts in evidence that there are many missing links between regional social sustainability and its assessment. Quantitative data does not capture social sustainability indicators, but there has been little research on how to visualize qualitative data for use in sustainability studies. Additionally, if there is a conflict between what is and what is not sustainable, who makes the decision as to which is correct? These missing links show the need for more research into regional social sustainability.
Practical implications – With the increase in need for sustainable communities, researchers need to be aware that to be environmentally and economically sustainable, communities also need to be socially sustainable. By calling out the need for research in this discipline, more measures and technologies can be created or tailored to handle the issue of regional social sustainability. Having these techniques will allow communities to better plan for a sustainable future.

Keywords – social sustainability, regional sustainability assessment, multi-criteria analysis, Delmarva Peninsula

Paper Type – Academic Research Paper

1 Introduction

The one commonly accepted concept of sustainability is that it has three pillars, namely environment, economy, and equity. Beyond that, the definition of sustainability seems to elude researchers as it can be so all-encompassing that it is hard to detail a specific aspect of a concept that includes everything. Luckily, the World Commission on the Environment and Development, otherwise known as the Brundtland Commission in honor of its chairman Gro Harlem Brundtland, published *Our Common Future* in 1987, defining sustainable development as meeting “the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

Given this vague definition of sustainability, it is even more difficult to define ecological, economical, and social sustainability and how they interact. However, one thing is definite, these pillars must be addressed in order for our society, as a whole, to be sustainable (Byrne et al., 2008).

The three pillars continually intertwine, making it difficult to separate one pillar from the other for empirical research. In order for the current generation to strive for sustainability, social and economic systems have to come together to support stewardship of the environment, through proving that the environment can be conserved and/or protected in a way that harnesses economic well-being and battles social injustice (Haughton, 1999). If the environment cannot be sustained, there will be a decline in resources people depend on, ultimately leading to a decline in equity. This decline in equity may be evidenced by an increase in poverty, which, in effect, leads to an unsustainable use of the environment, as those who have access to resources will exploit those resources to gain wealth, continuing the cycle (Haughton, 1999; Padilla, 2002; Tainter, 2006). The current unsustainable resource exploitation has already affected poor populations disproportionately leading to contaminated water, food, and air supplies, poor hygiene, compromised food safety, and degraded land productivity, especially in Asia, Africa and Latin America (Katyal, 2009).

Because of this cycle, it is important to understand who institutes sustainable changes. It is the people of the community, region, country, etc., that desire, create and continue change. The general public makes decisions based on their perceptions, values and emotions, not necessarily facts (Murray, Dey and Lenzen, 2006; Tainter, 2006). People will sustain what they value and therefore, pressure is placed upon their local governments, congressmen and other politicians for change (Tainter, 2006; Murray, Dey and Lenzen, 2006). In order to fully institute sustainability, new rights and obligations need to be supported by the general public (Haughton, 1999).

As such, sustainability ultimately depends upon the population for each region (Tainter, 2006). Incorporating the region’s needs, desires, and emotions into the
decision-making processes is largely handled under the umbrella of social sustainability. This paper seeks to examine regional social sustainability, calling attention to the missing links between regional sustainability assessment and social sustainability. In addition, recommendations on how to further assess regional social sustainability for a rural region where there is a conflict between environmentalists and the rural people who wish to sustain their way of life, a common theme in rural social sustainability, are given (Tainter, 2006).

This paper is organized into three distinct sections detailing social sustainability, how to assess social sustainability and a case study from Wicomico County, Maryland, USA. The first section discusses the theoretic background for social sustainability and the differing foci of the subject. Secondly, assessment methods are analyzed to determine an appropriate method for future use, in particular for rural regions. Lastly, the theoretical and assessment components are applied to Wicomico County, a largely rural county on the Delmarva Peninsula in the Mid-Atlantic region of the USA. This region is more fully characterized with respect to the missing links between social sustainability and assessment methods.

2 Social sustainability defined

The main concept of social sustainability is a fair process, establishing that a world that is fair will lead to a more sincere attempt to achieve sustainability (Paavola and Adger, 2006; Butler, 2008). This call for fairness implies a balance of societies, allowing no one group to benefit from an action at another group’s expense (Murray, Dey and Lenzen, 2006). Aside from this one commonality, many researchers define social sustainability differently, basing their opinions on theories of environmental justice, social equity, or future generations, discussed below.

The theory of environmental justice, like social sustainability, is an overarching concept that includes many different justice issues with respect to environmental decisions (Ikeme, 2003). If social sustainability is to follow environmental justice, it would encompass procedural issues associated with stakeholder involvement, or the lack thereof, as many of the poor and minorities are not represented or do not have the access to power to sway decision-making (Ikeme, 2003). This comes out of the environmental justice movement of the 1980’s when the increased vulnerability of minorities to environmental risks and stresses became a racial land use issue (Ikeme, 2003).

Social inequity is different in that it strives to focus on the inequity of populations, largely the rich and poor populations (Ikeme, 2003; Butler, 2008; Katyal, 2009). This is not so much procedural as it deals with distributional issues and access to environmental goods and services (Ikeme, 2003). Inequities based on economic status occur in resource consumption, media coverage, and double standards (Butler, 2008). For instance, the developed countries are responsible for the majority of the greenhouse gas emissions, whereby the developing countries may not be able to develop due to restrictions on greenhouse gas emissions and are more vulnerable to the climate change affects caused by the emissions (Butler, 2008).

Lastly, social sustainability research increasingly covers the issue of future generations, also discussed as intergenerational equity. This is made very clear in the Brundtland Commission’s statement, referenced above, but there is a lot of conflict over the consideration of future generations. There are some who feel that since we create the future generations, we have control over the present and therefore do not need to consider
the future (Padilla, 2005). However, future generations have certain rights and the present generation has an obligation to maintain those rights for the future; this constitutes a transfer of rights from one generation to the next (Padilla, 2005). One might also add that the present generation inherited the world from the previous generation who may not have been so forward-looking, leading us into an unsustainable future. Would this generation want the next to have to continue in this unsustainable fashion?

Through a general look at these three concepts, one can draw the conclusion that social sustainability includes environmental justice, social equity and intergenerational equity. In fact, Haughton goes a step further and includes two other principles for his five equity principles as they relate to (social) sustainability: intergenerational equity, intragenerational equity, geographical equity, procedural equity, and inter-species equity (1999). The first includes the concept of transferring rights between generations, as stated above. Secondly, intra-generational equity refers to the social equity discussed above. Geographical equity is a new concept that takes into account that local policies should aim to alleviate some global issues as well, as if the region is responsible for itself and for the globe as a whole. Fourth, procedural equity, largely follows the principles detailed in the environmental justice section, ensuring people are treated openly and fairly. Lastly, the inter-species equity concept is one that combines social equity with environmental sustainability in that humans have a right to protect others species as well as our own way of life (Haughton, 1999).

Haughton continues farther to stress that it is not the end-goal to achieve all five principles, but it is rather the process of achieving the goal that is important; the changing of practices and problem solving (1999). Tainter agrees with this statement, concluding that though science rarely addresses problem solving, this is the task of achieving sustainability (2006). The active problem-solving skills used to achieve sustainability are what will ultimately create a sustainable future (Tainter, 2006).

3 Social sustainability assessed

The literature surrounding social sustainability assessment is just as varied as the literature on what constitutes social sustainability, but the majority of assessment methods circle around multi-criteria analysis using indicators (Spangenberg, 2004; Roseland, 2005; Murray, Dey and Lenzen, 2006; Colantonio, 2007; Lyytimäki and Rosenström, 2008; Huby, et al., 2009; Mascarenhas, et al., 2010). The process on how to define these indicators and how to interpret them, however, is not unified in any way. After a discussion of three studies in using indicators to assess social sustainability, a discussion of the difficulties of regional assessment will follow. Lastly, a new holistic assessment method will be discussed.

First, Lyytimäki and Rosenström discuss the use of indicators for sustainability assessment, starting out with numerous indicators and narrowing them down as goals get more focused (2008). This method is commonly used because of the ambiguity of the definition of social sustainability. Once a myriad of indicators are gathered, refinement can take place to those that are most apt to the locality. The process of refinement will continue until the indicators finalized are resonant with policy systems, aligning the indicators with the goals of the local, state or national governments (Lyytimäki and Rosenström, 2008). The authors stress the idea of having common indicators for all regions, while it will not show the individual needs of each location, common indicators
will lead to common terminology and allow for comparison to other locations (Lyytimäki and Rosenström, 2008).

Murray, Dey and Lenzen continue that indicators are simple and are easier to communicate to the public (2006). The authors discuss the difference between endpoint and midpoint indicators (Murray, Dey and Lenzen, 2006). Endpoint indicators are those that are aggregate measures that detail several converging impact pathways, such as life span or loss of life indicators (Murray, Dey and Lenzen, 2006). Midpoint indicators are those that can be observed along the path of impacts, such as measures of sea level rise and population dislocation (Murray, Dey and Lenzen, 2006). The authors show that while endpoint indicators are stronger indicators for public dissemination, midpoint indicators show the policy possibilities that may affect the impact (Murray, Dey and Lenzen, 2006).

Lastly, Mascarenhas, et al., discuss how indicators are used widely in sustainability assessment because sustainability can be operationalized through indicators, increasing accountability of the locality, engaging the stakeholders, and ensuring access to information (2010). The authors also say that indicator assessment allows for vertical integration from local to regional and even national level aggregate assessment (Mascarenhas, et al., 2010). The local stakeholders can decide indicators for their respective locality; however, regional indicators should also be included to allow for the ease of vertical integration (Mascarenhas, et al., 2010).

The discussion of vertical integration brings up the disparity in spatial scales when assessing social sustainability. For instance, there are common indicators used at the micro scale, such as education, income and social contacts, whereas regional indicators at the macro scale are largely income distribution indicators and regional assets (Spangenberg, 2004). Additionally, the difference in scales between indicators could make regional assessment extremely difficult (Huby, et al., 2009).

In one particular study, Huby, et al., study how the Modifiable Area Unit Problem (MAUP) causes inconsistency in statistical output (2009). For instance, income deprivation and barriers to housing indicators in their study decrease in inequity as the spatial unit is increased, leaving the authors to conclude that the effects of social indicators that describe a local area can be lost at the regional scale (Huby, et al., 2009). Additionally, many socio-environmental indicators are collected based on physical regions and not political boundaries, causing a regional boundary issue when trying to compare those indicators; the authors use geographic information systems (GIS) to help remedy this situation (Huby, et al., 2009). It is the conclusion of the authors that, although indicators should still be conceptual in nature, statistical considerations with respect to regional boundaries need to be considered prior to study (Huby, et al., 2009).

A new way to assess social sustainability has been to evaluate community level sustainability because it is the main delivery point for associated policy (Colantonio, 2007). This concept looks at social sustainability as a function of the society as a collective being, based upon community and neighborhood characteristics (Colantonio, 2007). Likely indicators for social sustainability of communities include community interaction and social networks, community participation, pride, sense of place, community stability and crime (Colantonio, 2007). Indicators are not only quantitative, such as crime, but also include qualitative research on sense of place and social networks based on surveys and questionnaires (Colantonio, 2007). By qualitatively assessing the community’s perceptions, one will know what sustainability for that community will look like.
However, there is a missing link between assessment literature trying to quantitatively measure social sustainability with indicators and possible qualitative assessment. Colantonio is perhaps the only researcher to discuss this issue in her research; however, more research is needed in the field of qualitative assessment before it can be widely applied. It stands to reason that if social sustainability is as much a matter of citizen value judgment, then quantitative measures just cannot capture the data needed for assessment.

A substantial component to this type of assessment includes community involvement. Researchers may do indicator research without the community’s involvement, but they may end up with completely opposite conclusions. For instance, a study completed in Chiloé showed that while researchers were trying to call attention to how globalization was causing the destruction of one region’s historic way of life, interviews with the local population did not see globalization as a problem (Barrett, et al., 2002). In fact, the local population enjoyed what globalization was doing to their community, as previous worries of individual fishermen going out to catch increasingly shrinking populations of fish were replaced by new aquaculture operations, guaranteeing a wage and a short trip home (Barrett, et al., 2002). This research, in particular, shows that what a community member values and what an outsider researcher values may be two different things.

The circumstance of two different opinions comes up quite frequently, not just between researcher and community, but also within the community. This is especially true in rural communities where there is often a conflict between environmentalists and local landowners (Tainter, 2006; Huby, et al., 2009). In the case of rural social sustainability, accessibility problems are always a key issue (Huby, et al., 2009). In addition, many environmental advocates want to preserve the countryside, but do not continue to explain why they want to preserve it (Lowe and Ward, 2007). This tendency often restricts rural areas from any development and service extensions, even if rural town development would be beneficial for those living in the rural areas (Lowe and Ward, 2007). This case is not uncommon across the United States’ rural areas and Wicomico County is no exception.

4 Social Sustainability: a case study of Wicomico County, Maryland, USA

Wicomico County is located in the southeastern quadrant of the State of Maryland, USA, in the central portion of the Delmarva Peninsula, Figure 1. The County is bounded on the west by the Nanticoke River and the Wicomico River to the south, both flowing into the Chesapeake Bay. The County is named after the Native American words wicko mekee, meaning “a place where houses are built,” referring to a small Native American town on the banks of the river.
Wicomico County constitutes 400 square miles, 23 of which are water. The County includes two incorporated cities, Salisbury and Fruitland, and six incorporated towns, Delmar, Hebron, Mardela Springs, Pittsville, Sharptown, and Willards. The City of Salisbury is the county seat of Wicomico County. The Metro Core is a region including Salisbury, Fruitland, and Delmar in the center of the County that encompasses the majority of the County’s urban development. The adjacent jurisdictions are Dorchester, Somerset, and Worcester Counties in the State of Maryland, and Sussex County in the State of Delaware.

According to the 2000 US Census, the County had a population of 84,644 people, 32,218 households, and 21,779 families. The median household income was $39,035 and the median income for a family was $47,129. The per capita income for the County was $19,171.

Using the DRAFT Wicomico County Comprehensive Plan, completed in 2008, and associated public involvement documents, possible social sustainability indicators are developed to illustrate the missing links between social sustainability and regional social sustainability assessment. The following list is a set of these indicators, with explanations of how they were described in the County documents.

1. New development permits located within and outside the Metro Core region of the County – One of the goals of the Comprehensive Plan is to focus growth in the Metro Core area of Wicomico County, allowing for less development in the rural county areas (Wicomico County a, 2008). Some citizens of the County stated at public meetings that they were against cluster development, though they did want development to stay in the Metro Core region, while others stated that they wanted cluster development to allow for open space and for farmers to retain some land value. However, numerous other citizens also stated that farmers should be compensated for the loss of development rights if development is prohibited from the rural area (Wicomico County b, 2008). In addition, citizens stated that the County Comprehensive Plan does not and should not have jurisdiction over the incorporated town plans created (Wicomico County b, 2008).
2. Acres of natural and agricultural land preserved – The goal for less development outside of the Metro Core also includes a provision for preservation of natural and agricultural areas (Wicomico County a, 2008).

3. Population growth – The Comprehensive Plan states that Wicomico County will strive to maintain moderate population growth (Wicomico County a, 2008).

4. Tourism – The Comprehensive Plan states that Wicomico County should be promoted as a base for visitors to the Lower Eastern Shore of Maryland (Wicomico County a, 2008).

5. Quality of Life – The Comprehensive Plan states that it wants citizens to be better aware that land is a finite resource and that conservation of land will help preserve the existing quality of life (Wicomico County a, 2008). However, 40% of survey responses indicated that increased growth decreased their quality of life (Wicomico County b, 2008).

6. Economic development - The Comprehensive Plan states that it wants citizens to be better aware that land is a finite resource and that conservation of land will help preserve the economic health of the County (Wicomico County a, 2008).

7. Acres of active farmland – The Comprehensive Plan states that the County wants to promote and retain farms by protecting agricultural land while allowing farmers to retain value of land (Wicomico County a, 2008). An additional 17 percent of survey respondents stated that they want to promote the agriculture industry (Wicomico County b, 2008).

8. Number of agricultural-based employers – The Comprehensive Plan states that the County wants to connect agriculture to the economy by making it a viable industry (Wicomico County a, 2008).

9. Conservation Easements – Wicomico County wants protect valuable natural and agricultural land from development, as stated in their Comprehensive Plan (Wicomico County a, 2008).

10. Affordable Housing – The Comprehensive Plan states that it wants to retain neighborhoods and develop new standards for development for all income levels (Wicomico County a, 2008).

11. Open Space – The County wants to support accessible public open spaces, as stated in their Comprehensive Plan (Wicomico County a, 2008).

12. Heritage Sites – The Comprehensive Plan states that the County wants to preserve its historical and heritage sites (Wicomico County a, 2008).

While the majority of these indicators seem to coordinate between the County’s Comprehensive Plan and citizen comments, the biggest issue in Wicomico County is the value of rural land and whether it should be developed or preserved. The farmers look at their land as a retirement plan, and their retirement is locked into the value of their land. If the zoning of their land does not allow for development, then the value of the land decreases, reducing their wealth. Conversely, many people who have moved into the area do not want a large amount of development in the rural areas as a way to retain the agricultural way of life present. Supporting these claims are environmentalists who say that continued development would increase stormwater and further pollute the waters of the Nanticoke and Wicomico Rivers, and ultimately the Chesapeake Bay.

This conflict is a major conflict in most rural communities, as farmers want to protect their land values, while other residents want to protect their quality of life. Which scenario is socially sustainable and which scenario is not? Currently, there is no research complete as to how to resolve conflicts of such nature in social sustainability, leaving a significant missing link in the literature.
Another issue is the authority on social sustainability between local and regional entities. Should the rural development issue be dealt with at the local community level, based upon community values, or should it be handled at the county level by overall county opinion? This is the major missing link between social sustainability and regional sustainability assessment. While there are issues in data scales, those issues can be remedied by GIS, however, who has the authority to define the social goals of a region? It could very well be that at a regional level, a certain amount of rural development is seen as sustainable, however, at the local level, rural development could substantially alter the existing citizen’s way of life.

5 Recommendations and Discussion

The difficulties in social sustainability assessment at the local and regional level, much less disagreement on social goals, lend itself to poor quantitative research. How can science model social sustainability, especially when the majority of indicators mentioned for community sustainability are qualitative in nature? The answer is plainly that qualitative research works more comprehensively in cases of social sustainability, relying on surveys and questionnaires instead of models. Using a GIS to display qualitative data avoids the potential conflict of how to compare qualitative data as it can show similar attitudes and values spatially based on the specific region in question. The GIS may also be the tool used to display different community indicators to reveal larger regional similarities or differences that need to be addressed.

Therefore, this paper recommends a fully qualitative approach to social sustainability indicator research, while including a vast public involvement campaign at the community level. Using Mascarenhas, et al. (2010) as a framework, this assessment method starts with public involvement at the beginning, allowing the citizens of a community to establish their own sustainability goals, objectives and targets. If there are common goals, objectives and targets for different communities in a region, those communities may decide to work together and pool resources for choosing and monitoring indicators, as qualitative data collection and monitoring is labor intensive. Once the goals are established, stakeholders then work on selecting and developing their indicators. Primary indicators are then established and reviewed for applicability and feasibility in monitoring. Once these primary indicators are established, through a series of interviews and/or questionnaire surveys, stakeholders will decide upon the final local indicators for their community. These indicators can then be included in regional sustainability studies for vertical integration. The key to the success of this method is a constant feedback loop from the finalized indicators to all other steps in the process, as in order to be truly sustainable, indicators and assessment need to be flexible with the coming generations.

While the previous discussion has been intentionally left vague to account for the differences in planning at different localities, a new GIS tool has been developed that will allow for a fully integrative deliberation using public input during all levels of planning described above. The GeoDeliberative Annotation Technology (GeoDAT), developed by Guoray Cai and Bo Yu of Pennslyvania State University, combines the mapping and analysis capabilities of a standard GIS with annotation tools to allow for a map-based public participation forum (2009). This tool allows users to sign up and make comments attached to other comments or certain spatial aspects in the map projection (Cai and Yu, 2009). Users can make their comments public or private, giving them a level of comfort
In using the software and expressing their opinions, stories, and associated ideas (Cai and Yu, 2009).

In the case of the proposed framework described above, GeoDAT can be employed to gather goals, objectives and targets community members suggest, attributable to said community. If one particular goal is to preserve a particular natural resource, the annotation detailing the need for preservation can be directly linked to that natural resource shown on the map. That being said, time can be given to community members to use GeoDAT and voice their opinions, while at the same time collaborating with others in a non-threatening environment. This may allow for additional comments or ideas to spread, forming the goals, objectives and targets for the community, along with a map representing where each is located. If regional collaboration is recommended, then each community will still be able to maintain their individuality in goals by using the spatially explicit annotation system.

In turn, this program can also be used to gain input on different indicators to use for measuring sustainability in a community or region. Members can log on to their GeoDAT system and comment when it is convenient for them and also read other public comments to inform them further. The system will have a complete set of comments, as well as background materials to help educate the user on the issue at hand and offer other alternatives for issue management. Additionally, having the mapping component accessible to the community will also allow for targeted sustainability discussions and the inclusion of spatially-explicit qualitative data.

This recommendation is still in the conceptual stages and this paper does not seek to fully articulate the new assessment method, but only to offer support for a new qualitative method that includes stakeholder involvement to capture the true social sustainability of a community or region. Future research should focus on streamlining this methodology for use in a study of a community or region. It is anticipated that future work will continue to find new indicators for use as well as further articulate the definition of social sustainability.

6 Conclusions

Social sustainability remains elusive in concept because social equity and justice mean different things to every researcher and stakeholder. Care should be taken when defining the term for a community, as the researcher may not fully realize the attitudes and values of the study area. There lies a gap in knowledge concerning how to determine what is true social sustainability when citizens, communities, or even regions have conflicting opinions. Assessment methods for regional social sustainability also suffer from a gap in knowledge on how to spatially reconcile community versus regional indicators and how to assess qualitative data for sustainability science purposes. GIS can be an invaluable tool to remedy the spatial boundary conflict, but differences in the spatial scale and concepts are much more involved.

This paper took an existing assessment methodology and recommended that most indicators be qualitative in nature, in order to capture the community’s values. Providing for citizen participation at the beginning of the sustainability process through a GeoDAT program allows the citizens to be fully vested in their sustainability plan, reducing perceived social equity issues and ensuring full participation in environmental and economic sustainability in the long term.
References


Wealth creation in a sustainable world – from conceptual idea to operational reality: a framework to manage firm’s intangibles

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Structured Abstract

Purpose – The purpose of this paper is to present the preliminary empirical results of an investigation how firms in the Australian property sector currently manage their intangibles. It is part of a larger research program aimed at the development of a framework to improve the business case sustainability.

Design/methodology/approach – A review of the literature creates the conceptual bridge between sustainable development, intellectual capital and knowledge-based development. Definitions for intangibles are suggested in light of the literature and form the basis of the data collection and analysis. Data was collected to gather a picture of how and why firms in the Australian property sector are currently managing their intangibles through a web-based questionnaire and a series of semi-structured interviews.

Originality/value – The Australian property sector was targeted as a noteworthy case study in order to test the suitability of the concept as there has been little systematic empirical investigation on the intangibles of firms in the property sector, both in Australia and internationally. Previous empirical studies have typically been on sectors where the market value of the company well exceeds the book value, which is not the case in the Australian property sector. The property sector is also facing growing demands for transparency in environmental and corporate social responsibility reporting requiring firms to now more than ever to identify, assess, and report on their intellectual capital.

Practical implications – The research contributes to the sustainable business literature by proposing a better appreciation of how firms currently address the management of their intangibles is required to improve the business case for sustainability.

Keywords – sustainable development, property sector, intangibles, intellectual capital

Paper type – Academic Research Paper

1 Introduction

The research concept outlined in this paper stems from the need to help business understand and operationalise sustainable development. The Bruntland commission coined the term ‘sustainable development’ and defined it as the “ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs (World
Commission on Environment and Development (WCED) 1987: 8).” Today the goal of sustainable development and the accompanying sustainability discourse has become enshrined globally in government policy, business agendas and institutions (Dryzek 1997; Hajer 1995). Kates et al. (2005: 20) state that there is “near-universal agreement that sustainability is a worthwhile value and goal” and Dyllick & Hockerts’ (2002: 130) contend that sustainable development has become “the mantra for the 21st century.” However conflict often arises when businesses try to reconcile a belief that sustainable development is a worthwhile goal and how to actually go about it.

The ‘business case for sustainability’ is commonly used as a means to justify the voluntary uptake of sustainability in business (Holliday et al. 2002; Kemp 2001; Wasiluk & Horne 2009; Willard 2002). In the mid 1980s the academic literature shifted the focus from pollution control to the notions of eco-efficiency, ‘win-win’ solutions and competitive advantage gained through environmental performance (Porter & van der Linde 1995). This theoretical position is often criticised for its focus on the ‘low-hanging fruit’ and easy win solutions which mask the more significant and capital intensive issues businesses need to address (Walley & Whitehead 1994). Ecological modernisation (EM) as a theoretical concept also emerged, primarily in European countries, in the 1980s and similarly sought to re-frame the win-lose view of environmental protection to one which is win-win (Hajer 1995; Huber 1982; Mol 1995; Weale 1992). Though there are numerous interpretations of EM, it is generally agreed that the ‘first world corporatist’ view is the predominant view (Everett & Neu 2000; Mol 1995). This view promotes the ideology that business as usual, just done more eco-efficiently, is capable of providing solutions environmental problems (Tilley & Young 2009). According to Revell (2007: 124), EM has “become a discursive strategy whereby policymakers can appear to be delivering on environmental goals without seriously challenging existing economic practices or development trajectories.” Selling the ‘win-win’ rhetoric and convincing stakeholders is often difficult beyond that of the low hanging fruit, as the financial benefits becomes less apparent (Revell & Blackburn 2007: 412). Additionally the predominant EM worldview does not address the many other sustainability criteria, such as social dimensions of unequal and exploitive social relations (Dyllick & Hockerts 2002; Everett & Neu 2000; Young & Tilley 2006). Everett and Neu (2000: 24) argue that environmental accounting scholars need to better address the “reality and likelihood of win-win solutions”, however I disagree.

My proposition is that the problem lies not with our ability to prove the win-win business case, but rather in our efforts to make sustainable development values and goals ‘fit’ within existing frameworks and tools developed for the industrial era.

1.1 The knowledge economy

Sustainable development is not happening in isolation and there is a general acceptance in the knowledge management and knowledge-based development literature that the nature of the economy and drivers of value in business are shifting from the industrial era to the knowledge era.

The emergence and growth in the late 1980s early 1990s of what has been termed the ‘knowledge-based economy’ (Carroll & Tansey 2000; Sullivan & Sullivan 2000); the ‘service-based economy’ (Cordazzo 2005 442); and the transition from ‘old’ to ‘new economies’ (Bose & Thomas 2007: 653; Petty & Guthrie 2000), spurred a growing interest from academia, business and government to “identify new methodologies to
determine a company’s value and to understand the features of value creation (Pedrini 2007: 346).” In fact “the major novel characteristic of the knowledge economy” is the need for organisations to manage their intangible assets (Yigitcanlar 2010).

There is a very evident overlap between these two disciplines (sustainable business and knowledge-based development) in that they both highlight the need for firms to identify, assess, manage and report on their intangibles and understand how to create and exploit their value in order to be successful in a post-industrial era economy.

2 What are the intangibles of an organisation?

If the management of intangibles is crucial for business success in the knowledge-era and the era of sustainable development, a crucial question to be answered then is what are the intangibles of business organisations?

Intangibles are said to have always been present in business organisations even before the rise of the knowledge-based economy (Serenko & Bontis 2004). It was after the work of Karl-Erik Sveiby in Northern Europe and Scandinavia (Sveiby & Risling 1986) and a 1991 article by Tom Stewart in Fortune magazine that new approaches to explain, measure and manage these hidden assets gained (see for example Allee 2008; Bontis et al. 1999; Edvinsson & Malone 1997; Housel & Kanavsky 1995; Kaplan & Norton 1996; Lev 1997; Stewart 1997; Sveiby 1997). At around the same time the development of the resource-based view (RBV) of firm in strategic management studies highlighted that a company’s success was based upon more than access to material resources (Cordazzo 2005; Pedrini 2007).

Empirical studies have found that increasingly the “main assets of companies are held in intangible form rather than in physical capital (Bose & Thomas 2007: 653)”, often at a ratio of 5:1 (Lev 1997, 2005). At the macro-economic scale intangible capital is claimed to account for approximately 80% of a developed nation’s wealth (Hamilton et al. 2005).

Similar to the terms sustainability and sustainable development, the term ‘intangible’ has been defined and interpreted in many ways in the literature (see Kristandl & Bontis 2007). Often terms such as intellectual capital, knowledge assets and goodwill are used interchangeably with the terms intangibles and intangible assets (Kujansivu 2008), however, there are differences in all of these terms definitions (for a detailed overview see Petty & Guthrie 2000: 157). Many researchers do agree however that a company’s intangibles are the key drivers of competitive advantage and long-term business success (Bontis 2001; Bose & Thomas 2007).

For the purpose of this research – a firm’s intangibles have been defined based upon the literature on intangibles/intellectual capital (IC). A review of the intangibles/IC literature makes it clear that there is no one correct or universally accepted definition for IC (Brennan & Connell 2000; Petty & Guthrie 2000) and the discipline. Choong (2008) concluded that a classification approach rather than a definition approach is the best way forward. Kristandl and Bontis (2007) agree that in the absence of an agreed upon definition, many researchers rely upon categories of intellectual capital to describe it but they disagree with Choong that this is the best way forward. They argue that researchers are missing the point and that by doing this it is like “asking ’what is a car?’ and giving the answer ’sedans, convertibles, off-roaders, limousines and vans (Kristandl & Bontis 2007: 1511).’” While this limitation exists within the IC literature, a categorisation approach was deemed at the best available practice available for the purpose of this research.
Tan et al (2008) provides an in-depth review of the most popular classification systems, however, it is the categories of human, relational and structural capital that are said to be the most influential and widely applied (Kaufmann & Schneider 2004; Meritum 2001). These categories of intellectual capital formed the basis of the empirical data collection discussed in detail later in this paper.

2.1 Intangibles and sustainable development

At present, there is limited evidence of the IC/intangibles literature engaging with the sustainable business literature. A few authors have investigated the similarities in sustainability and corporate social responsibility disclosure and indicators (for example Cordazzo 2005; Guthrie et al. 2004; Möller & Schaltegger 2005). Lopez-Gamero et al (2009: 4) also identified this gap in the intangibles/IC literature and proposed the concept of ‘sustainable intellectual capital’ defining it as the “sum of all knowledge that an organisation is able to leverage in the process of conducting environmental management to gain competitive advantage.” Their empirical work resulted in strategies firms can undertake to incorporate environmental management into its general management practices by incorporating sustainability across the three categories of IC – i.e. human, structural and relational. Environmental management, they argue, is generally only address in terms of a company’s relational capital (i.e. through brand management, corporate identity, relations with customers.) However, their concept of ‘sustainable intellectual capital’ fails to address whether the three existing intangibles/IC categories adequately cover all the issues companies need to manage in order to achieve sustainable development goals.

Allee (2000) was one of the first scholars in the IC field to argue for an expanded categorisation of intangibles which includes integrate sustainable development driven indicators of wealth and value. The current IC taxonomy she argues is still rooted in industrial-age thinking and similar to the ecological modernisation concept, simply stretches old thinking a bit further rather than challenging mindsets and questioning underlying assumptions of the existing boundaries of business. Allee argues that the existing intangibles/IC categories does not recognise intangible value exchanges beyond those that companies have direct revenue exchange with. To address this she proposes that the categories of intangibles/IC should include:

- Business relationships;
- Internal structures;
- Human competence;
- Social citizenship;
- Environmental health; and
- Corporate Identity.

Allee’s critique of the most widely applied IC categorisation make is similar to those who criticise the “win-win” business case for sustainability. It is the unconscious carrying over of industrial age concepts about a business entity and its boundaries in these frameworks which limit the ability of the business world to grasp and capitalise upon the intangible assets created beyond their traditional business boundaries when taking a sustainable approach.
3 Knowledge-based development, sustainable development and intellectual capital – the conceptual link

The shift from the 20th century industrial era to the 21st century knowledge era is well established in the knowledge-based development literature. In the industrial era “companies valued margins, investment and asset productivity for comparative advantage” but 21st-century organisations “must focus on intangible elements”, and their ability to create and exploit them, as an indicator of their success (Yigitcanlar 2010). Sustainable development has also become the mantra of 21st century business (Dyllick & Hockerts 2002). Intangibles/IC researchers have long been investigated ways to define, measure, manage and present the importance of these intangible aspects of a business.

So the aim to value previously undervalued things, the requirement for successful business to effectively manage their intangibles, and growth in the stocks of intangible assets are three key conceptual links between the sustainable business, knowledge-based development and intellectual capital literature.

The aim of the empirical study presented in this paper was to understand why and how companies in one industry sector are currently managing their intangibles. This research is part of a larger research project which aims to develop a guidance tool for the intangible aspects of the business case for sustainability. However, it was deemed necessary as part of the research design to start by painting of picture of the current state of play by addressing the following questions: What are they? How and why are they currently managed? And what opportunities exist to improve intangibles management?

4 Methodology

Data was collected to gather a picture of how and why firms in the Australian property sector are currently managing their intangibles through a web-based questionnaire and a series of semi-structured interviews.

The Australian property sector is an interesting case study sector as a recent Australian review of the intangible assets of ASX listed companies found that the value of property firms’ tangible assets actually exceeds the market value (Brand Finance 2008) which contradicts the common rationale for pursuing the study of firms’ intangibles (i.e. that the reverse true and hence an explanation for the unaccounted value is needed). Additionally while many previous studies exist on the identification and management of intangibles, none could be found in the literature which have analysed the situation in the property sector. This sector is also responding to growing demands for transparency in environmental and corporate social responsibility reporting and performance (Newell 2008), requiring firms to now more than ever to identify, assess, manage and communicate about their intangibles.

4.1 Sample

According to the Property Council of Australia (PCA 2009a), the primary property industry body in Australia, the property sector includes firms that develop, own, manage and construct buildings (see Figure 1). Unique to Australia is the large size of its Real Estate Investment Trust (REIT) in the Australian stock market. Overall the Australian stock to market accounts for only 1.5% of the global stock market (1.5%), but accounts for approximately 8% of global real estate investment (De Valence 2004). As such funds management firms are included in the list of stakeholders in the property sector.
Additionally many of the larger firms operate across all five spheres presented in Figure 1 as well (PCA 2009a).

Figure 1. The Australian property universe (PCA 2009a: 6)

The data collection from property firms was limited to firms in the Australian property sector who are involved in non-residential property, primarily those involved in privately owned commercial property (i.e. offices, shops, hotels and industrial buildings) including building owners, developers, fund managers, contractors and managers. Due to the nature of the Australian property sector many firms operate across these multiple roles as well as in other property types (i.e. residential). However, the main sampling criteria were those involved in commercial property and undertake at least one of the functions presented in Figure 1.

There are 22 million square metres of commercial office accommodation in Australia (PCA 2009b) and most of it is controlled by institutional investors operating listed (i.e. quoted on the Australian Securities Exchange) and unlisted property trusts (Roussac 2009). For example, the City of Sydney estimates that 60 percent of office accommodation in its jurisdiction is controlled by only twelve separate entities (Barone 2009). This characteristic of concentrated ownership presents an opportunity to access a representative sample of firms from within just a few firms (Roussac 2009).

4.2 Questionnaire

The aim of the questionnaire was to provide qualitative information about property sector firms, to test the relevance of the traditional IC taxonomy, and gain a better understanding of the current practices and motivations for managing their IC. The content of questionnaire was informed by the intangibles/IC literature, primarily (Beattie & Thomson 2007; Gallego & Rodriguez 2005; Huang et al. 2007; Marr 2008; Meritum 2001). The questions were structured around the 3 traditional categories of intangibles/IC – human, structural and relational capital. Limited factual information was collected from respondents including their job function, industry group and company size and whether they are listed on the Australian Stock Exchange (ASX).

A small pilot survey completed by six people, including 3 PhD students of various discipline backgrounds, 2 senior sustainable business lecturers and an industry-based sustainability manager. Based on the feedback received revisions were made to simplify its structure and make the language ‘less academic.’ A second pilot was completed by the same sustainability manager and a business consultant in a large financial firm.

A random sample of 65 commercial property sector firms listed in the Property Council of Australia membership database was selected for distribution of the online
A recruitment email was sent to approximately 1-2 individuals at each organisation, in most instances the CEO, managing director or sustainability manager. These organisational roles were identified in the literature as being the most appropriate people to be able to respond to questions about a business organisation’s intangibles. A summary of the respondents’ job roles is reflected in Figure. The researcher’s contact details were provided should any questions or issues have arisen. A reminder email was sent to participants 1 week prior to the closing date of the questionnaire. Shortly before the closing date of the questionnaire additional advertising was sent through the Property Council of Australia’s “Your Building” website (which is aimed at those involved in the commercial property sector), in an effort to improve the response rate. This resulted in one additional questionnaire being completed. 32 responses were received in total; however, 11 were incomplete and had to be excluded from the results. The structure of the questionnaire can be summarised as follows:

- Identification as a knowledge-based sector. On the surface, the financial balance sheets of property sector firms might indicate that the sector is still based in the material resource era of the industrial economy, as they don’t follow the trend of other sectors with higher market to book value ratios. The opinion of the participants was investigated to determine to what extent they considered their firms to be rooted in the industrial economy (i.e. material resource based) or the knowledge-based economy. Respondents were asked whether they considered their firm to be a collection of knowledge resources, material resources or combination of both, similar to the study by Gallego and Rodriguez (2005).

- The most important intangibles of firms in the property sector. A diagram depicting the three categories of intangibles/IC (human, structural and relational) along with a definition of each, based upon the literature (Marr 2008; Meritum 2001) was shown to respondents. Then were then asked which rate the importance of each category of intangible to their firm, on a scale of 1-5, with 1 being not at all important and 5 being extremely important.

- Classification of intangibles/IC. Respondents were asked if they there were any categories of intangibles missing from the three described (human, structural and relational) and whether their firm had a specific categorisation or classification system for its intangibles/IC.

- Measuring and Reporting. Respondents were asked about how their organisation disclosed in formation about its intangibles/IC and whether the current financial statements of their companies sufficiently report their intangibles/IC. While the aim of the questionnaire was not to develop a list of indicators relevant to the property sector, as this is better suited to a content analysis, the intention was that the results of this question would provide the a sampling structure for a content analysis to be conducted in a future phase of this research. Respondents were then presented with a list of indicators under each of the categories of intangibles/IC, developed based upon a number of key empirical studies of intangibles/IC indicators (Beattie & Thomson 2007; Huang, Luther & Tayles 2007; Marr 2008), and asked whether the indicator was a. relevant to their organisation and b. how much data they currently collected on it, based on a scale of 1-5, with 1 being not at all and 5 being comprehensive.
Interviews

Fourteen semi-structured interviews were conducted with senior management at nine companies. Initially seven firms were identified as sustainability leaders and invitations to participate were sent via email to sustainability managers of these firms. Four of the seven firms agreed to take part. Firms identified as sustainability leaders were sought out first as they were more likely, according to the literature outlined previously, to be familiar with their organisation’s intangibles. Two of the other companies agreed to take part upon completion of the questionnaire and the three remaining companies were as a result of snowball sampling.

The interviews generally took place at the respondent’s place of business or a nearby cafe and lasted approximately 1 – 1 ½ hours each. Each interview was transcribed and a copy of the transcript sent to the interviewees to check for accuracy, as well as often the opportunity to review and revise any answers provided during the interview, as a way to address any issue of interviewer bias (Gray 2009)

The general structure of the interview questions was similar to the questionnaire; however, participants were not prompted with lists of possible responses as in the questionnaire. The interviews were used primarily to enrich the data collected in the questionnaire and ask questions not suited to a questionnaire. Interviewees were asked to indentify what they thought the intangibles of their firms are, which are most important, how and why they assess them and how they report the information. Interviewees were also asked to discuss the main challenges their firms are facing when it comes to managing their intangibles.

Results/analysis

5.1 Identification as a knowledge-based sector

71.4% of the questionnaire respondents identified their firms as being a collection of knowledge resources (people, processes and networks) while the remainder indicated
their firms were a collection of both material (plant, equip, money) and knowledge resources. The participants responses indicate that the Australian property sector like most other industrialised Western nations is following a trend towards being a knowledge-based sector (Carassus 2004). This is due in part to the fact that in developed countries property and construction industries are no longer “focused on large-scale production but on the services provided by the built environment (Carassus 2004: 6).” In Australia, for example, the amount of new commercial buildings each year is estimated to be between 1% to 2-3% of the total building stock (Wilkinson & Reed 2008) with the majority of building work completed in Australian office market being refurbishment and management of existing building stock.

While interviews respondents were not specifically asked this question without prompting many indicated during our conversation that they viewed their organisations as essentially collections of people, knowledge, systems and relationships. Interview respondents all indicated that it was particularly their intangible resources that are the key source of their competitive advantage, which is also characteristic of firms in the knowledge-based era.

“...in an organisation like ours, particularly in the management service we provide, we don't produce, were not an industry that produces phones or widgets. We provide management services, so we manage this overall process and the outcome is the building...so that is why how we use our people, our IT tools and technologies that is how we stay ahead of the pack really.”
(Interviewee at a Property development firm)

5.2 The most important intangibles of firms in the property sector

Human capital was identified as the most important category of intangibles/IC to the success of firms in the property sector, followed closely by relational capital (see Figure 2). Interview respondents all generally tended to also indicate that it is their people and knowledge (human capital) and their reputation and brands (relational capital) which is most important. One interview respondent went so far as to indicate that the most important intangibles were not their own, but rather those of their customers.

“we are in some ways the 'protector' of our tenant's intangibles - the defender of their intangibles. Now why do they ah...all our buildings are premium grade buildings. Our tenants pay a significant premium to be in those buildings, so it's about the address, it's about the size of the building, it's about the naming rights on the top of the building, it's about being on that tenant board in the front with like businesses. So it is part of their reputation and for many of the service businesses that occupy our offices, i.e. banks, financial companies, financial service companies, a significant portion of their value is in the intangibles, so we're playing a part in defending that value.”
(Building manager, property development firm)
5.3 Classification of intangibles

When asked in questionnaire whether any categories of intangibles relevant to their firm were not included in the taxonomy presented, 90% agreed the existing taxonomy was adequate and only 2 respondents suggested categories they would add. These included:

- Equity / Ability to source funds (respondent 1)
- Qualifications, quality of the investment in my IP, my career experience, the application of my career experience (respondent 2)

Respondent 1’s answer was a sentiment reflected by the interview participants, however, not so much as another category of intangible, but rather as an indicator of that they were successfully managing their intangibles. Respondent 2’s suggested could be said to be indicators of human capital, or how the way in which human capital is operationalised.

In the interviews, the sustainability managers included environmental and social sustainability categories in their list of their company’s intangibles/IC.

"I guess that when I talk about intangibles or nonfinancial indicators are issues that companies consider and we look at it from the [our company’s] perspective we’re looking at really important things like community engagement, stakeholder engagement and how we measure the success or otherwise in those areas. Employee engagement is a really big one for us and that can wrap up a whole variety of indicators in employee engagement. It can mean satisfaction, or turnover or retention or absenteeism. Corporate governance is a really big one for us. I think for all companies but I think also for [our company]. And of course the environmental intangibles for us, we are very much measuring and we are very much managing our carbon emissions, water and waste. (Sustainability Manager, Property development firm)

However, when the responses received from sustainability managers were isolated in the questionnaire results, none responded that social or environmental categories were missing from the three categories of human, structural and relational. This could simple
be a limitation of the questionnaire as a method and people’s reluctance to elaborate on or provide short answers.

How firms indentify or categorise their intangibles/IC is generally different to the intangibles/IC literature. It does not follow the formal categories outlined in the literature on IC and some respondents referred to their firm’s values statement or drivers of value, developed at the corporate level of the organisation, as the taxonomy for their intangibles, while most others indicated there was no formal, overarching indentification or classification of their organisations intangibles. None of the interviewees were familiar with the taxonomy from the literature, however, when presented with the diagram and definitions used in the questionnaire, most interviewees found it a relatively useful depiction to conceptualise and discuss their firm’s intangibles.

I would certainly concur with the intellectual capital of the elements which are shown here - the human, structural, and relational capital. I can certainly relate to those aspects and it is interesting to see put down effectively like it is - in the model and on paper. Because you come into a business and you get on with what you do day-to-day without necessarily taking the time to sit back and try recognize where these elements it. And it is interesting from my perspective to certainly see that. Part of the reason I was interested in responding to your questionnaire was, I was interested to see someone trying to identify these aspects that aren’t identified in the business and we don’t openly in an organization I believe as a management group sit back and try and structure it and openly identify these sorts of issues. You talk about a lot of things, you make a lot of decisions, you allocate staff, you allocate risk, you try to cover problems and often it’s in a bit of an ad hoc way. But then when you sit back over a period of time and look at how you’ve...what you’ve been exposed to, how you’ve treated issues and problems these all come into play (pointing at diagram) there is no doubt about that. (Commercial manager, Construction company)

5.4 Measuring and reporting

71% of questionnaire respondents indicated that there firms collect data on their intangibles/IC. All of the questionnaire respondents, except for 1 who was unsure, indicated that their firm’s traditional financial reports do not sufficiently report their intangibles/IC performance and 73% indicated that other mechanisms are used, including the company website, marketing material and the CSR or sustainability report. When asked in the interviews, no firms had ever heard of nor completed an intellectual capital report, and the sustainability or CSR report was the most frequently identified reporting avenue, particularly by the sustainability leaders.

Questionnaire respondents were provided with a list of approximately 9 indicators based upon the intangibles/IC literature, and were asked to indicate whether or not they were relevant to their firm. The results are summarised in Table 1. Human Capital Indicators, Table 2. Structural capital indicators and Table 3. Relational capital indicators.
Table 1. Human capital indicators

<table>
<thead>
<tr>
<th>HUMAN CAPITAL</th>
<th>% agreed indicator relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Satisfaction</td>
<td>90.5%</td>
</tr>
<tr>
<td>Employee Development</td>
<td>90.5%</td>
</tr>
<tr>
<td>Employee Experience/Education/Vocational qualification</td>
<td>85.7%</td>
</tr>
<tr>
<td>Staff Productivity</td>
<td>57.1%</td>
</tr>
<tr>
<td>Recruitment</td>
<td>71.4%</td>
</tr>
<tr>
<td>Staff Turnover</td>
<td>85.7%</td>
</tr>
<tr>
<td>Leadership Qualities of Managers</td>
<td>85.7%</td>
</tr>
<tr>
<td>Employee work relate competencies</td>
<td>76.2%</td>
</tr>
<tr>
<td>Employee work relate knowledge</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

Table 2. Structural Capital Indicators

<table>
<thead>
<tr>
<th>STRUCTURAL CAPITAL</th>
<th>% agreed indicator relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational culture</td>
<td>95.2%</td>
</tr>
<tr>
<td>Corporate values</td>
<td>90.4%</td>
</tr>
<tr>
<td>Management philosophy</td>
<td>66.7%</td>
</tr>
<tr>
<td>Intellectual Property</td>
<td>61.9%</td>
</tr>
<tr>
<td>IT systems</td>
<td>76.2%</td>
</tr>
<tr>
<td>Processes and Routines</td>
<td>85.7%</td>
</tr>
<tr>
<td>Networking systems with customers, suppliers, databases, etc</td>
<td>81.0%</td>
</tr>
<tr>
<td>Internal communication system</td>
<td>71.4%</td>
</tr>
<tr>
<td>Effectiveness of Expenditure on R&amp;D</td>
<td>38.1%</td>
</tr>
</tbody>
</table>

Table 3. Relational capital indicators

<table>
<thead>
<tr>
<th>RELATIONAL CAPITAL</th>
<th>% agreed indicator relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market demands for Product/Service</td>
<td>76.2%</td>
</tr>
<tr>
<td>Community Relations</td>
<td>61.9%</td>
</tr>
<tr>
<td>Corporate Reputation</td>
<td>95.2%</td>
</tr>
<tr>
<td>Customer Relationships</td>
<td>85.7%</td>
</tr>
<tr>
<td>Environmental Activities</td>
<td>85.7%</td>
</tr>
<tr>
<td>Ethical Matters</td>
<td>61.9%</td>
</tr>
<tr>
<td>External communications</td>
<td>81.0%</td>
</tr>
<tr>
<td>Business</td>
<td>81.0%</td>
</tr>
<tr>
<td>Alliances/Partnerships/Collaborations</td>
<td></td>
</tr>
<tr>
<td>Suppliers Relationships</td>
<td>90.4%</td>
</tr>
</tbody>
</table>

6 Discussion/conclusion

This paper presents the preliminary research results for an empirical study of the intangibles/IC of firms in the Australian commercial building sector. The work is part of a larger research program aimed at investigating how firms can better manage their intangibles to as a way to improve the business case sustainability.

Firms in the property sector clearly identify themselves with the characteristics of firms in the knowledge-based era. Although property companies are currently managing
their intangibles/IC in many cases they struggle to clearly articulate what their intangibles/IC is and how they create value for the organisation. Currently IC management is primarily about risk management, although the sustainability leaders are beginning to try and grappling with issues of intangibles/IC management and value creation which extend beyond the traditional industrial age view of organisations.

When it comes to improving the business case for sustainability, the intangibles which are most often presented in the literature are improving your brand and reputation, and particularly in the case of the property sector, improving staff productivity (GBCA 2006, 2008; Kats 2003). The results of the questionnaire clearly indicate that staff productivity is clearly one of the least relevant indicators of human capital to property sector organisations. Social citizenship, environmental performance and human capital are key areas that were indicated in the interviewees with sustainability leaders, as important intangibles/IC to focus on in a sustainable knowledge-era. To overcome some of the current barriers to organisations developing a business case for sustainability, we have to move beyond clutching at the productivity argument to try and prove the business case. The intangibles/IC framework which is already well established in the academic literature provides a useful starting point to help the industry more systematically indentify and manage their intangibles/IC, however, as pointed out earlier the current taxonomies do little to incorporate environmental and social performance.

Similar to the literature on intangibles/IC practitioners are also struggling with capturing and measuring intangible value. Many feel a constant pressure to ‘monetarise’ or put numbers to intangibles to give them more impact and acceptance as ‘real’ and valuable – so it can be said that value creation of intangibles/IC is poorly understood.

6.1 Next steps

The next stage of this research will see the development of a framework which will be tested in a series of in-depth case studies of individual firms in the Australian property sector. The purpose of the case studies is to better understand the role of intangibles in value creation and capture as it is currently poorly understood. Additionally a content analysis of property company websites and sustainability/CSR reports will be undertaken in order to develop a list of indicators relevant to the property sector.

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Climate change mitigation and adaptation at local
governments in NSW

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Abstract

Climate Change is probably the most important and the most urgent issue faced at all levels of governance in the 21st century. Climate Change is occurring through the build up of greenhouse gases in the atmosphere on a global scale; however its impacts are often felt locally in vulnerable, low lying and densely populated regions. In Sydney NSW, a significant proportion of the population resides in coastal locations, with impacts of climate change literally on their doorstep. Inland councils are also at risk due to rising temperatures and increasing intensity and frequency of natural weather events.

Analysing key documents, policies, and environmental planning instruments, this research examines responses and the strategic directions of local councils in the Sydney Metropolitan region, in regards to climate change. Mitigation and Adaptation action are essential to combating the present and future impacts, and thus are the key to managing climate change. One such example of a mitigative response is through the Cities for Climate Protection (CCP) program. This research in particular looks at the action on climate change mitigation and adaptation at local level through the prism of CCP which seems to have wide traction with local councils in NSW.

In this research, case studies of two coastal and two non-coastal councils provide insights into the development of climate change responses. Analysing their responses helps determine the usefulness of various policies, instruments and programs. Analysis and comparison of the case studies has revealed a number of interesting findings along the themes of state government (of New South Wales) and local councils (in NSW) interactions and the understanding, desire, capabilities and action of (small) councils in addressing this huge challenge.

Keywords – climate change; local government; mitigation; adaptation; Cities for Climate Protection (CCP)

Paper type – Practical Paper

Cities for Climate Protection (CCP)

A significant proportion of Sydney’s population resides in coastal locations, the impact of climate change literally on their doorsteps. Inland residents are at risk from rising temperatures and increasing intensity and frequency of weather events. Mitigation and adaptation are key to managing climate change. This comparative study of two coastal and two non-coastal local councils in the Sydney region with regard to their strategic responses to climate change reveals that mitigation activity is in place, but that large-scale adaptation is limited.
One example of a mitigative response is the Cities for Climate Protection program. The International Council for Local Environmental Initiatives (ICLEI) set up Cities for Climate Protection (CCP) in 1993 (ICLEI, 1993; UN, 2006). ICLEI is an association of local governments and local government organisations with common sustainable development goals. Its mission, according to its charter (ICLEI 2006) is to ‘build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability with special focus on environmental conditions through cumulative local actions.’

ICLEI has become an internationally recognised organisation comprising councils from over 900 cities, towns, counties and their associations (ICLEI, 2008c). Originally, the CCP program was coordinated through ICLEI headquarters in Toronto, but delivery of the program has since been decentralised. By 2002, national campaigns had been established in Australia, Canada, India, the Philippines, the US and the UK.

Significant goals of the CCP program as stated in ‘An International Campaign to Reduce Urban Emissions of Greenhouse Gases’ (1993) include:

- Strengthening of local commitments to reduce urban emissions of greenhouse gases;
- Dissemination of planning and management tools to facilitate the development of cost effective CO2 reduction policies;
- Research and development of best practices and development of local model projects for reducing energy use in buildings and transport; and
- Enhancing national and international ties so that municipal level actions to reduce emissions are included in national action plans and future international deliberations.

ICLEI provides projects, program support, technical and policy support, workshops and training resources, opportunities for networking and information exchange, and recognition events. One of many tools it has created for local governments is a software package which can calculate, forecast, and monitor greenhouse gas emissions (Bulkeley & Betsill, 2003).

The CCP program is implemented through a strategic milestone framework, as follows (ICLEI, 2008a; ICLEI 2008b):

1. **Establish an inventory** of greenhouse emissions from all operations (corporate sector), and an analysis of sources of emissions from the community as a whole (community sector). Following this, a Business As Usual (BAC) forecast is undertaken to inform Council of its future projections.
2. **Set goals** to be achieved by a stated year in the future. Goals are usually expressed as a percentage of corporate and community emissions.
3. **Action plan**—a strategy toward achieving goals set in milestone 2 set out as a blueprint in the form of a Local Action Plan (LAP), containing:
   - Baseline and forecast emissions profile;
   - Statement of goal and explication of goal development;
   - Outline of actions and policies implemented since the base year;
   - Proposed actions and policies to be implemented; and
   - Commitment to monitoring and reviewing.
4. **Implement and quantify** actions outlined in the LAP. Report reductions in greenhouse gas emissions as well as financial cost savings.
5. **Monitor and review** progress. Involves:
• Re-inventory using the CCP Greenhouse Gas Application, providing an absolute measure of the trends in Council’s corporate emissions;
• Quantification of measures implemented using the CCP Quantification Toolkit and/or other verified quantitative and qualitative assessments undertaken by Council; and
• The milestone 5 report, bringing together results from the re-inventory and the quantification.

In Australia, CCP is a collaborative initiative between ICLEI, which delivers the framework to councils and works with them to develop and implement strategy, and the Department of the Environment, Water, Heritage and the Arts, which provides policy and funding support. There are currently over 230 councils participating in CCP in Australia, representing about 84% of the nation’s population. New South Wales has (in 2008):
  - 25 councils in the CCP Plus category;
  - 12 councils completing milestone 5; and
  - 22 councils completing milestones 1-4.

(Department of Environment, Water, Heritage and the Arts, 2008)

CCP Plus is an extended arm of the CCP program for councils that have moved beyond milestone 5. CCP Plus aims to bolster greenhouse gas reduction goals by offering focused support in key areas of organisational review, planning, action projects, and corporate and community sectors. It requires yearly contributions to the annual CCP measures report (ICLEI, 2008b).

Following are case studies of two coastal and two non-coastal local councils in Sydney. Examination is made of each council’s actions and priorities regarding climate change, their level of implementation of the CCP program, and their adoption of policies for mitigation and adaptation. A coastal council for the purposes of this article refers to a council with significant frontage to foreshore, estuarine and/or coastal waters, and also membership to a regional organisation (in this case SCCG).

Local Council Case Study 1: Ashfield Council

Ashfield City Council is 12km south west of Sydney’s central business district. The local government area (LGA) covers 8.3 square kilometres. It has a population of approximately 39,000 (ABS, 2006a). Approximately 42.9% of the population is born overseas and 36% are from non-English speaking backgrounds. Ashfield is classified as a non-coastal council. The council is a member of two regional organisations, SSROC (Southern Sydney Regional Organisation of Councils) and IMROC (Inner Metropolitan Regional Organisation of Council).

Ashfield’s vision is to be ‘a community which protects and enhances its native and existing flora and native fauna and contributes to the wider responsibilities for the whole community to preserve the earth’s environment.’ In recent years the council has indicated ongoing commitment to environmental initiatives. It has adopted the Sustainable Streets program, established a staff sustainability committee and developed the GreenWay Coordination Strategy, the Cooks River Sustainability Initiative and Sustainable Ashfield. Ashfield has also adopted the Cities for Climate Protection program. A political declaration was completed in 2003, and they achieved milestone 2 in 2005. The Local Action Plan, part of milestone 3, is currently at draft stage.
Ashfield’s LGA is growing at approximately 2% per year (ABS, 2006a). It is highly urbanised and dense. The area consists predominantly of residential buildings, with a moderate commercial element; industrial uses are minimal. The population makeup of this council suggests a very multicultural mix, and also contains an ageing population - 23.7% of the people are over 55 years of age. Department of Environment and Climate Change document ‘Who Cares (DECC 2007) reveals that younger populations and people from English speaking households are more likely to be concerned and knowledgeable about climate change. Considering the makeup of Ashfield Council, it was important that the correct groups were targeted by educative campaigns.

The high level of urban development and number of stormwater drainage systems mean that there are very few natural creek systems or areas of remnant bushland; hence bushfires and associated risks are minimal. However, the high proportion of built elements means that localised temperatures may be higher than average due to the embodied energy contained in concrete, stone and other such materials. Sea level rise poses a low to medium risk in this LGA. There is a proportion of the local government area facing Iron Cove Creek, and tide markers have been erected. These markers are an example of a mitigative measure taken by the council.

Ashfield Council’s current management plan is for 2008-2012. The council also produces supplementary documents in the form of a Strategic Plan providing broad, long term action plans, and operational plans outlining management plan actions and key performance indicators on a yearly basis. The management plan is predominantly aimed at the community. While the council strives to achieve sustainable development, the plan doesn’t necessarily indicate climate change specific action. It needs to be more specific to deliver clarity to the community and direction to the corporate sector. However, the Strategic Plan comprehensively outlines actions and reports on the progress of these tasks. The management plan does recognise commitment to ongoing implementation of the CCP program, and the achievement of milestone 3.

Ashfield’s State of the Environment Report (SOE) is divided into 7 themes. Greenhouse gas emissions come under the heading of Atmosphere. The main pressures highlighted under this section are motor vehicle emissions and smoke from solid wood fire heaters. The regional pollution index indicates that increasing use of private automobiles is impacting significantly on local air quality.

**Cities for Climate Protection (CCP) Milestones – ASHFIELD COUNCIL**

1. **Establish an inventory**

For the corporate sector, significant sources of emissions are from waste and street lighting. For the community sector, significant sources of emissions are from residential areas and transportation. Figures 1.1 and 1.2 indicate the emission distribution of Ashfield’s corporate and community sectors.

2. **Set goals**

Ashfield has committed to a reduction goal of 20% by 2010 from the baseline year of 1998 for the corporate sector, and 20% by 2010 from 1996 levels for the community sector. Selection of baseline and goal years has been influenced by goal setting by other Australian councils. 64% of Australian councils have endorsed a 20% or greater community reduction goal, while 90% of Australian councils have endorsed a 20% or greater corporate reduction goal (Ashfield Council, 2008). It is interesting to note the council ‘following suit’ rather than attempting to take initiative by leading reduction goals. However,
20% is a significant reduction goal, and it is recognised that considerable, innovative actions will be needed to reach it.

3. **Action plan**
   The draft LAP outlines actions to be taken, some of which include:

   **Corporate actions**
   a. Staff energy awareness through education and campaigns, e.g. more efficient operating of appliances in the office;
   b. Establishment of an internal sustainability committee;
   c. Greater energy efficiency in office equipment through implementation of Energy Star Software on computers and installation of energy efficient flat screen monitors;
   d. Retrofit of council buildings with light timers and sensors and, where possible, use of photovoltaic systems;
   e. Audits on air conditioning systems and lighting in council buildings;
   f. Participation in SSROC street lighting review; and
   g. Fleet vehicle policy review including introduction of 4-cylinder vehicles and diesel utes.

   **Community actions**
   - Promotion of reduction of greenhouse gases and energy efficiency including efficient heating and cooling through newsletters, websites and carnivals;
   - Development of open space network that allows continuous pedestrian and bicycle access across the region;
   - The Sustainability Street Program: providing education to residents regarding reducing energy, water and waste in their homes, and avenues for residents to become involved in local environmental projects; and
   - Participation in regional projects such as the GreenWay project to provide walking and cycling linkages between the Cooks River and Iron Cove.

   The majority of these actions have yet to be implemented and timeframes for their completion are absent from the plan.

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**Figure 1.1. Ashfield council corporate emissions 1998**

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Community Emissions 1996

![Community Emissions Chart]

Figure 1.2. Ashfield council community emissions 1996

**Implementation**

The Ecological Sustainable Development (ESD) policy adopted by Council in 2003 demonstrates Council’s commitment to incorporating environmental policy development and state of the environment reporting into all aspects of operations, from management plans to development assessment. The public availability of this document signals intention to address environmental issues, and opens the council to scrutiny regarding its decisions on environmental issues.

Environmental Planning Instruments of Ashfield have been under revision. The new LEP is currently being prepared, consistent with the State Government standard instrument, including specific provisions to achieve Council’s development outcomes. The DCP is also being updated to ensure consistency with the LEP. Appointment of an environmental officer has assisted in implementing environmental goals in these planning instruments.

Ashfield has a ‘Building Design and Sustainability’ DCP in Part D2 of the Act. This is an advisory document for ESD in residential and other development. However, state (BASIX) and national (Building Code of Australia) legislation already sets out requirements in accordance with sustainability. The purpose of Part D2 is to identify building designs that exhibit greater standards than set by existing legislation.

**Adaptation**

Whilst the council is aware of adaptative measures, there is little evidence of comprehensive action. The council states that adaptation is a capacity issue, but it would seem that it views adaptation as a large-scale, high-cost activity involving infrastructure development and ongoing high maintenance, rather than inclusive of education programs and modified urban design.

**Local Council Case Study 2: Burwood Council**

Burwood Council is 14km south west of the Sydney CBD. The LGA covers 7.26 square kilometres. It has a population of approximately 31,000 (ABS, 2006b). About 49% of the population is born overseas and 56% are from non-English speaking backgrounds.
(2006 Census of Population and Housing). Burwood is classified as a non-coastal council, as the local government area has no foreshore. The council is a member of two regional organisations, SSROC and IMROC.

Burwood Council has not traditionally been environmentally aware. However, the council has indicated its concern about climate change through installation of energy efficient appliances and supply of rebates. Actions to date include production of the Green Action Plan, implementation of the Fridge Buyback Scheme, and participation in the regional group Inner West Regional Recycling Group (IWRGG). Burwood has also adopted the CCP program. A political declaration was completed in May 2006 and they achieved milestone 2 in 2007. The LAP, part of milestone 3, is currently at draft stage.

The Burwood LGA is growing at approximately 5% per year (ABS, 2006b). It consists of residential and commercial communities, with minimal industrial uses. The most notable population statistic relates to its ageing population. Population growth for children less than fifteen years old has slowed dramatically, while there are significant numbers in the upper age brackets including 22.3% in the 54–64 bracket. There are concerns over how the aged will cope with more frequent and intense cold spells and heat waves, and spread of airborne disease due to warmer conditions. Knock on effects of these and other changes are likely to impact on local government function.

There are over 200 individually Heritage items registered in the Burwood Planning Scheme Ordinance. This is due to the area’s rich history, dating back to Aboriginal occupation of the land and then European settlement in the 1700s (Burwood Council, 2007a). Particular precincts have specific DCPs in place to ensure appropriate maintenance of these sites.

Burwood Council’s current management plan covers 2008/09- 2010/11. Its vision is ‘to make Burwood vibrant, prosperous, progressive and proud of its history and heritage’. Its statement of goals indicates that Council aims for ‘environmental sustainability’ to be achieved through objectives outlined in the Burwood Town Planning Scheme. The operational component of the management plan outlines key tasks relating to waste management, transportation networks, community support services, recreation services, health and environment.

Within the health and environment theme, a section on ‘public health and pollution control’ states Council’s objectives ‘to minimise the occurrence of pollution incidents in the council area’ and ‘to improve the environment through pollution control’.

The council indicates that, in order to reduce pollution, it is important to maintain regulatory and educative functions. How they will do this is unclear. The main service provision seems to be investigations into pollution complaints.

The management plan points to the Green Action Plan (GAP) as its primary document in environmental management. The GAP is a council-specific initiative with a particular focus on greenhouse gas emissions and climate change impacts in the local area. In some ways it is similar to an LAP, the milestone 3 requirement for the CCP program.

The council’s SOE report is a 10 page document. Each of its 5 themes are identified in line with the LGA 1993. In ‘Air,’ objectives are to reduce greenhouse gas emissions and reduce instances of air pollution within the LGA. Assessments of corporate and community activities include:

- Council Chambers, Enfield Swimming Pool and the Library produce nearly half of all greenhouse gases in the corporate sector; and
- There is significant growth in the transport sector, in terms of the private car.

(Burwood Council, 2007b)
Involvement in the CCP program has been relatively recent. The management plan refers to the program under discussion of the GAP. In the annual report, current progress in the program is indicated.

Cities for Climate Protection (CCP) Milestones – BURWOOD COUNCIL
1. Establish an inventory
   For the corporate sector, significant sources of emissions are from buildings and street lighting. For the community sector, significant sources of emissions are from residential and commercial uses. Figures 2.1 and 2.2 indicate the respective distribution of emissions.

2. Set goals
   Burwood has committed to a reduction goal of 20% by 2012 from the baseline year 2005/06 for the corporate sector; and 20% by 2010 from 2001 levels for the community sector. Selection of baseline and goal years was due to the availability of data necessary for completion of the inventory. Lack of available data from other years indicates insufficiency and/or inadequacy in greenhouse gas emission recording instruments.

3. Action plan
   The LAP is in draft format, not yet available for public viewing.

Corporate Emissions 2005/06

![Pie chart showing corporate emissions distribution](image)

Figure 2.1. Burwood council corporate emissions 2005/06.
Figure 2.2. Burwood council community emissions 2001

Implementation

The council aims, through the GAP, to educate the community and outline operations being implemented. The GAP brings ‘all of the council’s “green” actions into one accessible document’ (Burwood Council, 2008a). It contains the corporate GAP and the community GAP.

The corporate GAP addresses energy efficiency in council operations. Outlined below are some of the initiatives in the corporate GAP:

Reduction of energy usage
- Solar lighting has been trialled in Flockhart Park, Enfield. Further installations of solar lighting are planned; an expensive exercise. Vandalism of facilities has occurred and is costly to repair.

Council fleet management
- Council has encouraged downsizing of employee vehicles to fuel-efficient varieties. The council fleet has downsized to four-cylinder modes.
- A hybrid vehicle was purchased in 2006 for the council’s car pooling system.
- The council’s truck fleet now uses low sulphur content diesel, which reduces black smog and sulphur dioxide.

Office equipment
- Paper recycling systems have been introduced at the council offices, Library and the Woodstock Centre.
- Printer and toner cartridges are recycled.

The community GAP addresses environmental impacts of community activities.
- BASIX is mentioned as a community action, though it is a State requirement that new development be energy and water efficient to meet certain standards.
- Tree plantings have been an ongoing council initiative, with over 900 trees planted in the past 2 years.
- Examples of promotion of energy efficient practices include water tank rebates, recycling programs, and distribution of environmental fact sheets and an environmental events calendar.
- Second-Hand Saturday is a council-organised event that has been running for the past 6 years. It promotes reuse of items and reduces landfill.
The GAP is a good starter’s document for the community and demonstrates some strategic direction. Whilst there is a comprehensive list of initiatives, it lacks statements of goals and plans for action. One might expect the production of the ‘milestone 3’ LAP to address environmental action with more detail.

The purpose of Burwood Council’s ESD policy is to integrate sustainable development into the council’s operations through economic, environmental and social considerations. Consequently, ESD principles have been incorporated into the new Burwood Town Centre LEP and DCP.

The LEP has been exhibited for public comment. It seeks to replace two former draft LEPs for 2 town centre precincts to maximise development opportunities. It aims for sustainable development features such as:

- Integrated approach to planning, management, development and economic use of land;
- Mixed balance of land uses;
- Development that encourages use of public transport and reduces reliance on, and the consequential environmental impacts of, private vehicles; and
- Development that promotes energy efficiency in relation to water conservation and aims to ensure waste and noise minimisation.

A particular DCP refers to ‘Environmental Management’, consisting of measures to maximise energy efficiency, minimise waste and conserve water. DCP No.8 refers to General Residential development. A specific clause, Part 5.4 ‘Energy Efficiency’, requires that all development consider:

- Efficient building orientation toward north and east;
- Internal design that minimises heating and cooling; and
- Maximum natural ventilation.

**Adaptation**

There is a lack of available information regarding adaptive measures to be taken by this council. Sea level rise is an issue of State significance currently being addressed on a regional scale by SSROC; however, it does not appear to be of concern to Burwood council at present.

**Local Council Case Study 3: Botany Bay Council**

Botany Bay Council is 13 km south of Sydney’s CBD. The LGA covers 10.3 square kilometres. It has a population of approximately 31,000 (ABS, 2006c). About 41.5% of the population is born overseas and 49% are from non-English speaking backgrounds (2006 Census of Population and Housing). The LGA is growing at approximately 2% per year (ABS, 2006c). Botany Bay is a coastal council; the LGA consists of significant coastal foreshore including Botany Bay and the Cooks River. The council is a member of two regional organisations, SSROC and SCCG.

Botany Bay’s history begins with Aboriginal occupation of the land, and its first European settlement was in the 1800s. The built environment contains many areas of State significance that Council has limited power to develop, or responsibility to maintain. There is significant concern about contamination by past and present uses of land. Many of the pollutants are severe and have the potential to cause birth defects and fatalities.
Emission sources from Botany Bay are unique in that, both presently and historically, most pollution originates from the airport and from heavy industry. The area has traditionally been industrially used, the port being the major service for importing and exporting goods. Development of heavy industry depended on the water supplies off the Bay.

The planned airport expansion includes a development proposed by the State to facilitate required infrastructure. Sydney Airport’s approved master plan will see a significant increase in flights, and increased activity from the airport will exacerbate pressure on development. Airport noise and flight paths mean that roughly 33% of the LGA is unsuitable for residential development. Restrictions on development are coupled by amenity impacts on existing residents and reductions in land value. The planned Botany Port expansion will impact not only this LGA, but also adjacent councils such as Rockdale Council. There is likely to be increased truck movement, and disturbances caused by freighting along the railway corridors.

Actions specifically addressing reduction of emissions have included trials of solar lighting at bus stops, adoption of hybrid vehicles for the council fleet, and implementation of an Energy Efficiency DCP. Botany Bay has also adopted the CCP program. A political declaration was completed in May 2001 and they achieved milestone 2 in 2002. The LAP is currently at draft stage.

The Botany Bay Council management plan is separated into principal activities undertaken, each detailing performance targets and measurements. There are no visions or goals in this document. The objective outlined in the Health and Environment section pledges ‘to contribute to a safe living and working environment by providing a public health service which aims to meet community needs while satisfying statutory requirements’ (Botany Bay Council, 2006). The plan doesn’t point to any particular mechanism of managing greenhouse gases and climate change, but mentions review of the Energy Efficiency DCP as an ongoing activity.

Part 3 of the State of the Environment report is titled Air and Greenhouse. The main pressures outlined are climate change and air pollution. The report provides a brief summary of the principles of the greenhouse effect. Air pollution is identified as primarily derived from industry and automobile emissions. Two responses to climate change are recorded under Air and Greenhouse: extended trials of solar lighting at bus stops, with investigation into possible future locations for solar lighting, and purchase of two hybrid vehicles for the council fleet, aiming to reduce corporate emissions and set an example for the community.

Botany Bay Council monitors air pollution through participation in ANSTO’s (Australian Nuclear Science and Technology Organisation) fine particle Aerosol Sampling project. The project monitors and characterises particles at Mascot through the collection of filter samples taken twice a week (Botany Bay Council, 2007). The particles recorded are becoming smaller and affect human health and visible air quality.

Cities for Climate Protection (CCP) – BOTANY BAY COUNCIL

Botany Bay Council joined the CCP program in 2001. Currently they are completing milestone 3, and the LAP has been in draft for over 6 months. The other councils examined in this article have recorded superior CCP progress in a shorter timeframes.

There are many reasons for Botany Bay’s slow progress with CCP. Firstly, the council is very small: the amount of office staff is limited. For instance, there is one environmental scientist who reports to the Director of Assets and Management. This person is responsible for many other tasks including review of development applications
regarding environmental issues. This is a significant task, as the council has significant industrial areas and contaminated sites that require careful management. Secondly, and perhaps consequently, there has been a high staff changeover rate.

Resources at Botany Bay Council are very tight, and although the council is debt free, to undertake a significant project could result in an unmanageable debt. The Water Savings action plan has recently been completed in full, and Council states that this has taken priority over completion of the CCP milestone 3 report.

**Milestones**

4. **Establish an inventory**
   Council have committed to a reduction goal of 20% by 2012 from the baseline year of 1999/2000 for the corporate sector, and 20% by 2012 from 1996 levels for the community sector.

5. **Set goals**
   Some actions to be implemented from the LAP include development of an internal working group, retrofitting lights with fluorescents, installing light sensors, training internal staff, managing energy efficiency in the Aquatic Centre, trialling fuels and developing a bike plan.

6. **Action plan**
   Currently being drafted.

**Implementation**

Botany Bay is to also review its current environmental instruments in order to comply with the new standard instrument set by the State Government.

The Botany Bay Local Environmental Plan includes a specific section on the greenhouse effect and global warming—the first to be encountered in these case studies. Clause 22 of the LEP stipulates that applications for significant developments submit documents addressing global warming, water pollution, energy consumption and groundwater contamination wherever applicable. Developers are also to take into account any possible adverse effects on the development itself as a result of climate change due to the greenhouse effect (Botany Bay Council, 1995).

Botany Bay adopted an Energy Efficiency DCP in 2000. This plan was developed in the context of previous initiatives such as the SSROC Greenhouse Strategy 1992 and the Energy Efficient Development discussion paper 1993 (Botany Bay Council, 2000).

The objectives of the current DCP are to:

- Improve energy and water efficiency of all residential, commercial and industrial development;
- Reduce greenhouse gas emissions and conserve non-renewable energy sources;
- Promote residential, commercial and industrial developments that are more comfortable to live/work in and cost less to run; and
- Provide means by which the development community can uniformly and effectively implement and demonstrate compliance with the objectives of the LEP (1995), in particular clause 22.

**Adaptation**

The council seems to be waiting upon certainties before taking any significant action. There has not been any significant adaptation action to date. There have been discussions on risk of land, and on significant risks relating to sea level rise and flooding (any amount of sea level rise can potentially cover the whole LGA).
Local Council Case Study 4: Rockdale Council

Rockdale City Council is 12km south of Sydney’s CBD. The LGA covers 30 square kilometres. Rockdale has a population of approximately 92,000 (ABS, 2006d). About 41.3% of the population are born overseas and 36% are from non-English speaking backgrounds. Rockdale also has an ageing, multicultural population. Rockdale Council is a coastal council, as it consists of extensive foreshore and is bounded by three waterways: Bardwell Valley, the Cooks River and Botany Bay. The council is a member of two regional organisations, SSROC and SCCG.

The Rockdale LGA is growing at a rate of approximately 4% per year (ABS, 2006d). The majority of the area is residential, encompassing both low-density housing and higher density areas along the railway corridor. However, industry is also a significant emitter of greenhouse gases. In Rockdale, much of the LGA is very low lying and vulnerable, comprising foreshore and bushland. A rise in the water table will have a significant effect; also a rise in sea level will immerser proportions of the LGA. Land is increasingly flood prone, decreasing house prices and creating issues around damage liability.

The council has been active with climate change policy development, including participation in the Greenfleet program, implementation of a Solid-Fuel-Heater-Buy-Back Program, creation of the Environmental Policy in 2003 and consequent adoption of the Environmental Plan. Rockdale has also adopted the CCP program. A political declaration was completed in 1999, just one year after the program’s inception. As part of CCP Plus, Council embarked on the Greenhouse Purchasing program in 2006 and the Sustainable Transport program in 2007.

Rockdale Council’s current management plan is for 2008/09- 2010/11. Rockdale’s vision for the natural environment is for ‘an ecologically sustainable city which protects and enhances its natural environment’. There is evidence that the council is committed to environmental sustainability. The strategic direction outlined in the city’s succinct vision statement provides focus for managing environmental quality. The management plan points to the Environmental Policy (2003) as the backbone of environmental decision-making. It led to the production of the Environmental Plan: a key tool for reporting to the community on the progress and direction of environmental initiatives. The plan was produced in 2003 and underwent review in 2006.

Rockdale’s State of the Environment Report contains seven themes. ‘Atmosphere’ is marked by an absence of objectives or goals. Pressures from community and corporate activities include:

- 70% of residents use cars for at least part of their journeys to work;
- Local air quality is affected by pollution from the M5 east motorway;
- Significant emissions come from the industry sector; and
- Adjacent land use by the Port Botany expansion and Sydney Airport Master Plan creates emissions and other stresses.

(Rockdale Council, 2007b)

Rockdale joined the CCP program in 1999 and has recorded significant progress. They achieved milestone 5 in 2005 and graduated from the program shortly after. The management plan identifies involvement in the CCP program as a demonstration of Rockdale’s seriousness about environmental matters. It is clear that CCP provided leverage for action, and that through it various other environmental initiatives were made possible.

*Cities for Climate Protection (CCP) Milestones – ROCKDALE COUNCIL*
1. **Establish an inventory**
   Significant corporate sector emissions are from street lighting and buildings. Significant community sector emissions are from industrial and residential activity. Figures 3.1 & 3.2 indicate the distribution of emissions for the corporate and community sectors.

2. **Set goals**
   Rockdale has committed to a reduction goal of 20% by 2010 from the baseline year of 1995 for the corporate sector, and 20% by 2010 from 1995 levels for the community sector.

3. **Action plan**
   A local action plan was produced. Completed projects therein include:
   
   **Corporate Actions**
   - Reduction of greenhouse gas emissions from office equipment including retrofitting the council administration building with fluorescent lamps, monitoring equipment and acquiring LG Flatron monitors with star ratings;
   - Retrofitting council streetlights: replacement of 10,000 20 watt lights with 360 mercury vapour lights; and
   - Updating Council’s fleet to 4-cylinder vehicles and trialling alternate fuel vehicles.

   **Community Actions**
   - Energy conservation workshops to increase residents’ awareness of energy efficient practices in the home;
   - Newsletters, website and displays encouraging energy efficient appliances and water heating, and renewable green power;
   - Information provided to local commercial and industrial businesses regarding energy audit guidelines and use of green power; and
   - Facilitation of more bicycle storage areas in parks and shopping centres, encouraging cycling as a realistic transportation option.

   A full list of completed projects is contained in the SOE report and Environmental Plan.

   Rockdale have progressed to CCP Plus. Since 2005 they have participated in two further projects, Greenhouse Purchasing and Sustainable Transport.

   **Greenhouse Purchasing**
   Rockdale joined the Greenhouse Purchasing project in 2005. The plan requires review of existing council policies and practices by staff from the supply and environmental departments. A staff survey was also conducted.

   Rockdale’s Greenhouse Purchasing action plan identifies its key issues as:
   - Updating the environmental policy and the environmental purchasing policy;
   - Greenhouse purchasing criteria to be considered for tenders;
   - Ensuring suppliers meet greenhouse purchasing criteria;
   - Ensuring staff make informed decisions regarding sustainable purchasing through checklists, tracking systems and the like; and
   - Educating staff through workshops and regular updates.
   (Rockdale Council, 2006)

   It is clear that Rockdale has a good platform for purchasing policies, and even though implementation has been minimal, staff have already been considering greenhouse issues in purchasing decisions.

   **Sustainable Transport**
Rockdale’s Sustainable Transport action plan states the following key goals:

- To integrate sustainable transport objectives and principles into all priority strategic planning projects;
- To encourage an integrated approach to sustainable transport issues across Council departments;
- To actively promote alternative transport modes to both staff and the community; and
- To reduce greenhouse gas emissions by the council vehicle fleet.

(Rockdale Council, 2007c)

In the past, Rockdale Council has had problems with lack of community awareness, lack of strategy/plan coordination, and limited influence on the State Government regarding sustainable transport. More recently, these issues have been partially addressed through their environmental policy, their management plan and their fleet policy, and through strategic planning via their Transport Traffic Plan.

**Figure 3.1.** Rockdale Council Corporate Emissions 2005

**Figure 3.2.** Rockdale Council Community Emissions 1995

**Implementation**
Environmental Policy

The Rockdale City Council Environmental Policy was developed and adopted in 2003 to achieve ESD through council decision-making processes. The policy specifies that council staff must:

- Comply with all applicable laws, regulations and standards, and apply additional standards that minimise environmental impacts resulting from operations or services;
- Communicate openly with the community about environmental issues;
- Ensure that environmental and social costs are considered when evaluating services provided by and to Council;
- Ensure that employees, local community and suppliers of goods and services are aware of their environmental responsibilities in relation to council business;
- Establish programs to protect the environment; and
- Provide employees and external parties with the necessary resources in order to comply with the requirements of Council’s Environment Policy.

(Rockdale Council, 2003a)

The Environmental Plan is a key strategic document outlining the need for protection of the atmosphere globally, regionally and locally. Locally, carbon monoxide, sulphur dioxide, lead and other toxins are highlighted as key pollutants. The Environmental Plan outlines the need for ESD and cites an array of documents produced locally and regionally. Actions, listed in table format, span issues, action to be taken, departments responsible, performance indicators and completion timeframes. Categories in this table are designed to ensure uniformity with the 2006 SOE report.

The council is developing a new LEP, consistent with the NSW Government standard instrument. This plan aims to incorporate the targets of the Sydney Metropolitan Strategy. A new clause will deal with flood height and flood prone land. It is unclear how other environmental objectives will be incorporated.

Council has identified a high proportion of emissions from private automobiles. In 2004, Rockdale Council developed a draft Transport and Parking DCP setting controls for car parking provision in developments and encouraging alternative travel modes. Another DCP is currently being adopted to ensure that new development takes into account freight, car, cycling, walking and public transport. The plan aims to improve social inclusion, widen transport choices and reduce greenhouse emissions.

Adaptation

Preston (2008) state that Rockdale Council has a low adaptive capacity for climate change. There is a high degree of sensitivity due to its geographic position, topography and coastline. Given the circumstances, there is a great need to take stock of adaptation in this LGA.

Council seems to be aware of the concept of adaptation. There is regard for addressing risk management and liability issues involving the community. The management plan contains an objective for adaptation to climate change: ‘to develop mechanisms to enable Council to adapt to climate change’ (Rockdale Council, 2007a), and a deadline to achieve it: June 2009.

Climate Change modelling in Manly Council has revealed that a 1% sea level rise will result in the immersion of a significant amount of Manly’s LGA. This flood model represents the higher end of realistic predicted emissions, and demonstrates the potential impacts sea level rise will have on a specific area. There is no such tool in use at Rockdale Council.
Comparative study of Climate Change Mitigation and Adaptation Strategies

There is more disparity in environmental policy between the examined coastal councils than between the non-coastal councils. All four councils examined contain ageing and multicultural populations. In Botany Bay, Ashfield and Burwood, there is no directive toward educating the ageing population about climate change. The Ethnic Community Council is active in providing education to multicultural groups in Ashfield, but it is not clear whether there is similar involvement from the relevant groups in other councils.

Burwood and Ashfield Councils have undertaken moderate climate change action. At Burwood, the GAP is a comprehensive document outlining ‘green’ initiatives. This will be complemented by the LAP when it is released. At Ashfield, the LAP is already exhibited. The recent adoption of CCP and attainment of milestone 3 by both councils indicates a commitment, however moderate, to addressing climate change.

In assessing the management plans of the four councils, Burwood’s objectives for the environment are clear, but future direction lacks conviction. There is no mention of other initiatives besides the GAP. Ashfield has a slightly stronger strategic direction, outlining achievements and new initiatives scheduled for the next 4 years. There is a gauge for self-assessment of projects. However, both these councils’ management plans lack urgency in areas of environmental sustainability.

Botany Bay Council’s management plan outlines minimal initiatives under ‘Health and Environment’ and ‘Air’. Participation in the CCP program is mentioned once, and there is no mention of climate change or greenhouse gas emissions in the report, which points only to the Energy Efficiency DCP. Strategic direction with regard to the environment is vague. At Rockdale, the management plan is much more comprehensive, outlining issues, pressures and responses. It lists council specific impacts and identifies an environmental plan, environmental policy, CCP agenda and Sustainable Transport Plan. Whilst it doesn’t specifically mention climate change, it identifies a need to reduce greenhouse gases.

All SOE reports examined exhibit basic coverage of the state of the environment and address air quality management briefly. They do not mention objectives, goals or future directions in line with the management plans, and do not explicitly indicate sources of pollution, even though Ashfield’s SOE identifies vehicles and wood fire heaters as pressures.

The main measurements used by Ashfield and Burwood Councils are records of high, medium and low pollution levels. Burwood have recorded a reduction in high pollution days; Ashfield have recorded increasing instances of medium pollution days.

Botany Bay Council’s SOE report contains no indication of change in the environment or the quality of the air, besides the obvious facts that there are more vehicles in the area and fine particles are becoming smaller. The report mentions only two responses to air quality issues. By contrast, Rockdale Council’s report identifies many local pressures and air quality measurements. There is a specific section on greenhouse gas emissions and a summary outline of related CCP achievements.

Burwood and Ashfield have adopted similar ESD policies. Ashfield has an Energy Efficiency DCP specifically designed to set standards greater than those required in BASIX and BCA. There is mention of ESD principles in the management plan and in the annual report’s ‘key results’. At Burwood, there is very little link between the ESD policy and the three key reporting documents. Burwood has developed an LEP and DCP specific
to its town centre, and energy efficiency is incorporated into their various DCPs. Rockdale also has an environmental policy and environmental plan that push for consideration of ESD in all decisions made. While Botany Bay doesn’t have such instruments, they have incorporated principles of sustainability into their LEP and DCPs, which include an Energy Efficiency DCP. Objectives in the LEP point to addressing the greenhouse effect and global warming. Their management plan needs to be updated to include this objective.

In the non-coastal LGAs, a notable feature of the study is that councils appear to be motivated by issues involving their citizens’ health, rather than the wider global fight to address climate change.

The two coastal councils are very low lying and vulnerable to sea level rise and storm activity. Awareness of this issue is expressed in both councils’ documents, but actions have been limited. Rockdale has incorporated an adaptation objective into the management plan, and an adaptation plan is currently being produced. There is no evidence that Botany Bay is undertaking adaptive actions.

The most prominent difference between the actions of all these councils is their relative progress with CCP. Rockdale is very advanced, while Botany Bay has been very slow in progress, and Ashfield and Burwood have progressed at a moderate rate.

**Conclusion and recommendations**

It is easier for small councils to support projects with small set up fees and guaranteed immediate returns. State support for larger projects requiring larger investments would enable mitigative activities that are simply not feasible at present for smaller councils. It is recommended these local governments lobby state government to make available grants enabling councils to invest in larger, longer term projects.

Transport emissions contribute vastly toward overall emissions in the community sector. This needs to be acknowledged and addressed. There has been little pressure on councils to act, from the State Government or from the community. There is a need to review urban design and environmental planning instruments to encourage alternate forms of transport.

Motivations for climate change action and joining CCP have largely been tied up with asset management and insurance premiums. Councils are taking economic precautions rather than addressing climate change. Councils are meanwhile becoming more vulnerable as a result of climate change impacts, and are likely to experience an increase in lawsuits.

CCP is a very useful program, and perseverance in the program usually yields results. It is recommended that Botany Bay and Burwood Councils devote more resources toward CCP milestones 3 and 4, so that plans of action are available to internal staff and the community.

There is little, if any, mention of impacts of climate change on discrete demographic and socio-economic groups, particularly elderly people and people from non-English speaking backgrounds. It is important to review the impacts on demographic-specific groups.

There is a reliance on informative newsletters to encourage the community to be more energy efficient. Councils ought to initiate concrete actions and projects to ensure the
community are not just hearing but acting, and that people from non-English speaking backgrounds are also hearing and acting.

Terms such as sustainability and ecologically sustainable development are over-used in policy documents and reporting, or used vaguely. It is recommended that councils research and employ more specific and accurate terminologies.

Coastal councils seem to be more aware of climate change impacts and adaptation than non-coastal councils, as they are under more immediate threat. Councils should continue to work with their regional organisations (SCCG and SSROC), which are very active.

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Investigating challenges and opportunities of water sensitive urban design for knowledge based development of Australian cities

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Structured Abstract
A new approach that is slowly replacing neoclassical models of economic growth and commodity based industrial activities, knowledge based urban development (KBUD) aims to provide opportunities for cities to foster knowledge creation, exchange and innovation, and is based on the concepts of both sustainable urban development and economic prosperity; sustainable uses and protection of natural resources are therefore integral parts of KBUD. As such, stormwater, which has been recognised as one of the main culprits of aquatic ecosystem pollution and as therefore a significant threat to the goal of sustainable urban development, needs to be managed in a manner that produces ecologically sound outcomes. Water sensitive urban design (WSUD) is one of the key responses to the need to better manage urban stormwater runoff and supports KBUD by providing an alternative, innovative and effective strategy to traditional stormwater management.
Purpose – Large-scale implementation of WSUD is still lacking in Australia due to significant impediments and negative perceptions. Key barriers to this has been identified as social and institutional barriers rather than technical, including institutional inertia, lack of support for WSUD implementation and overall lack of knowledge, amongst others. This paper discusses on the barriers and challenges to mainstreaming WSUD implementation and suggests methods in which they can be overcome through collaborative institutional learning and efficient knowledge transfer.

Design/methodology/approach – This paper offers a conceptual framework to discuss attributes needed by organisations when attempting to deal with new paradigms. Utilising the concept of ‘receptivity’ borrowed from the field of innovation and technology, this paper discusses how this can be used in conjunction with knowledge management and transfer provided by KBUD.

Originality/value – While research into the barriers of effective policy implementation exists, little of this research focuses on understanding the capacity and capabilities of stakeholders to respond to the implementation of these policies, and less still is studied in the field of stormwater management.

Practical implications – Current efforts to achieve sustainable urban stormwater management through WSUD are hindered by many issues, particularly those involving knowledge transfer and the reaction of stakeholders towards policy implementation. The main aims of this paper are to identify the challenges faced by mainstreaming WSUD and address the issues of receptivity and knowledge transfer to contribute to the current knowledge base of both WSUD implementation in particular and to policy implementation of sustainable stormwater management in general.

Keywords – sustainable urban development, stormwater infrastructure, stormwater quality, water sensitive urban design

Paper type – Academic Research Paper

1 Introduction

Water management issues are one of the great challenges of the world today. From freshwater provision to wastewater treatment issues, awareness and understanding of this dilemma has slowly emerged in the last quarter of the century. How water is distributed, utilised and disposed off will become more and more critical as environmental pressures intensify, the world’s population increases exponentially and the speed of urbanisation accelerates. These stressors are further compounded by the escalating impacts of climate change, whereby the warming of global temperatures and shifts in precipitation patterns can severely affect the water supply and environmental quality of surrounding aquatic bodies (Donofrio, 2009). Due to environmental and social pressures stemming from the impacts of urbanisation, over-consumption, industrialisation, land clearing and other anthropogenic activities, it is now widely accepted that a new paradigm in urban water management must be found in order to convert to the more sustainable use and management of urban water in general and urban stormwater in particular (Brown, 2005).

The concept of sustainability calls for development to not only benefit the current generation, but also not to affect the ability of future generations to be able to meet their own needs (WCED, 1987). Following this, sustainable development demands that all water resources are preserved and protected from urban development (Carmon et al., 1997). Australia has experienced a significant shift in the way that water is viewed and valued in the past few decades due to the recognition of the significant issues regarding
both quantity and quality of water. This paper touches on the alternative paradigm of water sensitive urban development (WSUD), and how this innovative and ecologically sustainable approach to a long-standing urban problem can be mainstreamed utilising opportunities provided by knowledge based urban development (KBUD).

2 KBUD and WSUD

KBUD is a new approach that is slowly replacing neoclassical models of economic growth and commodity based industrial activities and centres around the concepts of sustainable urban development and economic prosperity. In KBUD, the three spheres of sustainability—economic, social and ecology—are all equally important due to the awareness of impacts of rapid urbanisation on the environment (Yigitcanlar & Velibeyoglu, 2008). The emphasis on social and ecological sustainability is vital in order to attract and retain the human capital needed to build successful communities as a solid base for economic development, due to their strong links to elements such as urban diversity and quality of life (Yigitcanlar & Velibeyoglu, 2008). An ecologically sustainable city is much more attractive to investors and workers (Cities Alliance, 2007). Thus, while KBUD is principally about the processes of knowledge production, the goal of ecological sustainably remains a vital contribution to its success in any location. As such, stormwater, which has been recognised as one of the main culprits of aquatic ecosystem pollution and as therefore a significant threat to the goal of sustainable urban development, needs to be managed in a manner that produces environmentally sound outcomes. WSUD is one of the key responses to the need to better manage urban stormwater runoff by supporting KBUD through the provision of an alternative, innovative and effective strategy to traditional stormwater management. It not only ensures that the quality of the water body stormwater discharges into remains as un polluted as possible by utilising naturally occurring tools such as native vegetation, WSUD is also a feature of urban design, helping enhance the aesthetics of urban areas, improving quality of life while providing important environmental outcomes. This is especially important as the world struggles to adapt to the impacts of climate change. However, large-scale implementation of water sensitive urban design is still lacking in Australia due to significant impediments and negative perceptions. Key barriers to the mainstreaming of WSUD strategies has been identified as social and institutional barriers rather than technical, including institutional inertia, lack of support for WSUD implementation, overall lack of knowledge and lacking in stakeholder knowledge transfer, amongst others. The following section discusses these challenges in more detail.

3 Barriers, Challenges and Opportunities to WSUD

On the surface, holistic management of urban stormwater in Australia appears to have ‘evolved beyond conceptual, investigational and demonstrational stages linked with government and academic partners’ (Gardiner & Hardy, 2005). In reality, uptake has been slow and sporadic as urban water agencies, policymakers and developers are still reluctant to take the risk of attempting a different and innovative approach (See Wong, 2001; Brown, 2005). Traditional water management strategies still dominate the majority of water institutions and agencies (Brown, 2007). Most of these are frequently fragmented, with operations that do not take into account the multi-dimensional aspects of urban water management, focusing instead on the technological elements (Farrelly et al., 2007). For policies and practices to be efficient and specific to local scenarios, current
settings need to be evaluated in order to specifically identify the problems and issues involved.

Technical expertise and knowledge in WSUD is not lacking or new; in fact, WSUD has been implemented in many locations around the world and is known by other monikers such as Low Impact Urban Design and Development (LIUDD) in New Zealand (e.g. van Roon et al., 2006), Low Impact Development (LID) in the United States (e.g. Roy et al., 2008) or as Sustainable Urban Drainage Systems (SUDS) in the United Kingdom (e.g. Roach & Sargent, 2007). Increased awareness of WSUD benefits has prompted local governments to revamp their urban stormwater management practices to include WSUD in their policies, or as a requirement for development approval. Examples include the Brisbane City Council (BCC) rewriting its planning policy to specify WSUD as its preferred option in development, while the Gold Coast City Council (GCCC) not only released a WSUD guideline, it has also specified that WSUD is a legally required component under its planning scheme (GCCC, 2007). Wong (2001) stresses that changes in government policy is important to create fertile environments that will lead to new and innovative stormwater management strategies. Absorbing WSUD into planning documents and setting standards and guidelines will encourage its wide-spread uptake; but, it is not enough. A key issue of concern is that the skills and technical knowledge of planners, engineers and policymakers need to be adequate in order for the features to function properly and efficiently (see Lloyd et al., 2002; Brown, 2005; Wong, 2006).

White (2007) and Taylor (2008) both identify change agents, or ‘champions’, as one of the key drivers in achieving sustainable urban stormwater management. They state that the attainment of sustainable urban stormwater outcomes depends not only on technical knowledge but also on the development of individuals (White 2007; Taylor, 2008). These champions have the ability to influence how principles found in policy and guidelines (‘concepts’) are translated into concrete examples on the ground (‘implementation’) (White, 2007). Although these policies and guidelines already exist, the translation of these intangible elements into real practices hinges upon agents who understand the interpersonal and organisation perspectives needed (Cullen, 2007). Cullen (2007) states that these agents are particularly important in local governments as they act as ‘brokers’ of new scientific knowledge, and are able to present this knowledge in the context of urban stormwater management in a manner that is easily understood and absorbed. Champions can not only push through innovations, they can also foster a culture of employing ground-breaking solutions when feasible, and are able to create momentum to establish widespread organisational commitment to sustainable solutions (Brown, 2005, in White, 2007). The agency is then more likely to try new approaches, while at the same time encouraging innovation and experimentation to build knowledge, traits that are yet to be common according to Cullen (2007).

Some stakeholders are also yet to be convinced of the extent of effectiveness of WSUD methods in practice. Ponds and wetlands have been incorporated into development for the better part of the last decade, and efforts such as stormwater trains have proven to be highly effective in the preservation of the quality of receiving waters as well as the alleviation of flooding (Wong, 2001). However, inappropriate implementation such as not properly linking them to stormwater management considerations has lead to instances whereby they have been inefficient or even harmful, thus defeating the purpose of the strategy (Lloyd et al., 2002; Wong, 2001). Wong (2001) also points out that inadequate levels of technical skills and knowledge within the industry to design, assess and maintain water sensitive development schemes has created uncertainty about their
merits. While these technical principles and skills are available, the information and skillsets are often only available to certain departments or are scattered amongst different professions that are involved in urban water management, but do not necessarily work together (Lloyd, 2001). For example, GCCC (Alam, 2008) states that WSUD design drawings and management plans are available mainly to the engineering department but not readily accessible to staff of other departments, such as to the divisions in charge of maintenance. It is up to the local governments and their respective agencies to provide a decision making guide for best planning practices associated with urban development such as site feasibility, council requirements, recommended processes for undertaking a WSUD plan and so on. A BCC audit of Water Sensitive Road Design in 2005 noted that recurring deficiencies in swales occurred at all stages of development, and suggested that the release of universal guidelines and education programs would be useful in minimising inadequacies and inefficiencies as well as in informing developers and other stakeholders of the importance of both design and maintenance.

Lack of standardised best practice and differing requirements can cause confusion amongst stakeholders (Cullen, 2007). Kay et al. (2004), Gardiner & Hardy (2005) and Roy et al. (2008) are some of the researchers who state that lack of consistent standards and knowledge are the biggest impediments to implementing WSUD strategies. The ability of staff, especially those who were working in development assessment, to evaluate the efficacy of these strategies was suspect in some cases (Gardiner & Hardy, 2005). Standardised guidelines are important to ensure that common standards are maintained in management plans and implementation. These can also have the additional benefits of cost cutting and ease of inspection, and can enable the harvesting and documentation of emerging knowledge and best practice—an important factor in capacity building in WSUD, and when dealing with high turn-over in staff (Cullen, 2007).

The linkage between concept and construction is often not well established, and results in poorly translated works on the ground, affecting their efficacy (Wong, 2001). One of the solutions to this could be the formation of more diverse, multi-disciplinary teams to design, assess and maintain WSUD features based upon the specific considerations of local sites. However, integration is made difficult by the fact that urban water management in most states in Australia is fragmented, and conducted by different institutions (Lloyd, 2001; Brown 2005; Wong, 2006; Cullen, 2007). Lloyd (2001) point out that an effective regulatory framework and communication channels that links local, precinct and regional levels and enables integration of urban stormwater management is important in order for the different agencies to communicate efficiently and to have common goals and understandings. A highly fragmented arrangement only adds to the confusion of both agencies and developers (Cullen, 2007); local councils and management agencies need to work together to develop plans that help build linkages between strategic directions of regional water managers and local WSUD initiatives.

A major concern of WSUD is the perception of high economic costs. In actuality, WSUD features are not substantially different from conventional ‘end of pipe’ treatment systems; but due to the effort needed in its design and approval, WSUD is often seen as being more expensive (Gardiner & Hardy, 2005). While costs may be higher in the short term, potential advantages, such as better environmental outcomes and preservation of quality of life are often the benefits in the longer term. WSUD potentially provides a higher level of environmental and community protection compared to traditional urban stormwater features, especially the ability to weather the uncertain impacts of climate change. Proper research and site-specific considerations of WSUD features, alongside
scenario modelling and integration of all aspects of urban water management (that is, water supply, waste and stormwater management), have the potential to significantly reduce costs and provide more specific and accurate cost assessment (Lloyd, 2001).

4 Knowledge Transfer and WSUD

This research explores how paradigms shifts from traditional resource management to a more sustainable manner can be implemented successfully. Despite academic evidence supporting the efficiency and advantages of implementing a new stormwater management system utilising innovative technology, this shift is often difficult and hampered by many barriers both real and imagined. The notion of ‘routine’ is often in the heart of institutional behaviour; actions carried out appropriate to the situation they face without rational choices being made, but rather as re-enactment of processes that work (Berkhout et al., 2006). Research into the barriers of effective policy implementation has long been looked into (see Dinar, 1998; Fletcher et al., 2004; Brown et al., 2008). However, Jeffrey & Seaton (2004) argue that despite this significant history, most of the research focuses on ways in which paradigm shifts can occur, or on optimisation of policies. Little is being done to look at understanding the capacity and capabilities of stakeholders to accept and respond to the policies implanted (Jeffrey & Seaton, 2004). Due to the multi-faceted nature of policymaking, Jeffrey & Seaton (2004) argue that ‘receptivity’ of stakeholders is paramount to the success or failure of policies. Change and the willingness to accept this change is related to the ‘receptivity’ of an organisation or an individual to accept new knowledge, innovation or technology. Figure 1 below details the conceptual framework of pressures exerted onto current stormwater systems and how knowledge transfer is utilised to overcome the challenges faced when attempting to mainstream WSUD strategies.

**Figure 1.** Conceptual framework of WSUD and sustainable stormwater management through knowledge transfer (adapted from: Pearson et al., 2010)
The current unsustainable state of stormwater management is under the external pressures of climate change, rapid urbanisation, large-scale industrialisation, exponential population growth and widespread environmental degradation. The system itself is also under internal stress by critical water resource problems such as droughts and flooding, as well as having to supply ever increasing services utilising aging infrastructure. These pressures are signals that are recognised and put into context, which clarifies and identifies the problems. Next, stakeholders are engaged in order to facilitate knowledge transfer and awareness. This increase in information, knowledge flow, science and learning will enable change in mindsets as well as improvement and innovation in technology. This change in stakeholder mindsets enable the uptake of new skills and technologies to tackle this problem, with WSUD being one of the many strategies put forward. However, these solution sets themselves are under different influences such as stakeholder receptivity, institutional networks and perceptions. They are also simultaneously pushed by drivers and impeded by barriers. This process is expected to produce solution sets, but solutions themselves, when implemented and then subsequently reviewed, are anticipated to throw up different bodies of problems and pressures, which can be resolved through this same reiterative process. This entire process is affected by a continuous transfer of knowledge amongst stakeholders. This section will further detail how knowledge transfer can be utilised in order to facilitate the mainstreaming of WSUD strategies.

The concept of ‘receptivity’ is defined by Seaton & Cordey-Hayes (1993) as the ability of an organisation to identify and subsequently take advantage of new and innovative knowledge. This idea was adopted from the field of innovation and technology into the discipline of water management in order to better understand how human interact with and behave towards water and water management systems, and therefore enable the understanding of successful development and implementation of this resource (Jeffrey & Seaton, 2004). Jeffrey & Seaton (2004) states that the failure of policy can be in part related to the lack of understanding of the recipients to incorporate these changes, or to the failure of policy translation, where a mismatch of intentions and outcomes of the policy occurs. How much these new policies are accepted by stakeholders rely on the function of ‘fit’ between their motivations, expectations, norms, means and the policy ambition (Jeffrey & Seaton, 2004). Change is often instigated by necessity; and in Australia the most obvious being the current twin challenges of population growth and climate change. This motivation to change is also highly related to the ability of stakeholders to change—knowing about the benefits of WSUD is not the same as being receptive, or being able to achieve benefits from them (Jeffery & Seaton, 2004). Gilbert & Cordey-Hayes (1996) point out that any model for revolutionise in the 21st century must employ the concept of organisational knowledge transfer throughout the entire entity. A ‘learning organisation’ that is receptive is far better equipped to develop with emergence of new knowledge as well as be able to react to change in order to achieve success (Gilbert & Cordey-Hayes, 1996). Fien (1993) also points out that facilitating a fertile ‘learning environment’ is also important to create change. Fostering this learning environment with high levels of engagement, states Burkhard et al. (2000), allows for the ‘transformation’ of behaviour that helps increase the awareness that improves sustainable management of urban water. Cohen & Levinthal (1990, cited in Jeffery & Seaton, 2004) have argued that an organisation’s capacity to innovate and succeed in this therefore hinges upon its ability to conduct knowledge transfers.
Flow of knowledge between stakeholders, rather than that of physical equipment, is the key to technology transfer (Seaton & Cordey-Hayes, 1993). However, this will only be successful if the institutions involved are able to acquire, assimilate and apply this knowledge into organisational culture, and only when this knowledge and technology is seen to benefit them (Seaton & Cordey-Hayes, 1993). Wong (2001) suggests that current methods of knowledge transfer of sustainable stormwater paradigms such as publication and conference discussion need to be augmented by an inclusive community engagement. Smith & Smith (2006) states that sustainable outcomes are most likely achieved through a comprehensive learning process, whereby all stakeholders are engaged and all knowledge is shared. Effective communication on what is needed and expected is vital in order to ensure that all stakeholders are able to participate and are able to increase their knowledge and interest through this learning process (Pearson et al., 2010).

Technical guidelines based on best available practice also need to be developed, with collaboration between industry and researchers (Wong, 2001). Dialogue between these parties will not only help identify gaps in knowledge and determine subsequent research and policy direction, it will also uncover and exchange the knowledge and technical expertise which is available in both spheres (Wong, 2001). However, WSUD strategies are highly site-specific; this means that generic guidelines will only offer a certain amount of guidance (Gardiner & Hardy, 2005). While there is clearly a need for more specific direction, Gardiner & Hardy (2005) lament the fact that few developers are willing to share experiences due to commercial responsibility, and that knowledge transfer via publication is not an important factor in their line of work. However, it is encouraging that local councils (for example, the Municipal Association of Victoria and the GCCC) are willing to hold workshops, run programs and field trips to impart knowledge and experience. These programs also have the valuable role of developing skill levels and fostering dialogue not only between industry and researchers, but also amongst disciplines that may have never worked closely before. Feedback from participants has been overwhelmingly positive, showing that these initiatives are badly needed in the industry. The way in which technical knowledge is transferred efficiently is thus one of the more critical but understudied area of the efforts in mainstreaming WSUD.

5 Conclusion

It is only in the past decade that significant change in urban water management in Australia has occurred. One of the responses to the increasing degradation of the aquatic environment has been WSUD, which challenges the traditional manner of managing urban stormwater. Instead of an ‘out of sight, out of mind’ approach, WSUD represents a changing paradigm in urban stormwater management in Australia, where objectives go beyond rapid conveyance of runoff and include the protection of environmental quality, the promotion of stormwater as a resource, and the integration of stormwater facilities into the natural hydrological cycle. While its implementation in Australia has been rather slow and sporadic, rising awareness of impacts of urbanisation and other anthropogenic activities, impacts of climate change and increasing engagement between researchers and industry have prompted local authorities and land developers to adopt the WSUD philosophy, and to confront traditional issues regarding urban stormwater management (White & Lloyd, 2005). However, there is still a need for significant research to recognising core barriers and drivers in this area, such as considerable institutional
fragmentation as well as gaps in knowledge and awareness; these need to be identified and overcome. For the widespread uptake of WSUD strategies, all stakeholders need the benefits of additional planning, clearer legislation and deeper knowledge.

This paper presents means in which stakeholders can attempt to mainstream WSUD strategies through opportunities provided by knowledge based urban development and through knowledge transfer. Core components of these include the identification and recognition of pressures and problems, stakeholder engagement, evaluation of decisions and strategies, all elements which come under the over-arching umbrella of knowledge transfer. Linking urban stormwater management to a learning process is not a method that has been greatly emphasised, but its inclusion will only produce a more sustainable outcome for urban stormwater.

Improving stormwater quality not only benefits the water bodies it discharges to, but also creates an opportunity whereby stormwater can be used to augment potable water supplies. There are already significant drivers in replacing traditional stormwater management with innovative, sustainable measures such as WSUD, and the current situation is ripe for change agents to conduct further research in the area, to revolutionise traditional methods, and to build a new paradigm in urban stormwater management.

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The mixed-use complex as knowledge-intensive structure

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Structured Abstract

Purpose – The purpose of the paper is to examine the establishment of mixed-use complexes especially in urban inner city locations as a sustainable policy and intensive knowledge structure. Sustainability refers in this sense primarily to durability and the reduction of sprawl in terms of building materials and built earth-surface, while the intensive knowledge structure relates to its manifold of dimensions, processes and programmatic integration. Within the variety of sustainable city and building approaches the in-between scale is usually overlooked. Eco-concepts focus either on large structural systems on the city scale or on smaller building level possibilities at an architectural scale. Integration of the two scales might be considered when constructing complete new city lay-outs, but even then, the sustainable measurements are typically separated to scale.

Design/methodology/approach – I propose an approach that, besides a historical overview of main environmental approaches, discusses in more detail the current array of inclusive eco-concepts with a focus on mixed-use complexes. References to case studies and significant developments are made and discussed in terms of programmatic shifts, essential features and political conditions. Derived criteria should draw the conceptual requirements for a possible establishment of the mixed-use complex as an eco-city concept.

Originality/value – This methodology puts in evidence that currently, the tendency of scale enlargement, new organizational global patterns, knowledge-intensive time-management and emphasis on public space generates a strong stimulation for the establishment of mixed-use complexes. They are in planning terms relatively independent, which makes it a powerful instrument. Connecting to urban movements, structures and functions on the one hand and providing the city an architectural identity and realm on the other hand, mixed-use complexes respond to complexity and existing knowledge patterns in cities and landscapes, having the unique capacity to become attractive key points in urban fabric and to transfer areas in a dynamic way.

Practical implications – The outcomes of the application suggest that mixed-use complexes, spatially, economically and politically most often established as an independent structure, can be regarded as a strong opportunity to initiate essential eco-values within a short-time realisation framework.

Keywords – mixed-use complexes, knowledge-intensive, sustainability, integration, flexibility.

Paper type – Academic Research Paper
1 Introduction

Mixed-use complexes are featured by an interconnected building structure and a content-intensive mixed program. They are not a phenomenon of the last century as is often thought, but have a long course in history, heavily determined by strong policies. Throughout history, a common characteristic is the sharp focus on densification of knowledge and function on the one hand and matter and identity on the other hand, which opposes the tendency of urban sprawl. Early examples occurred in ancient Greece (800 B.C. – 3 A.D.), where initial single training schools (the gymnasium and especially the palaestra) gradually functioned as centres for social, educational, cultural and intellectual activities. Later on, the Forum Romanum in Rome can be considered as one of the first prime points of economic, cultural and political processes in inner urban areas.

As the notion time has become so important in society and urban organization, it is not surprising that the first modern mixed-use complexes emerged around transport zones, especially train stations. Grand Central Station (1913, New York) is one of the first stations to combine its transport functions with commercial, cultural and office functions, which was followed by many stations in Europe like Hoog Catharijne Utrecht (1973, The Netherlands) and Euralille TGV Station (1994, France). The second group of interest sharing functions mostly consist of cultural and commercial centres combined with offices and government functions like Sergels Torg in Stockholm (1974, Sweden). Transport places that are strategically situated in the urban fabric give as well strong possibilities for a mix of interest sharing functions, like the cruise terminal Ponte Parodi in Genua Harbour (2009, Italy).

As a result of the strong rise of environmental concerns, recently many of the proposed mixed-use complexes involve at least to some extent environmental schemes, although the majority of them target just energy reduction. More ambitious schemes show all-round environmental attempts concerning next to energy: water, green establishment, smart organisation of infrastructure, recyclable materials and occasionally flexible building methods. In this paper I focus on the most advanced environmental approaches that span different scales and address the main ecological themes in a significant way.

I will argue that in general, mixed-use complexes are relatively flexible on basis of their wide internal diversity and consequently sustainable as a building and plan structure, especially in combination with a strong architectural identity and well created connections to the existing urban pattern. Sustainability refers in this sense primarily to durability and the reduction of sprawl in terms of building materials and built earth-surface, while the intensive knowledge structure relates to its manifold of dimensions, processes and programmatic integration and continuity. Besides this essential basic sustainability, I aim to test the suitability of mixed-use complex to incorporate ecological main themes across the scales in a rather simple way due to its relatively political, economical and cultural independence.

The structure of this paper is to explore specific concepts and approaches for integration of sustainable layers and, in particular to examine the suitability of the mixed-use complex as strategic ecological intervention. A brief overview of main historical environmental approaches is given, followed by a more detailed narrative of the current array of inclusive eco-concepts with a focus on mixed-use complexes. References to case studies and significant developments are made and discussed in terms of programmatic shifts, essential features and political conditions. Derived criteria should draw the
conceptual requirements for a possible establishment of the mixed-use complex as an eco-city concept.

Although this paper seeks to include references from many different geographic areas, it certainly aims not to provide a complete overview of environmental approaches and scientific frameworks worldwide. A number of projects will be included that are relevant in the wider context and the focus is clearly on the design principles within ecological approaches.

2 Main eco-city approaches

2.1 Early environmental design developments

The first ecological design principles date back as far as 5000 years and are visible in ziggurat structures across old Mesopotamia (nowadays Iran and Iraq) in the form of vegetation for cooling purposes and integrated drainage water holes in its massive walls. The first written account is by Vitruvius who prescribed to plan the city lay-out of the Roman town according to the principles of protecting people against wind, heat and cold, while ensuring views from public places across the sea if possible or ‘with a view to general convenience and utility’. Translated to design parameters it included zoning guide lines, important sight lines, walking routes along colonnades and detailed recommendations for the use of materials, waste management and water systems. Other early smart ecological inventions include the Persian-originated windcatcher, used for cooling of buildings and entire city parts, and a wide range of natural building materials.

The majority of ecological movement reviews regards the early design techniques as just vernacular and not ecological since in general there was no urgent need and, mostly, since it was not explicitly intended as ecological. I do not agree with this view as many different options were possible and yet it was chosen to do it in a particular way with ecologically advantages. The fact that there was no need or ecological intention does not make the solution less ecological or less interesting.

These early developments and discoveries in ecological approaches, which clearly focused on the building physics component, generating relatively convenient conditions for both the inhabitants and the world system, have been abandoned for a long time. After the fall of the Roman Empire during the 5th century, environmental knowledge and applications are lost in a significant way and the attention turned to establishing communal places of economics and religion and private expressions of power without particularly environmental or mixed zoning interest. The more complex interventions of smart zoning, wind use and justified material usage as well as the mixed-use complex were rarely found for almost a millennium. Water providing structures and sunlight block/usage in architectural and urban settings were more common, although the recycling techniques were not applied until the last century.

As a result of the gap in ecological interest, instead of a gradual evolution of early environmental techniques, a strong disruption is visible and almost a new start occurred in the second half of the 19th century with a main focus on the human conditions. Within this new approach, it is the social, political and organizational perspective that gave attention to ecological issues and, consequently, an opposite vision is noticeable – holistic, ideological world views are predicted in sets of ideas without any explicit design techniques involved. The ecological principles were not primarily the result of new inventions, but merely a reaction to the social, political and technical circumstances (of
mainly the Industrial Revolution) in society at that time. These early environmental concerns wrote by pioneers as Ruskin and Morris (and later on the movement of Arts & Crafts) were explicitly focused on traditions and ethics. During the 20th century the focal point shifted to rather environmental design oriented writings, clearly positioned in the fields of urbanism and architecture. Lynch and Alexander, two main representatives of environmental oriented rising theories, focused on respectively the psychological and the structural pattern characteristics in architecture and urban planning, addressing several design scales in explicitly stated principles while relating them to design suggestions.

When reviewing the history of environmental design, in general, considerable attention is paid to main architects during the 19th and 20th century who took an organic approach to architecture or integrated in the design important human values in relationship to nature, as daylight and far views. Horta and Guimard (Art Nouveau movement), Wagner, Gaudi, Taut and Frank Lloyd Wright are in general named in association with organic architecture, while Le Corbusier, Alvar Aalto and Buckminster Fuller are considered as masters playing with the harmony and geometry between architecture and nature. Lastly, environmental initiatives became a significant sub-discipline movement in the 1960s, strongly involved with politics. During this time, platforms and groups were formed to discuss the possibilities of environmental values in the architectural and urban disciplines, which continued on thoughts of the early pioneers. Examples of these formations are 'Principles of Intelligent Urbanism' (1960s) and 'New Urbanism' (1980s); both formations still worked in the format of formulated principles heavily focused on the human condition state.

Concluding, two separate lines can be distinguished in the early history of environmental design: one that is clearly oriented towards the structures of building physics, essentially expressed in practical design techniques, which had its peak during the Roman Empire, and one that is rather oriented towards the human condition state, typically conveyed in idealistic principles, which had its peak during the 19th and 20th century. A fundamental difference between the two approaches is that the former addresses clearly both the state of the world environment system and the human condition, while the latter just focuses on the human factor and implies no regulations for a neutral or positive world-climate state in the sense of building physics.

2.2 All-round eco-concepts

The fairly distinguished environmental approaches so far gradually merged in the last decades and were significantly enriched in both its technical as the social and political sides. It led to the introduction of more all-round ecological concepts, although most attempts evidently emphasize a single main aspect. After the institutionalisation of the environmental discourse in the 1960s, a second important advancement was made during the 1980s and 1990s when environmental aspects in architecture received considerable attention within university networks and establishments. Slowly, it started to become a fundamental research subject at Departments of Architecture and Urban Planning. The development of theoretical scientific insights and methods urged a strong impulse in its field and a transformation occurred into a fully recognized discipline.

One of the first integrated eco-concept is referred to as permaculture, initiated by Bill Mollison and David Holmgren in Australia during the mid 1970s. Permaculture clearly approaches the environmental design technique from an integrative ecological relationship structure of intelligent linked processes in which it analyses both the
characteristics of the structure itself as the designed relationships. Although this approach is highly integrative of character, it does not necessarily involve any architectural, urban or social dimensions in its original theories and is therefore not very often considered as a leading concept by urban planners or architects.

In the 1990s, The Netherlands formed an important scientific centre for design oriented environmental theories in both the architectural and the urban field and a set of premises was introduced that rather centralises the design activity instead of the overall sustainable world view. Clearly anticipating on the integration of ecological impacts into the design process, a few design theories were developed of which the most design oriented is Integral Designing by Kristinsson. Kristinsson manifestly set the building physics, which were such central elements in ancient times, back on the agenda. He promotes an architecture and urban planning that strongly emphasize the physical and technical aspects (as heat/cold transport, light, ventilation, damp, natural materials) across all scales and disciplines, as an integrative part of the architectural design process; no distinction is necessary between good architecture and well-designed sustainability. One of the first to make use of both formulated principles and clear design techniques with technical specifications, although applied to a rather small scale; it did set the perspective for true integration to develop in the last decade.

It was Ken Yeang, who took the integration of design and sustainability to another level around millennium times by focusing on large mixed-use building complexes, especially high-rise towers, in both his writings and designs. He convincingly pushed the field of environmental building design into the large-scale dimension and emerged as a central figure in the environmental design field. Although critics debate whether his designs are truly environmentally profitable as tests have proven that some of his buildings are consuming more energy than conventionally designed equivalent buildings, he has developed his theories over ten years in an interesting concept of four integrative infrastructures: eco-infrastructure, engineering infrastructure, water infrastructure and human infrastructure. On the architectural scale he defines as well four infrastructures: the red infrastructure of energy, the blue infrastructure of water, the grey infrastructure of installations and lastly, the available resources to actually make the building. It is the main task to find a balance between all these different and conflicting aspects, in which strategies have become crucial.

2.3 The sustainability hype

Since the film of Gore, the environmental discourse has gone wild in the last five years and became a hype. Roughly, 3 main developments can be distinguished:

1) The emergence of the new discipline sustainability science that focuses on ecological specifics, strategic management and relevant criteria/parameters and paradigms in general.

2) The development of methods in urban and architectural domains related to ecological parameters, such as checklist, classification/categorisation schemes, certificate rating etc..

3) The architectural and urban practices, which tend strongly to focus on certificate targets and a ‘green’ image in general, often claiming to have addressed sustainability wherever possible.
In general, a strong rise occurred in the quantification of the early physical building design parameters, involving ecological data and parameters, and setting criteria and minimum targets to be reached within projects. It is clearly the ambition to integrate and combine different environmental views and options that are developed during history, with a strong emphasis on new techniques and possibilities. There is no longer a focus on just one scale, but projects cover the wide spectrum from micro-algae to large-scale urban planning.

It has become the aim to use the environment in a smart way as in the ancient times was done, and even more, to facilitate the world’s complex climatologically environment and, if possible, to improve its conditions. The design process has taken a central place in this approach instead of the final design product as was the case during the last two centuries. Integration of the different demands has become the main aspect and instruments of quantification and calculation have become vital. Nowadays simulation programs to estimate the influence on the world conditions are highly usual and, in general, several scenarios are considered for each design step from different points of view.

Sustainability science and urban/architectural methods involving ecological parameters are extensively discussed within academic environments. Far less brought up is the actual design/planning process going on in urban and architectural firms. This paper explicitly focuses on ecological design principles and I will briefly discuss some of the most ecological advanced and integrative practices both at the urban planning and the architectural scale. I considered case studies of a number of cities and architectural firms that recently were nominated for awards of most sustainable/liveable city/project worldwide. The urban ecology approach of Barcelona proved to be one of the most integrative, all-round and accurate ecological urban approaches amongst a selection of cities as Vancouver, Seattle, Oslo, Stockholm, Melbourne, Curitiba and Lyon and therefore I selected this approach as case study. For the architectural firms, Foster + Partners showed strong expertise in ecological approaches at both the urban and architectural scale in their designs as well as in their writings. They clearly represent one of the most integrative, all-round ecological approaches in the architectural and urban design field.

3 Case studies environmental practices

3.1 The Urban Ecology Agency of Barcelona

Some years ago, in 2007, The Urban Ecology Agency of Barcelona (BCN Ecologia) was initiated as a government consortium to develop urban sustainable strategies based on information and knowledge. It aims to enhance the existing complexity in its built territories and to stimulate the possibilities instead of reducing complexity to obtain a ‘manageable’ overview. Clearly aiming to replace the current consumption society model with a model that can tackle both sustainability and the incorporation of information and knowledge into society, the consortium proposes in collaboration with Barcelona City Council the Agenda 21 framework which includes the following strategies: 1) Compactness; and its compatibility with inhabitability and the quality of life (aim: against speculation – original plan for Eixample by Serda was 50% building and 50% open space).
2) **Complexity**: to continue and increase the Mediterranean tradition of mixed-use functions, knowledge structures and complex urban fabrics/eco-systems.

3) **Efficiency**: aimed at achieving maximum efficiency in the use of resources and minimum disturbance to the ecosystems.

4) **Stability**: aiming for social cohesion, co-development frameworks and capacity for anticipation. Just in stable contexts the diversity of the components has gradually increased, and consequently the stock of organised information that provides opportunities.

So far, the proposal acts like any other listing of formulated important criteria from any kind of perspective that is subject to wide interpretation. However, BCN Ecologia handles an all-embracing approach and supplements these broad visions with a wide variety of indicators of the aimed qualities (even mathematical), a provision of economic, legal, organisational and educational instruments for realisation including local strategies and programmes, the agreement of management implementations across 400 agencies in Barcelona and a strong application to the spatial dimension, consisting of drawings, diagrams, analyses and conceptual sketches and schemes. Together it forms an incredibly rich, informative and strategic approach aiming for broad visions and concrete measurements at the same time in an integrative development framework.

3.2 **The sustainability forum of foster + partners**

Foster + Partners state they have always embraced environmental values in the broadest sense in their designs since the beginning of the firm. One of the very few (if not the only) prominent architectural office to have received several awards for its sustainable designs during the 90s before the sustainability hype, the office shows indeed a long dedication to sustainable values. The architectural office however, clearly addressed the more social and cultural environmental values back then and the initial involvement with the more building physics oriented green technologies was not as strong as it is these days. They describe their current involvement with sustainability as following, reflecting their broad definition: ‘While architects cannot solve all the world’s ecological problems, we can design energy efficient, socially responsible buildings and we can influence transport patterns through urban planning. Importantly, sustainability also implies a way of building that is sensitive to its location and the culture that has shaped it.’

The office of Foster + Partners has not defined a set of leading principles, but rather identified the main themes they address in every single design from a holistic perspective; they aim in an explorative way for new solutions in order to achieve a maximum overall result. In general, several design options are developed in the studio and discussed within the Board of Design for its main characteristics, values and possibilities. Most often the proposal is chosen, in a somewhat pragmatic way, ‘that simply gets the most ticks concerning the relevant criteria and requirements’ as Paul Kalkhoven formulates it.

The considered main themes in each design are the following:

1) Location;
2) Function;
3) Orientation;
4) Form;
5) Structure;
6) Heating and ventilation systems;
7) Materials Used;
8) Amount of Energy to build and maintain;
10) Amount of Energy to travel to and from it.

Although these themes are fairly standard, it proves again to be the exact working method that is decisive for its final qualities. In order to address the many domains they intend to, the office maintains an inclusive working method with strong assistance of the Research and Development Group, and in particular, the Sustainability Forum. The Forum was established to consolidate and develop the practice’s knowledge base and has allowed them to develop better access to information on new products, materials, and research findings. The Forum acts as a library, information centre, archive and a database and the gathered information consists of strategies, parameters and most of all technical specifics, for which they work in close cooperation with ecological specialists and industrial partners. It helps the studio to make new advances in sustainable design and often leads to pioneering sustainable solutions and projects. As the studio mentions: ‘By maintaining a commitment to internal and external research, we are not only up-to-date with new knowledge and techniques, but are also able to evaluate their relevance and appropriateness for individual projects.’ Usually, a sustainability profile is established for every project in which targets (as a rule one of the LEED or BREEAM certificates) and methods are agreed on in cooperation with the client. ‘In doing so, our aim is to provide a system to monitor the sustainability agenda of individual projects and to promote a strong sustainable design ethic.’

3.3 Criteria for integrative ecological and knowledge-intensive approaches

Both sustainable methods of Barcelona and Foster + Partners show substantial common characteristics. First of all, the methods make use of strategies and general visions on the one hand and clear parameters, indicators, criteria and targets on the other hand, often expressed in terms of building physics. It involves an all-round integrative approach across all layers and scales. Secondly, and importantly, they refuse to follow simply the speculation market or easy solutions and strongly commit to ecological values to achieve truly an improvement in the built environment. For the third, they embrace complexity instead of reducing it, and structure their working methods accordingly, reflecting the complex integrative design process. The fourth common aspect is the fact that both methods highly emphasise the present local ecological and knowledge-intensive structures and define it as one of the main aims to considerably improve these qualities with the intervention. The fifth aspect concerns the strong management network they created around the working method, aiming for actual realisation while collaborating with industry and many partners.

Translating these common characteristics to derived criteria for ecological integrative approaches, possibly applicable to mixed-use complexes, the criteria could be formulated as aiming for the following:

1) Strategic Design – involving visions and general strategies, design oriented;
2) Parametrical Design – aspiring to improve the ecological and knowledge-intensive local conditions and to set targets;
3) All-round Integrative Design – allowing complexity, relating visions and strategies to parameters/targets and to design decisions and sketches.

4 Conditions for mixed-use complexes

Having described two of the current most integrative advanced ecological practices and its derived criteria, it is worth examining the suitability of the mixed-use complex as
strategic ecological intervention. The mixed-use complex turns out to be relatively independent in political, economic and spatial sense. Considering 100 mixed-use complexes across the world (24 Europe, 21 Asia, 9 Oceania, 6 Russia, 17 Middle East, 2 Africa, 17 America’s, 4 Canada), it appears that just 31% of them are initiated by government agencies; in the majority of projects private corporations acted as client. Examining the overall spatial and political planning situations for ten of these (randomly picked) mixed-use complexes, it indicates that in all cases the mixed-use complexes are explicitly planned by national/local planning authorities as an outstanding, but rather independent structure. As a result, the mixed-use complex is seldom developed by an urban planner/designer as part of a bigger ensemble, but in general considered as a unique architectural opportunity to brand the city (part) and treated as an architectural design assignment.

Hence, regarded in political, economic and spatial context as an exclusive exception, the mixed-use complex is hardly bound by any regulations or standards and has strong opportunities as an independent framework to incorporate both ecological and cultural knowledge-intensive location-specific structures. So far, however, this is recently not very often the case; 76% of the 100 analysisd mixed-use complexes appear not to include any cultural nor ecological function. The majority of the functions include shopping malls, retail, offices and apartments. Less than 25% of the centres allow a cultural function, while barely 3% addresses an ecological function that transcends energy-saving measures. Nowadays mixed-use complexes are in general fairly one-dimensional, plain and simple constructions in comparison to the cultural, intellectual, economic, and political centres formed by its ancient precedents in Roman times. It is not surprising therefore, that the mixed-use complex has in general not a very popular image with the public; it is simply too monotonous and pompous. Taking in consideration the ecological and knowledge-intensive criteria of strategic, parametrical and integrative design, cities should aim to facilitate mixed-use complexes as instrumental tools for intensification. Building on its possibly wide variety in functions and internal flexibility, it should not longer prioritise just speculation motives, but regard mixed-use complexes as excellent opportunities for ecological and knowledge nodes in the middle of the city centre and embrace it as a major stimulation.
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Evaluation of accessibility for knowledge-based cities

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Structured Abstract

Purpose - The purpose of the paper is to develop a framework for evaluation of accessibility for knowledge-based cities.

Design/methodology/approach - This approach notifies common mistakes and problems in accessibility assessment for knowledge cities.

Originality/value - Accessibility plays a key role in transport sustainability and recognizes the crucial links between transport and sustainable goals like air quality, environmental resource consumption & social equity. In knowledge cities, accessibility has significant effects on quality of life and social equity by improving the mobility of people and goods. Accessibility also influences patterns of growth and economic health by providing access to land. Accessibility is not only one of the components of knowledge cities but also affects other elements of knowledge cities directly or indirectly.

Practical implications - The outcomes of the application will be helpful for developing particular methodologies for evaluating knowledge cities. On other words, this
methodology attempts to develop an assessment procedure for examining accessibility of knowledge-based cities.

**Keywords** - accessibility, knowledge-based cities’ accessibility, knowledge base urban development, accessibility assessment for knowledge-based cities.

**Paper type** - Academic Research Paper

1 **Introduction**

The knowledge city (KC) concept has become an attractive notion because it relates to interests in regional development policies, and emphasises the development and progression of technologies and socio-economic activities (Oh, 2002). KCs play a fundamental role in knowledge creation, economic growth and urban development. Edvinsson (2003) describes KC as a city that is firmly designed to encourage the development of knowledge. The notion of KC is interchangeable to a certain degree with similar evolving concepts such as ‘knowledge-based clusters’ (Arbonies and Moso, 2002), ‘ideopolis’ (Garcia, 2004) or ‘technopolis’ (Smilor et al., 1988).

As societies become increasingly knowledge-based, the character of city development transforms because activities in the knowledge sector are becoming more important and they need conditions and environments which are very different from those required by service-based manufacturing activities in the production sector (Knight, 1995). Literature indicates the importance of essential conditions for cities to change their position towards KC in various developments levels and scales (Van Winden et al., 2007; Yigitcanlar et al., 2007). Even though prior research regarding KCs refers to about three decades ago (Ryser, 1994; Knight, 1995) and a number of cities have had a strong association with knowledge development concept, recently, most cities around the world have started giving direct attention to knowledge based urban development (KBUD) (Carrillo, 2004; Ovalle et al., 2004).

One of the undeniable components of this development is accessibility. Accessibility is one of the most important factors for KBUD and increasing accessibility helps to develop knowledge-based cities. In this regard, evaluation of accessibility for knowledge cities is one of the key difficulties in assessment of KBUD. This paper attempts to find the problems in evaluation of accessibility as a KC component and proposes a framework for this assessment.

2 **Sustainable transport and knowledge-based urban development**

Rapid urbanisation and its immense effects on the environment have raised the importance of urban sustainability, and the necessity of reviewing urban transport plans in the knowledge era (Yigitcanlar et al., 2008). One of the important issues in life quality of cities is related to sustainable transport of cities. Sustainable transport should guarantee environmental consideration in development. One of these environmental considerations is the modal shift from private automobiles to public transport. Automobile dependence associated with urban sprawl has resulted in a series of problems in terms of economic, environmental, social equity, quality of life and human liveability (Newman and Kenworthy in Kwok & Yeh, 2004). Hence, a sustainable transport system should balance short- and long-term requirements for the environment, economic growth, and community (Heanue & Petty, 1998). In this regard, accessibility is a key element in transport sustainability. Accessibility ‘appears central to overcoming the current friction among major environmental issues, social aspiration and economic imperatives’ (Bertolini,
Current knowledge developments tend to increase mobility. However, high-quality mobility does not guarantee high-quality of accessibility and increases the environmental impacts of transport. This tendency decreases the quality of life and social equity of cities. Therefore, improving accessibility has a key effect on knowledge-based urban development.

3 Knowledge city concept

The theory of the KC is very extensive and may refer to all aspects of social, economic, and cultural life of a city (Ergazakis et al., 2006). According to Ergazakis et al. (2004), ‘A KC is a city that aims at a knowledge-based development, by encouraging the continuous creation, sharing, evaluation, renewal and up-to-date knowledge’.

One of the more frequently cited definitions of a KC is explained by Edvinsson (2003), in which he mentions that a KC is a city that is designed to encourage the development of knowledge. According to Amidon (2005), the aim of a KC (she uses the term Knowledge Zone) is to create and realize value from the flow of knowledge. One of the latest and most detailed definitions is contained in the conference announcement for the 2nd International Symposium on Knowledge Cities (2007):

‘A KC is the one that depends on Knowledge-Based Economy and possesses advanced means for facilitating knowledge to its citizens, who should be linked to the cities through communication and information technology; the one that provides a wide range of public libraries and educational, cultural and social facilities guided by a central strategy of education; and it is the city that respects the diversified cultures of its citizens and provides them with adequate know-how and tools that enable them [to] participate effectively in establishing the knowledge community’.

The term KC has entered into knowledge management, urban planning, economic development, transportation and other disciplines. It refers to urban areas that are intentionally designed and governed to facilitate the creation and flow of knowledge for sustainable development (Merrick, 2009).

KC can be seen as an umbrella concept for geographical entities, which focuses on knowledge creation, and covers knowledge spaces such as ‘knowledge precincts / corridors / villages / regions’ (Dvir & Pasher, 2004). The KC is an emerging, interdisciplinary focus of study that encompasses knowledge management, urban planning and design, information and communication technology, public policy, economic development, and other disciplines (Merrick, 2009).

In this regard, knowledge-based development concentrates on strategies and alternative methods for generating urban ‘centres of excellence’, development successful infrastructure, providing generalized access, and reducing side effects on urban development (Nagy, 2001).

3.1 Knowledge city components

Literature review reveals that KC has different components. While it is recognised that every KC is different, and requires diverse knowledge qualities to grow, there are a number of consistent qualities that generally characterise a KC (Yigitcanlar et al., 2008). For example, the major characteristics of a KC in the case of the ‘Strategic Plan of the Cultural Sector’ Barcelona City (2003) has been listed as accessibility, cutting edge technology, innovation, cultural facilities and services and quality education as well as world class economic opportunities. Similarly, Van Winden and others (2007) improve
Barcelona’s KC elements and provide a framework of characteristics for the structure of KC. The components which have been considered in a KC are:

- Knowledge base
- Industrial structure
- Quality of life and urban amenities
- Urban diversity
- Accessibility
- Social equity

1. The knowledge base: This component shows the universities, polytechnics and other public and private R&D activities in the urban region (knowledge infrastructure), as well as the educational status of the people. Several research efforts have revealed a link between these infrastructure elements and different aspects of urban development. For example, Matthiessen et al. (2002) analysed 40 cities which shows that knowledge infrastructure has impact on the economic life of a city and urban growth. However, as the interaction between universities and the business sector is not defined properly in many cities, this potential remains inactive. A key challenge for authorities is considering regional business sectors in the research and education centres. Another challenge is to counter the knowledge infrastructures which can cause many complexities. Large urban areas typically have a number of universities that work independently and may have some overlaps in terms of educational and research programmes. Also, many studies suggest that cities with a many share workers with tertiary education show better performance generally (van Winden et al., 2007; Glaeser, 2000; and Simon, 1998).

2. The industrial structure: This component deeply effects on the urban knowledge economy. Cities with a weak industrial structure have many interrelated difficulties (van Winden et al., 2007; Turok and Edge, 1999; Cheshire and Gordon, 1995). Based on comparing regions with a healthier economic base, it is extremely difficult to retain or attract knowledge intensive companies. Many evaluation methods for industrial structures have been proposed. As the contemporary evaluations for this component, it is suggested to consider the degree of specialisation. Small and medium-sized urban regions tend to be more specialised than large metropolitan areas (Henderson, 1997). However, some larger urban regions are also relatively specialised—for instance, Frankfurt (finance), Helsinki (ICT)—whereas other regions reliable on a broader variety of sectors (van Winden et al., 2007).

3. Accessibility: This component is required for a city to obtain, generate and use knowledge effectively for greater economic and social development. The knowledge economy in cities is a networked economy (van Winden et al., 2007). Simmie (2002) argues that international contacts and network conducted by face-to-face contacts. These connections are facilitated by international airports and they are critical factors for international knowledge transfers. Also, proper accessibility provides appropriate connection between knowledge and industrial bases. Successful cities should manage environmentally-friendly accessibility for all urban residents. Therefore, proper international, regional and multimodal accessibility is crucial for successful knowledge cities. For smaller cities, the lack of international transports can be a significant barrier to economic development (van Winden et al., 2007) while for greater ones the regional accessibility plays key role on knowledge cities.

4. Quality of life: The quality of urban life has crucial importance in knowledge cities (Florida, 2002). Quality of life refers “to the more or less ‘good’ or ‘satisfactory’ character of people’s life” (Szalai, 1980). Quality of life, ‘the liveability of a region’,
commonly includes such indicators as the standard and variety of facilities, education and community services, climate, environmental quality, housing affordability, crime level, and transportation access (Van den Berg et al., 2004). In this regard, Van Winden & et al. (2007) described the characteristics of life quality as an attractive built environment, high-quality houses, attractive city parks, clean air, a variety of cultural institutions, and also high-quality hospitals and (international) schools. These indicators do not include more traditional considerations such as the quantity, quality and housing affordability (Berry, 2005; Franke and Verhagen, 2005). In this regard, accessibility to urban facilities can be defined as one of the quality of life dimensions as well as can improve the quality of an urban environment and affects convenience of residents.

5. Urban diversity: Diversity covers various ranges of the person (e.g. gender), the community (e.g. ethnicity) and the place (e.g. the architecture of the urban fabric) (Van den Berg et al., 2004). Diversity is defined in a cosmopolitism atmosphere, accepting of foreigners and opening channels for the communication/exchange of knowledge (Florida, 2002). On the other hand, of course, diversity can raise social tension and conflict (e.g. between the resident culture and an unaccepted ethnic minority) (Carvalho, 2006).

6. Social equity: Social equity is one of the significant aspects for sustainable urban development. Current economic growth tends to increase the gap between social classes, which leads to a dual economy of knowledge workers and a growing underclass (Carvalho, 2006). Consequently, this economic policies increase social tensions and conflicts (Van den Berg et al., 2004). On the other hand, from the perspective of sustainable growth, it is important to reduce poverty and inequality. Social equity cannot be limited to urban economy, this concept has broad concept in other urban dimensions. The effects of urban public facilities on social equity have been discussed during the past two decades (Smith 1994; Erkip 1997; Ogryczak 2000; Tsou et al. 2005). Accessibility is undeniable indicator for social equity (Talen 1998). One of the factors of social equity is related to transportation equity. Although high-quality mobility represents a proper condition to access urban amenities and services, it may not represent social equity. The urban facilities may not be shared out equally among the individuals and the social groups or does not reflect the same quality everywhere in relation to the resources used and the constraints which limit their use (Colleoni, 2007). Therefore, accessibility plays critical role in knowledge base urban development through social equity. Also, improving social equity has a constructive effect on the quality of life in the cities. Figure 1 shows KC’s components theirs interactions.

Due to the influence of accessibility directly and indirectly on KC, increasing accessibility has become the key subject in knowledge-based urban developments. The first step to improve accessibility in support of knowledge-based development is to define a framework for accessibility measurement. The next section explains the accessibility, its components and measuring methods briefly.

4 Defining accessibility

Accessibility definitions become very important from this fact that ‘different accessibility measures often show different approaches to accessibility’ (Makri & Folkesson, 1999). Accessibility is defined and operationalised in several ways, and therefore has taken on a range of meanings. These include such well-known definitions as ‘the potential of opportunities for interaction’ (Hansen, 1959), ‘the ease with which any land-use activity can be reached from a location using a particular transport system’
(Dalvi & Martin, 1976), ‘the freedom of individuals to decide whether or not to participate in different activities’ (Burns, 1979) and ‘the benefits provided by a transport/land-use system’ (Ben-Akiva & Lerman, 1985).

**Figure 1.** KC framework of analysis (Van Winden et al., 2007)

Very roughly, accessibility has been defined as ‘a measure of an individual’s freedom to participate in activities in the environment’ (Weibull, 1980). According to the recent explanations accessibility is ‘a measure or indicator of the performance of transport systems in serving individuals living in a community’ (El-Geneidy & Levinson, 2006). The concept of accessibility can be intuitively grasped and it makes the interaction between the land-use and transport systems detectable (Bertolini, 2005).

Moreover, the concept of accessibility spans a variety of aspects such as the physical, mental, economic and financial (Doi et al., 2008). In addition, accessibility also guarantees to be a useful tool for monitoring the land use and transport system, and assessing the benefits of proposed changes to land use or networks (El-Geneidy et al., 2008). Weinbull (1980) has pointed out that accessibility can be defined as a multi-faced notion that finally centres on an individual’s ability to conduct activities within a given environment.

4.1 **Accessibility components**

Accessibility involves a large number of complex and interacting relationships that are often difficult to quantify and analyse (Pirie, 1979; Pooler, 1987). Many factors affect accessibility, including people’s transport needs and abilities, the quality and affordability of transport options, the degree to which various links and modes are connected, land use patterns, and the quality of mobility substitutes (Litman, 2007).

On the other hand, although there are many different measures of accessibility that vary in terms of details, there are two common aspects in most definitions of accessibilities: the first is the attractiveness and the second is the impedance functions. The attractiveness (land use component) is usually measured as the number of opportunities at destinations. For example, when measuring accessibility to jobs, the attraction value can be the number of jobs at the various potential destinations, while for
shopping centres this can be the number of shops in the centre. The impedance function consists of a measure of the transport system, such as travel time or travel distance (Cerda, 2009). Moreover, these functions describe the probability of being attracted to such destinations based on distance or travel time (El-Geneidy & Levinson, 2006).

Two other aspects that often are considered in accessibility measures are the temporal and individual components. However, this study found that current accessibility definitions tend to neglect the effect of the urban pattern. The urban form and structure can define artificial barriers for the accessibility of residents. Current accessibility measurements have a tendency to ignore the direct and indirect effect of street networks on accessibility estimations. Hence, from these aspects and the different definitions, five components of accessibility can be described as following:

1. **The land-use component** represents the land-use system, including (a) the amount, quality and spatial distribution opportunities (jobs, shops, health, social and recreational facilities, etc.), and (b) the demand for these opportunities at origin locations (e.g. where inhabitants live), (c) the confrontation of supply of and demand for opportunities, which may cause competition for activities with restricted capacity such as job and school vacancies and hospital beds (Geurs & van Wee, 2004). These opportunities can be weighted to account for their attractiveness or for the competition effect (Cerda, 2009).

2. **The transport component** describes the transport system, expressed as the sensitivity of individuals to the distance between an origin and a destination using a specific transport mode; included are the amount of time (travel, waiting and parking), costs (fixed and variable) and effort (including reliability, level of comfort, accident risk, etc.). “The supply of infrastructure includes its location and characteristics (e.g. maximum travel speed, number of lanes, public transport timetables and travel costs). The demand relates to both passenger and freight travel (Geurs & van Wee, 2004).

3. **The temporal component** represents ‘very basically by calculating accessibility within a predetermined travel-time or for a specific time of day (e.g. the morning peak)’ (Cerda, 2009) or describes the temporal constraints, i.e. the availability of opportunities at different times of the day, and the time available for individuals to participate in certain activities (e.g. work, recreation).

4. **The individual component** reflects the needs (depending on age, gender, educational level, household situation, etc.), abilities (depending on individual’s physical condition, availability of travel modes, etc.) and opportunities (depending on individual’s income, travel budget, educational level, etc.) of individuals. These characteristics influence a person’s level of access to transport modes and spatially distributed opportunities and may strongly influence the total aggregate accessibility result (Cervero et al., 1997; Shen, 1998; Geurs and Ritsema van Eck, 2003).

5. **The urban form and structure component** reflects natural and artificial network barriers including gradients, network convenience (including lighting, pavement condition and network crossing) and form of city. This component causes a diminishing effect on accessibility by walking to stations or destinations and discourages individuals from walking or using public transit to reach opportunities.
4.2 Accessibility measurements

Since definition of accessibility concept, different measurements have been developed over the past five decades, which are various in terms of approach and methodology. However, in that accessibility measures did not focus on forecasting development, but rather on explaining the effects of different urban or regional land-use systems on social and economic interaction (Geertman & van Eck, 1995). All of the studied measures of accessibility possess similarities, which are observed using both visual and statistical methods (El-Geneidy & Levinson, 2006). These measurements can be broadly grouped into six main types that are introduced in the following.

4.2.1 Distance measures

Distance measures are the simplest accessibility measurement, counting the distance from one location to different opportunities. It can be measured as average distance, weighted area distance, or distance to the closest opportunity. The estimation of these distances can be performed in several ways, from simple straight-line distances to more complicated impedance formulations. Measuring accessibility by average distance estimates either the average distance to one destination from all departure points in the area, or the opposite, the average distance to all destinations from one departure point or zone. The attraction of the destinations is not included in this measure.

4.2.2 Cumulative opportunity measures

The cumulative opportunity measure is one of the simplest accessibility measures to calculate and one of the earliest to have been developed (Wachs & Kumagai, 1973). Cumulative opportunity measures typically describe the number of opportunities that can be reached within a certain time, distance or cost. For example, the numbers of jobs within 30 minutes travel time from a residential area by certain modes. There are three main types of cumulative opportunity measures: fixed impedances (time, distance or cost), fixed opportunities, and fixed population. Fixed impedance describes the number of opportunities within a certain time, distance or cost limit. Fixed opportunities expresses the average or total impedance (measured in cost, time or distance units) required to access a specified number of opportunities while fixed population describes the average population available within various fixed travel impedances.

4.2.3 Gravity-based measures

Gravity-based measures (also called potential accessibility measures) derive from the denominator of the gravity model for trip distribution (Geertman and van Eck, 1995; Sonesson, 1998). Gravity-based measures were first devised by Hanson (1959), and have since been widely used. They are obtained by weighting opportunities in an area with a measure indicating their attraction and discounting them by impedance measure (Makri & Folkesson, 1999). The differences between various studies of this accessibility model are about utilising functional forms that measure the cost to move between origin and destination and how opportunities are calculated (El-Geneidy & Levinson, 2006).

4.2.4 Utility-based measures

Utility-based measures are based on random utility theory, in which the probability of an individual making a particular choice is relative to the utility of all choices (Handy & Niemeier 1997, Makri & Folkesson, 1999). Utility-based measures take into account the attributes of each choice and the socioeconomic characteristics of the individual or household (in addition to the opportunities available at different destinations and the
travel cost of reaching them) (Envall, 2007). The utility-based measure is the most complex and data-intensive of the location-based accessibility measures. It was developed in order to provide a solid theoretical basis for the concept of accessibility and it is directly linked to economic theory and adheres to travel behaviour theories (Ben-Akiva & Lerman, 1979).

4.2.5 Space-time measures

The theory of space-time measures also known as people-based measures first proposed by Hagerstrand (1970) and further elaborated by Lenntorp (1976). The space-time measure accounts for the spatial and temporal dimensions of participating in a given activity. This means that activities take place at a given location at a given time, for a specific duration (Miller, 1991). Space-time measures express the feasibility of opportunities to an individual using the volumes of the space-time prism as indicators of accessibility. The transport system determines travel speeds and network constraints which affect the amount of time available to participate in activities at dispersed locations (Miller, 1999).

4.2.6 Place rank measure

Place rank is an accessibility measure that requires the knowledge of actual choices of origins and destinations. The place rank measure is inspired from a methodology developed by Brin and Page (1998) that is applied in ranking web pages for large scale search engines. Web pages are ranked according to the links connecting to them, which in turn are valued according to their host’s rank. This translates into an accessibility measure that ranks each location based on the number of people commuting to it to reach an opportunity; each person’s contribution is ranked according to the attractiveness of their origin zone as a final destination. This measure is based on the flows between origins and destinations and it accounts for the number of opportunities that an individual foregoes in a zone to reach an opportunity in another zone. The power of the contribution of this person depends on the attractiveness of his zone of origin (El-Geneidy & Levinson, 2006).

5 Framework for accessibility evaluation in support of KC

Although accessibility is one the main components of the KC notion, current KC evaluations do not assess the effects of accessibility on knowledge-based development accurately. These assessments suffer from different weaknesses. These problems are clarified in the next subsections.

5.1 Appropriate destinations

Current KC concepts focus on airport destinations and neglect the effect of accessibility to other opportunities. In small cities, accessibility to international airports can be significant for economic and social development. In contrast, in metropolitan cities accessibility to airports cannot show the degree of knowledge-based development while accessibility to other opportunities has a great impact on city development. Clearly, considering the limited destinations (the KC’s opportunities) provides inaccurate accessibility estimations. The issue of choosing proper destinations for evaluation of KC interrelates with many socio-economic criteria. According to the KC components this study proposes to include polytechnics and other public and private R&D activities for
estimation the accessibility in the region. It also, suggests considering the accessibility to industrial and knowledge based companies with different degrees of specialisation in this evaluation. This disaggregation in computing accessibility will enhance the precision of knowledge-based evaluations especially in metropolitan regions. Disaggregation will be helpful to consider the demand and supply of destinations in the proposed methodology.

Additionally, considering the affects of digital and non physical accessibility may have influence on the result of this evaluation. Nevertheless to prevent complexity, most studies propose to estimate face to face connections in KC evaluations.

5.2 Travel modes

Multimodal accessibility is critical for successful knowledge cities. Accessibility by different travel modes not also increases social equity in the region but can also increase quality of life by providing sustainable transport. Therefore, in computing accessibility for KC evaluations the effect of multimodal accessibility should be considered. Also, in terms of social equity this evaluation should consider the availability of travel modes for different types of city residents.

5.3 Appropriate indicators

Current accessibility measurements often fail to incorporate all effective components and their various indicators. ‘They generally focus on impacts that are easy to measure at the expense of those that more difficult to measure’ and commonly involve very limiting assumptions (Breheny, 1978). Furthermore, some indicators are so over-simplified that they are misguided, while others are so complex that they are difficult to calculate (Lyborg, 2000).

In the current methodologies, enhancing the accuracy of models by incorporating more indicators changes the models from practical tools to theoretical techniques. Another problem in selecting appropriate indicators is the interaction between indicators. Most models eliminate the interacting indicators instead of solving the problem. In some cases these indicators are highly correlated with each other and ignoring one of them causes factual error in the results of the model. Although relevant research reveals that no firm framework for identifying appropriate accessibility indicators for KC evaluation has been found, accurate evaluations need to involve effective indicators of accessibility components to provide true estimations.

5.4 Measuring method

One of the problems of current accessibility models in evaluation of KC is related to measuring methods. A review of these models reveals that current methodologies have three main difficulties. First, most of these models cannot practically consider all accessibility components in their methodology. Accurate methodologies should have a propensity towards disaggregation and complex representations of accessibility (Makri, 2001). Second, reviewing current accessibility methodologies shows that these models do not provide the opportunity for calibrating all the applied indicators. Third, there is ongoing discussion among researchers about whether it is better to apply a more quantitative or a more qualitative approach for characterising accessibility. According to Handy and Niemeier (1997) it is possible to combine quantitative measures with qualitative evaluations, in order to obtain a fuller understanding of accessibility characteristics.
Reviewing the different model methodologies reveals that, although applying qualitative indicators increases the accuracy of the models, finding operational methodology is still difficult. According to the fact that by KC relies on components with several qualitative indicators, finding proper accessibility models for evaluation this concept is very difficult.

5.5 Weighting the indicators

Measuring impedance and attractiveness of indicators is a significant issue in estimation of knowledge-based cities’ accessibility. This problem occurs in simple models, as well as complicated models. Different methods for calculating these indicators which have fundamental differences from one methodology to another exist. Different approaches call for different solutions to calculate the impedance and attractiveness of indicators. Handy and Niemeier (1997) claim that the potential of destinations has to be evaluated for each characteristic. Consequently, in evaluation of knowledge-based development, different attractiveness levels for different R&D activities should be defined.

Measuring impedance functions faces many challenges. Although different accessibility estimations propose different methods for computing the impedance functions, they tend to apply a single function for different opportunities. Due to the different characteristics of opportunities in the KC concept, this approach can cause accessibility miscalculations for KC evaluations. Figure 2 shows the proposed process of accessibility estimations for the KC concept.

![Figure 2. Proposed framework of accessibility estimation for Knowledge Cities](image-url)
According to Figure 2, the first step for accessibility evolution of knowledge cities is selecting appropriate destinations (opportunities). This selection has a great effect on the result of accessibility for comparison of cities according to the KC concept. After this selection, the effective indicators according to the selected opportunities should be considered. As Figure 2 shows, the process of selecting and calibrating indicators and selecting an appropriate model is a trial and error procedure. According to the limitations of accessibility models, considering all effective indicators in this evaluation is not possible. However, choosing the proper model can include more effective indicators in accessibility estimations for knowledge cities.

6 Conclusion

This paper has focused on defining a framework for estimating accessibility as a component of KC. It argues that accessibility plays a great role as one of the KC components. In addition, accessibility affects other components of KC including quality of life and social equity.

Accurate estimation of accessibility is critical for KBUD evaluation. Planners apply different measurement methods for accessibility measurement which have differences in terms of indicators and methodology. It seems that a standard measuring method for all situations is impossible. With respect to the current modelling methods, each particular methodology should be considered for a particular circumstance. In small cities, accessibility to airports, main high-tech industrial and knowledge institutes can show KBUD in terms of accessibility, while in metropolitan regions accessibility to different knowledge bases should be computed.

It is perhaps not surprising that increasing accessibility can improve the quality of life and social equity in urban districts. Therefore, accessibility directly and indirectly has an effect on knowledge-based development. This study revealed that accessibility estimating for knowledge cities should consider five main fundamentals: selecting appropriate destinations, estimating accessibility for different travel modes, applying appropriate indicators, selecting suitable measuring method and weighting the indicators. In a nutshell, the paper has shown that accessibility estimations are not straightforward procedures and they need to apply trial and error approaches.

As further research, it is possible to develop a particular accessibility model for KC evaluation by consideration of the proposed framework in each circumstance. The resulting improvement is achievable by considering all accessibility aspects of KBUD in this new model.

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Minimising transport disadvantage to support knowledge city formation: applying the capability approach to select indicators

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Structured Abstract

Purpose – The aims of this paper are to demonstrate the application of Sen’s theory of well-being, the capability approach; to conceptualise the state of transportation disadvantage; and to underpin a theoretical sounds indicator selection process.

Design/methodology/approach – This paper reviews and examines various measurement approaches of transportation disadvantage in order to select indicators and develop an innovative framework of urban transportation disadvantage.

Originality/value - The paper provides further understanding of the state of transportation disadvantage from the capability approach perspective. In addition, building from this understanding, a validated and systematic framework is developed to select relevant indicators.

Practical implications – The multi-indicator approach has a high tendency to double count for transportation disadvantage, increase the number of TDA population and only accounts each indicator for its individual effects. Instead, indicators that are identified based on a transportation disadvantage scenario will yield more accurate results.

Keywords – transport disadvantage, the capability approach, accessibility, measuring urban transportation disadvantage, indicators selection

Paper type – Academic Research Paper
1 Introduction

Over the past few decades, the conventional trading of commodities is being replaced by knowledge-based production, which introduces more sustainable urban physical and economic strategies. The knowledge-based urban development (KBUD) promises a secure economy in a human setting (Yigitcanlar, 2008), oscillating between economic and environmental policies, thus supporting the social dimension from every perspective. The changing economic climate requires a more vibrant, knowledgeable environment to attract and accommodate knowledgeable workers. As knowledgeable society is an integral element of knowledge-based development, maintenance and improvement of quality of life have become explicitly vital in KBUD. This means providing necessary accessibility levels to support, including diversity and mixture within society, engaging society in various activities and enriching cultural/arts in every dimension of the knowledge-worker environment.

KBUD creates unique travel behaviours in knowledge-workers. The knowledge-worker pays great concern to time impediments and frequent and high service levels of the public transport system. Thus, knowledge-workers demand a dense public transport network with wide coverage, good linkage between public transport services and uninterrupted traffic flow. Intensive external linkage provided by the international air service is of importance to provide a transport-intensive environment in KBUD (Yigitcanlar et al 2007). The working environment, particularly in the knowledge precinct, demands a good network of pedestrian and cycle paths and a high level of public transport services, which collectively creates a transport rich environment (Yigitcanlar et al 2007).

Transportation disadvantage is a multi-dimensional issue, and generally relates to the issues of accessibility, transportation cost, travel convenience and access to information. (Yigitcanlar et al., 2007b; Duvarci & Yigitcanlar, 2007; Duvarci & Mizokami, 2007). The two dimensions, accessibility and mobility, shape urban transportation disadvantage. Immense and challenging urban development increases the tendency for immobile individuals and non-drivers to be socially excluded and disadvantaged (Lyons, 2003). In essence, transportation disadvantage is produced by three reciprocal events (Cass et. al. 2003). Firstly, social practices and obligations generate the need to travel, to be mobile and to live in the proximity of convenient areas, such as the inner city or its suburbs. Secondly, available infrastructures, such as road networks and systems, parking spaces, and public transport services, determine accessibility for each area. Thirdly, individual commodities encompassed by time; money; and vehicle ownership, and demographic characteristics, predetermine mobility at the individual level. Interaction between these elements materialises transportation disadvantage, as travel demand is not met. The multi-dimensional factors involved provide a great challenge for policy-makers to determine urban transportation disadvantage.

Murray and Davis (2001), ascertain that sustainable public transport is a system that provides the community with a significant level of travel experience that minimises travel time, distance and cost to essential destinations, thus, offering alternative mobility to those without access to a car. This includes reasonable access to public transportation stops or stations, and provides a high public transportation coverage area and various medium mobility and accessibility levels. A growing body of researchers have also linked the lack of social dimensions in transportation provisions with the deleterious effect on health levels, education and employment (Lucas, 2004a). Without a strong social
dimension in the transportation decision making, the current transportation system is less viable, creating an imbalance between ecological issues and human capital. In the past few decades, public transportation systems have been under attack for enhancing social exclusion, mobility, poverty, and urban transportation disadvantage (see Denmark, 1998; Kenyon et al., 2002; Lyons, 2003; Cass et al., 2005; Lucas, 2006; Duvarci & Yigitcanlar, 2007; Stanley & Lucas, 2008). Therefore, a strong social dimension, with great concerns of moral and ethical aspects, which imposes both equity and justice in public transportation provision will benefit large numbers of individuals and societies.

Currently, transportation research is channelled into developing various indicators of transportation disadvantage; subsequently, developing policies and development strategies based on findings. Given the complexity of transportation disadvantage, researchers have used substantial multi-individual indicators to quantify the relative needs and service of public transport systems. They also use social-economic indicators to express travel needs. The traditionally transportation disadvantaged individuals, such as the elderly, low income earner’s, school children, women, and immigrants are assumed to have low mobility and are highly in need. Meanwhile, public transport indicators, such as frequency, travel costs, access to stops and accessible destinations are used to assess public transport supplies. Even though spatial indicators receive the least attention, their characteristics, such as density, mixed land uses and pedestrian paths, are used regularly, along with other indicators, to form accessibility indicators.

This paper argues these current practices based on two points. Firstly, the multi-indicator approach has a high tendency to double count for transportation disadvantage and increases the number of TDA population. The multi-indicator approach only accounts for individual effects, rather than how indicators jointly affect transportation disadvantage. This research attempts to ascertain the severely transportation disadvantaged scenario by proposing combinations of significant factors to explain transportation disadvantage. Secondly, understanding the relationship between indicators and implemented policies of transportation disadvantage is fairly limited. This poses questions of whether the current indicators are accurately linked with transportation disadvantage and the effectiveness of the current policies. Instead, clearer relationships among indicators will provide validated procedures and more structured processes in the selection of relevant transportation disadvantage indicators.

This paper highlights the literature on the approaches used to measure transportation disadvantage and methods involved to apply the capability approach in selection of transportation disadvantage indicators. Following this, it proposes a Geographical Information System (GIS) based method to quantify the disadvantaged scenario.

2 Approaches in measuring transportation disadvantage

Measuring and determining urban transportation disadvantage deals with great challenges, due to the multiple perspectives and dimensions that constitute urban transportation disadvantage. The explanations and Figure 1 below briefly explain the four measure approaches, which are relevant in order to determine transportation disadvantage.

2.1 Poverty approach

Urban transportation disadvantage is likely to be associated with an inability to travel due to financial constraints, which highly correspond with decent education, employment
and health levels (Lucas, 2004a). The poverty approach measures transportation disadvantage levels using material indicators, such as car (or vehicle) ownership, driving license affordability, and cost of travel via public transport, or the cost of driving a private vehicle. (Lucas, et al., 2001; Gleeson & Randolph, 2001; Priya & Uteng, 2009). In addition, proxy indicators, such as forced car ownership in a household, were used in Currie and Stanley’s (2008) research. However, relying solely on economic indicators to imply urban transportation disadvantage is insufficient. This has been criticised by many throughout the literature. Church (2000) and Preston and Raje (2007) make certain that the term ‘poverty’ is significantly related to material welfare; therefore, it should be separated from transportation behaviour discourse. In regards to transport related exclusion, Church et al. (2000) identifies that poverty based indicators tend to hide some socio-economic stress that limits people’s participation, mobility and accessibility. Instead, ‘poverty’ is better fit as a subset off the overall dimension of urban transportation disadvantage and transport related exclusion. Thus, it is an important indicator in order to identify low-income households that consist of social needs individuals and groups.

2.2 Mobility approach

Travel variables are substantially used in built environments, and travel behaviour research is a significant mobility outcome based indicator of urban transportation disadvantage. The traditional urban transportation disadvantaged individuals and groups have relatively low mobility and travel capacities due to a lack of access to a private vehicle. Mobility levels are measured using four travel behaviour outcome variables: 1) trip frequency (rates of trip making), 2) trip lengths (distance or time), 3) mode choices or modal splits, and 4) cumulative person kilometres travelled, vehicles kilometres and hours travelled (Ewing & Cervero, 2001). These measures are used in sustainable mobility indicators. Travel variables constitute the conventional travel demand forecasting process and indicate trip generation of the built environment. Therefore, operational and communicable data is a rather substantial advantage for using this type of variable. Mobility approaches have been criticised for focusing only on access to vehicles, rather than on access to essential destinations, subsequently undermining the immense dimensions of transportation disadvantage and social exclusion (Church, 2000). In addition, physical mobility approaches only limit fully viable and sustainable solutions (Kenyon et al., 2002).

2.3 Accessibility approaches

Accessibility measures are considered to be more advanced and complicated, and require taking both qualities of the transport system e.g. travel speed and the qualities of the land use system (functional densities and mixes) (Handy & Niemeier, 1997). Therefore, measuring transportation disadvantage using accessibility measures requires a substantial amount of data on socio-economics (such as income levels, quantity of household members, and car ownership), land characteristics (such as the location of activities and the distribution of services), and public transportation characteristics (such as trip frequency, travel time and travel speed). There are four perspectives of accessibility measures: the infrastructure-based measure, the location-based measure, the person-based measure, and the utility-based measure with each having its advantages and shortfall.
Vandenbulcke et al. (2009) ascertain that the choice of accessibility indicators faces great challenges, such as finding the right balance between interpretability, communicability and operationalisation, selection and hierarchy of destinations, travel behaviour, and spatial data aggregation. On the other hand, Makri and Folkesson (1999) ascertain that there is no single best approach in measuring accessibility. The shortcomings of these accessibility measures are overcome in two ways. First, Geurs and Van Wee (2004) urge that accessibility measures are combined; for example, the location-based and person-based measures are used to supplement each other’s shortfalls. Alternatively, accessibility measures are used along with non-accessibility measures, such as social needs indices (Currie & Wallis, 1992; Currie, 2004; Currie et al., 2009a; Currie et al., 2009b). When undertaking such approaches, interpretability and communicability levels increase and, in addition, they are easily operationalised.

2.4 Equity approaches

Equity in the distribution of transportation systems is measured by considering territorial distribution, physical capability and the economic capacity of the potential user. When measuring territorial equity, the provision of services should be proportionate to need (Hay, 1993); therefore; the distribution of transportation systems should provide significant access, while considering the needs of the society. Various users’ physical capabilities, which differ with age, gender, family structure, stage in the life cycle, and disability, receive attention in equity measures. Economic capacity assesses equity among varying income and wealth levels. However, the concept of equity is highly subjective and changes regularly, making objective decisions challenging (Levinson et al., 2002). These problems are overcome by considering both the quantitative and qualitative aspects of equity measures. In this regard, Murray and Davis (2001) embed both aspects in order to quantify the equity of the public transport service. Their research also comprises the distribution of the traditionally disadvantaged (representing the qualitative aspect) and access to public transport (representing the quantitative aspect).

![Figure 1. Summary of approaches in measuring transportation disadvantage](image-url)
3 The capability approach and transportation disadvantage

Using Sen’s theory of well-being—the capability approach, this research paper attempts to explain the state of transportation disadvantage and ascertain adequate indicators of transportation disadvantage. In the past, utility has been portrayed as the ultimate objective of well being, and social injustice was evaluated by the distribution of income. The capability approach rejects income and commodity as the sole object of value, and, more importantly, is based on the capability of the person (Burchardt, 2004; Disatso, 2007).

The two elements of functioning and the capability set form the capability approach. The functioning element is regarded as the states of being (for example, being well nourished or being in love), or the ability to endure any activities (for example, dancing or voting) by an individual (Burchardt, 2004). In reality, an individual is capable of accomplishing more than one function simultaneously, thus has freedom to choose to accomplish certain functions and discard others. The whole set of available functionings, which an individual does on does not choose to do is called the capability set. In other words, the capability set is the opportunities that are available to an individual.

The capability approach is concerned more with interpersonal variation at the personal level and opportunities or interests rather than actual action (Mitra, 2006). The relationship underlined between functioning and the capability set is illustrated in Figure 2. Commodities, personal environment, characteristics and resources determine the capability set and functioning ability of an individual. In other words, the capability set is the opportunities attained due to certain personal abilities, resources, practical means, and knowledge (Burchardt, 2004). Therefore, when using the capability approach, the tenet of the assessment is on the goal of a circumstance of capability sets, rather than the means or functionings (Sen 1995).

Applying the capability approach is an intricate process, which involves a great challenge. The scope of functionings vary greatly, as functioning could be essential, such as being healthy, or complex and widely valued, such as being socially well integrated (Sen, 1980). Based on the social model, capability sets and functionings are preferably determined by self-determination or an opinion pool by those who are affected (Burchardt, 2004). These involve capacity-building debates of society and sub-groups in society. In addition, since some capability sets and functionings are temporary, the authenticity of both need to be ascertained (Mitra, 2006). The vagueness of the capability approach allows the framework to adapt to any disciplines, particularly disability study. Mitra (2006) demonstrates the ability of Sen’s theory to determine disability at the capability level and functioning level. Undertaking such an approach allows validation of disability and disadvantaged circumstances. Alas, the application of Sen’s theory, the capability approach, in disciplines other than well-being or poverty is limited, particularly in transportation disability or transportation disadvantage research.

Urban transportation disadvantage is a function of mobility and accessibility that affects the individual’s mobility to reach core destinations (Denmark, 1998). Using the capability approach, urban transportation disadvantage is determined to occur due to a combination of (a) personal mobility and social economic characteristics (e.g. age, gender, household structure, income), (b) area accessibility created by the physical environment where an individual lives (c) resource availability and public transport service levels (e.g. route, linkage and temporal). The measurement of transportation disadvantage also needs to deal with self-imposed transportation disadvantage. A way
forward is to identify the relationship between the capability set and functioning ability of the transportation disadvantaged. Thus, the evaluation process also needs to determine the impact of multi-dimensional factors on capability sets and functioning.

**Figure 2.** The capabilities approach (source Mitra, 2006)

4 The indicator selection process

4.1 The urban transportation disadvantage framework

This paper suggests a new framework to determine urban transportation disadvantage distribution and population, which is built on the unique relationship between the transportation disadvantaged scenario and low travel capabilities. The aims of this framework are simplification and operational ability, thus, theoretically viable. This framework is divided into 3 stages, which are: (1) data collection, (2) scenarios building and selection of indicators, and (3) Multi-Criteria Evaluation. The first stage of the framework focuses on data collection from various resources. The second stage a two stages of statistical analysis processes: Principal Component Analysis and Canonical Correlation Analysis, aimed to clearly identifying the transportation-disadvantaged scenario and determining the combination of transportation disadvantaged indicators. The final stage of the framework utilises the capabilities of the Multi-Criteria Evaluation process in the Geographical Information System in order to determine transportation disadvantage distribution and population. During this stage, expert opinion is sought in order to compare and weight each indicator’s relative importance to transportation disadvantage.

Through intensive review of the literature, indicators that significantly affect the individuals or group’s accessibility and mobility levels are considered in the development of transportation disadvantage framework. These indicators are used substantially to depict the demand and supply of public transportation and identify the traditional
transportation disadvantaged groups (see Figure 3). All the indicators can be categorised into three main dimensions: the socio-economic dimension, the spatial dimension and the public transportation dimension.

![Figure 3. The key dimensions and indicators of transportation disadvantage](image)

Transportation disadvantage is interrelated and multi-dimensional, thus, relying on a single dimension or indicator will simplify the complexity that is embedded in transportation disadvantage. Previous transport researchers have used the multi-indicator approach and attempted to cover most of transportation disadvantage dimensions, which eventually used a substantial number of indicators. Instead, the use of the scenario approach reduces this complexity. In order to determine transportation disadvantage accurately, the transportation disadvantage scenario is identified and, subsequently, using the scenario indicators of transportation, disadvantage is identified.

The complex relationship between each indicator and transportation disadvantage is complicated and, thus, not always straightforward. Each transportation disadvantage indicator holds a different weight, in which, certain indicators are more dominant than others, resulting in hierarchical and inter-connected structure. The relative importance of each indicator to the event of transportation disadvantage is identified using a statistical analysis (this research will use Principal Component Analysis or PCA) and experts survey. Subsequently, the significant information is used to assign a weight to each indicator. Figure 4, below, illustrates the transportation disadvantage analysis framework and the undertaken steps to develop a transportation disadvantage index score map for this research.
In dealing with transportation disadvantage, authorities need to examine the core source and extent of disadvantage. This framework works in a clear and explicit process, and the outcome of the framework will guide authorities in the policy making process. In addition, this framework enriches plural planning and stimulates city planning in various ways. The findings of this framework and research diversify alternative solutions and add pressure to public agencies to improve current transportation and accessibility plans.

**Figure 4.** The urban transportation disadvantage framework and steps of the framework

4.2 **Relationships analysis and selection of indicators**

This research paper proposes a method that can clearly select indicators of transportation disadvantage using a systematic and well-structured approach. Two stages of analysis processes are undertaken using the Principal Component Analysis and Canonical Analysis. Multiple disadvantaged situations, which occur simultaneously, are carefully monitored to identify severe disadvantage scenarios.

In the initial stage, inter-related factors consisting of socio-economic, spatial and public transportation forming transportation disadvantage scenarios are identified by employing a dimension reducing analysis, the Principal Component Analysis (PCA). PCA will group indicators into principal components or inter-related indicators. These underlying relationships will be observed to identify transportation disadvantage scenarios. This research will select these scenarios by carefully following statistical guidelines, such as the communalities, eigenvalues, and scree plot. These scenarios are likely show low travel *functionings*, such as low trip frequency, long distance travel, more time travelled and high private vehicle use.
Various scenarios will be formed, and hence, it is vital for the most significant combinations to be identified. The study predicts that each scenarios will has different travel capability sets and functionings. To determine the severely disadvantaged scenario (s), each scenario will be employed to all disadvantage travel capability set and functioning indicators simultaneously using the Canonical Correlation Analysis (CCA). To identify this, the Canonical Correlation Analysis (CCA) will treat all disadvantage travel capability set and functioning indicators (e.g. low trip frequency, longer time travelled and high automobile dependency) as the dependent variables—\(X\); while the each scenario indicators are the independent variables—\(Y\) (see equation 1).

### Equation 1: Canonical Correlation Analysis Process

\[
X = aY_1 + bY_2 + cY_3 + \ldots \ldots .
\]

where:
- \(X\) = dependent variables
- \(Y\) = independent variables
- \(a, b, c\) and \(\ldots\) = variance of each independent variable

#### 4.3 Multi-Criteria Evaluation

The Multi-Criteria Evaluation (MCE) techniques will facilitate the identification of transportation disadvantage distribution based on different transportation disadvantage scenarios.

In the initial stage of MCE, all scenarios and their indicators will be stored in GIS layers. To address the different magnitudes of each indicator, towards transportation disadvantage, each indicator set will be adjusted or standardised by manipulating AHP’s abilities to decompose transportation disadvantage scenario(s) into hierarchy order (see Equation 2). Expert opinions will be sought to make a comparison using a pair-wise scale of 1, 3, 5, 7 and 9 with values of 2, 4, 6 and 8 as intermediate values (Zahedi, 1986; and Saaty, 1990) for each indicator. These values will average in columns, then each column of the matrix will be normalised and a relative weight produced. To ensure reliability and fair judgement during the weighting assignment, a consistency index will be calculated using the formula below (see Equation 2). These weights are then carried down through the hierarchy, whereby weights in the lower tier are related to the weights of the upper level. The composite weight of each indicator is gained by multiplying the weights of each indicator with the weight of the respective dimension it is associated with. Since each indicator layer uses different units, standardisation of each GIS layer will be using...
linear combination (Store & Kangas, 2001). Value 0 is the least important factor and 4 is the most important factor. The resultant map will be overlayed and will produce a thematic map based on the index score.

\[
CR = CI / RI
\]

Where: RI is the average of the resulting consistency index.
CI is the consistency index and can be expressed as:

\[
RI = (\lambda_{\text{max}} - n) / (n-1)
\]

Where: \( \lambda_{\text{max}} \) is the largest or principal eigenvalue of the matrix.
\( n \) is the order of the matrix.

**Equation 2:** Consistency index (Source: Dai, 2001)

5 Conclusion

Knowledge cities are incubators of knowledge and culture, forming a rich and dynamic blend of theory and practice within their boundaries, and are driven by knowledge workers through a strong knowledge production. To have a strong base of knowledge cities and attract knowledge workers to the knowledge precinct, KBUD cities are instructed to engage with high quality of life environments. For a highly accessible urban environment equipped with a dense and wide covering public transport network, a good public transport service and uninterrupted traffic flow are necessary. Transportation disadvantage is a multi-dimensional issue, which encompasses accessibility and mobility, and is a great obstacle for KBUD to overcome. Identification of the transportation-disadvantaged population using a well-structured and theoretically sound framework is permissible.

In developing the framework, various approaches of transportation disadvantage have been scrutinised. These measures range from mobility to poverty, accessibility, and equity approaches. Poverty is subsumed within mobility measures to indicate low-income households of the traditional urban transportation disadvantaged; while, the equity approach underpins the overall perspective of urban transportation disadvantage dimensions, and governs the measures of urban transportation disadvantage. Each measure is curtailed for operational, interpretation or data consumption. This requires a generic measure that can resolve these deficits. The multi-indicator technique are widely used in transportation research, using socio-economic, public transportation and spatial indicators to determine mobility and accessibility levels of individuals, households or areas. Even so, this technique can be easy operated, can yield interpretable findings and only requires available data for analysis. However, this research paper argues that this technique has a high tendency to double count the event of transportation disadvantage and increase the number of the TDA population. In addition, it has a fairly limited understanding of the relationship between indicators and implemented policies, which may create false public transportation and development policies. Acknowledging these circumstances, this research develops a framework that enables the improvement of the selection process of transportation disadvantage indicators.
The capability approach is used to conceptualise urban transportation disadvantage. In essence, various factors which determine capability sets and functionings will be the tenet of assessment and indicators selection process. Also, this framework pays great concern to identify transportation disadvantage scenarios, rather than the selection of individual indicators. This research paper will utilise the Canonical Correlation Analysis’s capabilities to use more than dependent variables in order to identify a combination of factors that explain different transportation disadvantage scenarios. Applications of the interactive map-based Multi-Criteria Evaluation (MCE) will be developed to visualise the transportation disadvantage scenarios. The framework is still being developed and may face various instabilities. The process for framework development will now move to explore other types of framework for comparison purposes, and to identify a possible framework to strengthen the selection of indicators.

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Evaluating sustainability of urban development and its contribution to a knowledge-base development

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Structured Abstract

Purpose – The purpose of the paper is to discuss the components of urban sustainability as to their implications about knowledge-base economy and society

Design/methodology/approach – An indexing model which can be used by the local government specifically in Australia is presented to generate sustainable urban development policies. The model consists of sustainable neighbourhood indicators and employs a spatial indexing method to measure the sustainability performance of the urban settings

Originality/value – This methodology puts in evidence about the use of indexing methodology in the assessment of sustainable neighbourhood performance

Practical implications – This model could be considered as a practical decision aid tool for local government planning agencies for the evaluation of development scenarios

Keywords – knowledge-based urban development, sustainable urban development, sustainable transport, sustainability assessment

Paper type – Academic Research Paper

1 Introduction

Knowledge-based economic development has become one of the most important policy issues, particularly for large urban areas. Accordingly, there has been a rapidly growing number of studies considering conceptual and practical aspects of knowledge-city (KC) concept. From urban planning perspective, designation and management of
core qualities of a KC bring forward clearly defined considerations to business-as-usual planning practices. Moreover, in terms of urban administration, Carillo (2004) stated that KC development demands more than well designed housing and transport system, competitive advantage, and economic growth policies, but it is “a permanent settlement of relatively higher rank in which the citizenship undertakes a deliberate, systematic attempt to identify and develop its capital system in a balanced, sustainable manner” (Ergazakis, 2006). Even though KC concept strongly highlights the issues of the local knowledge culture, cultural diversity and tolerance, developed and well-organised local labour market, provision of good quality infrastructure and urban attractiveness as the minimums (Martínez, 2004), a close examination of these concerns reveals that there is a clear correspondence between the main considerations of KC and sustainable urban development (SUD). Whereas KC provides a general framework for contemporary economic development with its essential qualities, SUD purports a balanced approach to urban development with respect to economic, environmental, social and institutional tiers.

To put knowledge based urban development (KBUD) into practice, apparently the most important issues will be:

- how current market, human and technical knowledge can be developed to capture evolving consumer tastes, skills and creativity, and innovations in products and services (Lever, 2002; Yigitcanlar & Velibeyoglu, 2008),
- how KC qualities can be incorporated with sustainable development principles which are mostly mandated to local governments and
- how urban planning interventions can be employed in emphasising the emerging meaning of local advantages of a city, and attracting and retaining floating labour and/or capital.

Murphy (2000) sums this matters as “…cities are the drivers of economic activity; however, the quality of life the city offers in terms of environmental, physical, social and cultural development are becoming increasingly critical in both attracting and retaining inhabitants in a knowledge-based economic order”.

Apart from the adoption of KC and SUD considerations in the urban planning discipline, another important issue is to measure the effectiveness of planning policies and interventions. More specifically, after agreeing upon the core elements and the implementation strategies of KC and SUD, still there is a need for benchmarking tools identifying whether the status of a city is moving towards the designated KC vision as well as SUD considerations. There are a number of assessment methods which is advised for different problem domains. To name a few, impact assessment techniques, life-cycle assessment, triple bottom line accounting, multi-criteria decision aid tools and system indicators are well known examples. Among them, system indicators or indicator-based performance assessment is a well-known and widely-used method by various institutions from international to local.

In this study, an indexing model which can be used by the local government specifically in Australia is presented to generate sustainable urban development policies. The model consists of sustainable neighbourhood indicators and employs a spatial indexing method to measure the sustainability performance of the urban settings. It encompasses the local sustainability objectives and policies which help to designate a KC with prominent sustainability considerations. By using a grid-lattice representing urban areas and analytical tools of GIS, the model has obvious advantages in visually presenting sustainability metrics and enhancing communication between stakeholders, and providing an easily modifiable model structure which can be applied for different concerns with
relevant variables. The output of the model can be used for various purposes, for example, to analyse the best localities where overall sustainability level can be enhanced, or at least retained, with the new development, to diagnose the problem areas as to their poor sustainability performance and to generate area specific economic and social policies in solving these problems, and so on. The paper introduces close correspondence between KC and SUD and gives the main considerations of SUD. Then, neighbourhood sustainability indicators compiled from the literature and local government documents are discussed in the framework of sustainability assessment techniques. After that, methodological details related to the generation of the composite index are presented. The paper is concluded by presenting the initial snapshots of a hypothetical example and by discussing the practical use and importance of the model.

2 Knowledge-based versus sustainable urban development

Yigitcanlar and others (2008b) extracted Van Winden’s framework for Barcelona (2007) in explaining characteristics that structure a KC as follows:

- **Knowledge base**: including educational institutions and R&D activities;
- **Industrial structure**: affects progress and initial development of a KC;
- **Quality of life and urban amenities**: ensures a KC has necessary elements knowledge workers are attracted to build a strong knowledge base;
- **Urban diversity and cultural mix**: as an instrument in encouraging creativity;
- **Accessibility**: encourages and facilitates the transfer and movement of knowledge;
- **Social equity and inclusion**: minimises social disparity and negative tensions;
- **Scale of a city**: larger KCs may tend to offer a greater knowledge pool, greater diversity and choice for knowledge workers and businesses (Van Winden et al., 2007; Yigitcanlar et al., 2008b)

From the list above, it is obvious that KC development proposes, to some extent, radical changes in the form of urban areas, provision of services, cultural patterns and people’s mentality. It encompasses high level structural amendments in governance (legislative, financial and social), medium level transitional strategies (cultural change, new knowledge networks and management of human resources) and low level spatial interventions (urban services, infrastructure and quality of life concerns). As Van Winden’s (2007) framework is examined, the first two items correspond to high and medium level considerations, while the remaining items fit mainly for spatial interests. Moreover, these issues closely resemble SUD concerns in planning literature.

While UN-Habitat’s report series of *The State of the World’s Cities* provide a framework to conceptualise sustainable cities, in Europe, the applicability of sustainability principles to urban planning domains has been searched by the EU institutions for many years. The search for making urban development process sustainable has given rise to constitution of SUD framework. In this respect, Building Environmental Quality Evaluation for Sustainability (BEQUEST) network has been formed by the EU commission. Researches undertaken by this network of academics and professionals have shaped European SUD roadmap. As a condensed form of UN Agenda 21 principles, PICABUE model of sustainable development (Curwell et al., 2005; Mitchell et al., 1995), has revealed goals of ecological integrity, equity, public participation and futurity. These
goals are considered as main principles of BEQUEST framework and according to this framework four factors are researched. These are (Curwell et al., 2005):

- Interrelated activities of urban development process (planning, property development, design, construction and operation),
- A set of sustainability issues that surface concerning the environmental, economic and social structure of urban development,
- The spatial level of analysis according to the impact of urban development over various scales from city to building components,
- The time scales of impact.

The ‘planning’ dimension of the first factor, ‘interrelated activities of urban development process’, could be grouped under four main components that constitute ‘substantial’ considerations of urban planning. These are urban form, transportation, infrastructure and environment. These components compromise the intervention domain of the planning discipline. The second factor, sustainability issues, can be considered as the framing concepts over the planning since it inherently determines the qualities of the regeneration of an existing area or a new urban development via mostly environmental policies. The third and fourth factors highlight different scopes for planning interventions in terms of spatial scales and longevity of the designed planning endeavour.

In practical terms, SUD encompasses a number of interrelated issues. Categorically, these are urban macroform, infrastructure, urban economy, community and urban ecology. Urban macroform concerns are tied with the historical development of the urban areas and mainly focus on the reconfiguration of existing urban pattern and generating decisions on new urban development areas. More specifically, the qualities, such as density, diversity and design, of urban areas frame the macroform discussion. As closely related to urban macroform and an issue for either SUD or knowledge-based development concepts, the provision of hard and soft infrastructure has crucial importance for both city dwellers and knowledge labour to be attracted. Among the infrastructure components, transport infrastructure has critical importance due to the growing demand for mobility and the contribution of transport activities to overall GHG emissions, which reaches nearly to one fourth of the total GHG emissions. In terms of SUD, the internalisation of transport externalities (non renewable fuel use, traffic congestion, low and unequal mobility, pollution, accidents and fatalities, degradation of ecosystems) compromises the main discussion topics. As clearly stated in the literature (Banister, 1997; Banister et al., 2000; Kenworthy & Laube, 1996; Litman & Burwell, 2006; Low & Gleeson, 2003; Shore, 2006), examining the transport externalities without taking into account the driving forces of socio-economic determinants and their effects on the contemporary travel patterns, and the urban form which affects and is also affected by the transport system could be misleading and maybe inconclusive for policy intervention. Regarding the urban form and transport relationship, Holden (2007), stated that the primary objective of integrated urban and transport planning is to diminish urban sprawl and reduce the frequency and length of everyday journeys via some planning and design principles, such as urban consolidation, mixed use and so on, as well as to make urban services and amenities more accessible (Yigitcanlar et al., 2008a).

Sustainable urban economy debate defines a new economic development approach which takes into account the intra-generational and intergenerational wealth issues. Some of the major objectives of this approach could be defined as follows:

- Investment in innovation for clean production technologies,
- Lowering health and safety costs via healthy and safe work places, which provides improvement in labour productivity and savings from social service and health costs,
- Lowering labour costs and formulating innovative solutions by providing good work conditions to personnel,
- Providing easy access to lenders, insurers, preferential loans and insurance rates to lower loan rates and to develop new networks,
- Propping best practice influence on regulation to participate preparation of sets and regulations,
- Enhancing and maintaining company’s reputation to secure social license,
- Maintaining market advantage via producing good customer service,
- Supporting ethical investors (Azapagic, 2003; MMSD et al., 2002).

Moreover, there are some other important concerns that should be included in the sustainable urban economy debate, such as, efficient and responsible resource use, avoidance of unnecessary foreclosure of future development options, use of renewable energy, employment and job accessibility, development of human resources and soft infrastructure, just income distribution, local production and consumption, waste management, and so on (UN, 2007).

From sustainable community perspective, urban form and neighbourhood design concerns are also tied with quality life, community sense, active public participation, social cohesion and public health issues (Bramley & Power, 2009; Briassoulis, 2001; Campbell, 1996). Moreover, following the conceptualisation of SUD, local governments have recently involved the issues of safe urban environments, equal accessibility, empowerment of powerless groups, public housing endeavours, protection of cultural values and heritage and so on, which can be considered as factors shaping people towards the sustainable knowledge society.

SUD considerations span a very wide scope and mostly controversial issues which have been discussed extensively in the planning discipline. Because of this and to provide a clear connection between SUD and knowledge-based urban development (KBUD), there is a need of manageable scope which is in concordance with the spatial qualities of a KC and also spatial intervention tools of the local planning agencies. Baum and others (2007) discussed the spatial qualities of the knowledge cities, which are coupled with the characteristics of the knowledge workers. For example, it is stated that knowledge workers are highly mobile, in need of mass organisation, sustainability oriented, have small-size-households, value vivid cultural life, social diversity and integrated work and life. Considering these characteristics, it is also stated that they have differing preferences and expectations from a place. The implication of these characteristics, in terms of space structure, could be compiled as: “…on community level, walkability, greener modes of transport, safety, green areas, public realm, environmental quality; on city level, connectivity, culture, CBD opportunities, quality of public spaces; from (urban) amenities perspective, climate, water access, topography, cafes, bookstores, dance clubs, and etc.; as the (valuable) attributes of a place, identity, uniqueness, vibrancy, authenticity, diversity, openness, coolness, playfulness” (Baum et al., 2007; Clark, 2003; Florida, 2002; Llewelyn, 2006). Considering these features with the spatial intervention opportunities of the local governments, sustainable neighbourhood concept, a sub-concept in broad SUD domain, come forward with its practical and space-oriented approach to urban planning endeavours.
3 Sustainable neighbourhood concept

As a part of the built environment, sustainable neighbourhood design issues also have grabbed attention particularly initiating new urban developments where 3D (density, diversity and design) urban design models of New Urbanism and Smart Growth are adopted. Moreover, the application of 3D considerations in new developments has been used as a new marketing strategy due to the increase of public awareness towards the environmental concerns. The prominent examples of sustainable neighbourhood design and assessment are U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) rating system, Australian Housing and Urban research Institute’s (AHURI) Triple Bottom Line indicator suite, Victorian Governments’ VicURBAN, Waitakere City Council’s (New Zealand) Tool for Urban Sustainability - Code of Practice (TUSC), the South East England Development Agency (SEEDA) checklist and ARUP’s SPeAR (Sustainable Project Appraisal Routine) tool. Even though they use different indicators or variables to convey the sustainability performance of a neighbourhood (suburb or precinct), they, in general, encompass four dimensions of sustainability, environmental protection, social equity, economic viability and efficient use of natural resources. They provide an easy-to-grasp rating for site and this rating, until recently, has been used as an important assessment and marketing tool to attract people who have a tendency to pay eco-friendly living environments.

While there has been arguments related to the definition and content of the sustainable neighbourhood, a generally accepted approach embodies urban form specific concerns, such as efficiency of land and resource consumption (sustainable use of natural resources), location of new development and its effects on surrounding environments, neighbourhood scale land use decisions (job proximity and mixed use), accessibility (encouraging non-automobile modes, particularly pedestrians and cyclists), quality of non-motorised transport network, building level sustainable design qualities and so on. Additionally, economic vitality, social cohesion, support for low income groups, public involvement and quality of governance are other issues specific to aforementioned sustainable neighbourhood approaches.

Relying on contemporary approach to sustainable neighbourhood concept, in this study we mainly focus on urban form and mobility issues, as can also be seen from selected indicators in the next section. The main reason behind this approach is twofold. As local governments and planning agencies have been involving spatial decisions in their daily practices, it is easy to access or produce spatial data via GIS technologies. Also, these considerations are highlighted numerous times in the literature and government documents as crucial factors affecting the sustainability of settlements, from regional plans to building codes. Overall, this model, as a decision support tool, has been designed to effectively evaluate spatial policies and decisions. Because of these, a practice-led approach has been followed in general.

4 Indicators reflecting the sustainability of neighbourhoods

In this study, we compiled a list of over 1000 indicators from the literature of urban sustainability indicators and relevant institutional documents encompassing different spatial scales (from region to neighbourhood). A synthesis of the literature findings has generated two main categories for the indicators. These main categories are employed to structure the indicator system. By using eDPSIR framework (Niemeijer & de Groot, 2007) (see Figure) and considering indicator selection criteria (see below), these two
categories are separated into 8 themes and 34 indicators (Allen, 2008; Black et al., 2002; Cervero & Kockelman, 1997; European Commission, 2001; Gold Coast City Council, 2006; Handy et al., 2005; Jeon & Amekudzi, 2005; Litman, 2007; Newton et al., 1998). In Table below, the structure and list of indicators are given.

In similar indicator studies, the most critical phase is to select indicators in a reliable and valid way. After a comprehensive review of the indicator studies, Niemeijer and others (2007) have revealed that most of the studies have been using somewhat arbitrary and ambiguous indicator selection methods and even if it is stated that a number of criteria has been employed in the process, specific details of evaluation are not frankly given. In order to overcome this difficulty, they advised a modified version of well-known OECD’s driving force-pressure-impact-state-response (DPSIR) framework by using causal networks. Having called it enhanced DPSIR (eDPSIR), they advised a selection process according to the policy problem at hand (if the problem is to deal with the main causes of a phenomenon, it is wise to select indicators from the driving force and/or pressure domains, however when it is related to policy formulation, it is better to focus on impact and response indicators) and a clear preference towards selecting key nodes which incoming and outgoing network arcs focus on. By selecting appropriate nodes (factors or indicators) as to the problem at hand, the critical information can be captured which in turn helps avoiding the problems of overweighting or omission of some indicators. Following these principles, an eDPSIR framework is drawn and a condensed version of it is presented in Figure.

As it can be seen in the figure, all items are interrelated with each other and due to policy relevance considerations, the indicator themes are selected from the impact and response domains. Accordingly, the transport domain themes are accessibility and affordability, environmental externalities, resource consumption and travel pattern, while the urban form related themes are location, resource consumption, urban density and urban form and design.

In addition to eDPSIR framework, a set of criteria has been defined to select the specific measures for the categories. As defined by Lautso et al. (2002) qualities of well-designed indicators are:

- Relevance (properly embrace the definition and theoretical basis of sustainability),
- Representativeness (cover key issues related to different domains of sustainability),
- Policy sensitiveness (help to formulate policies)
- Predictability (lead to model policy impacts).
These items are used as criteria in indicator selection process. While the first two items in the list above correspond to the theoretical robustness of the indicators, the remaining items point out the practical qualities. It is also stated that the indicators should be scientifically valid (reliability), responsive to the changes in the respective system, understandable, and flexible enough to encompass new knowledge and public perceptions (flexibility and practicality) (Maclaren, 1996). In this study, in order to satisfy relevance and representativeness criteria, a comprehensive list of indicators via literature was

Figure 1. eDPSIR framework for the study
compiled, and following this, an analysis of correspondence between the list and the local government policy documents was performed. Also, small workshops were conducted with local government officers to ensure content consistency and policy sensitiveness of the indicators. For predictability, depending upon the spatial level of the data, the indicator values were aggregated or disaggregated to 100 x 100 m grid cells, by which it could be possible to make spatial analysis over unit of analysis (grid cells) and to produce measures which can be used to model the selected neighbourhood-level-policy-interventions.

Table 1. Indicators of the model

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Indicator</th>
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<tbody>
<tr>
<td>Dynamic Built Environment</td>
<td>Accessibility and affordability</td>
<td>Access to public transport</td>
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<td></td>
<td></td>
<td>Transit service coverage</td>
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<td></td>
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<td>Transit service density</td>
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<td></td>
<td>Public transport performance indicator</td>
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<td></td>
<td>Accessibility for those without a car</td>
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<td></td>
<td>Environmental externalities</td>
<td>Average portion of household transportation expenditures</td>
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<td>Greenhouse gases from transport</td>
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<td></td>
<td></td>
<td>Emissions of heavy metals and polyaromatic hydrocarbons</td>
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<td></td>
<td></td>
<td>Exposure to traffic noise</td>
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<tr>
<td>Resource consumption</td>
<td></td>
<td>Consumption of mineral oil products for transport</td>
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<tr>
<td>Travel pattern</td>
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<td>Land area occupied by roadways/transportation infrastructure</td>
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<td></td>
<td></td>
<td>No of trips by car, public transport, walking and cycling</td>
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<td></td>
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<td>Average speed by mode and distance</td>
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<td></td>
<td>Off-street parking spaces per employee in CBD</td>
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<td>Location</td>
<td></td>
<td>Mixed land use ratio</td>
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<td>Energy use</td>
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<td>Housing and jobs proximity</td>
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<td>Resource consumption</td>
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<td>Residential water consumption</td>
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<td></td>
<td>Solid waste generation</td>
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<td></td>
<td></td>
<td>Wastewater generation</td>
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<td></td>
<td></td>
<td>Stormwater reused</td>
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<td>Urban density</td>
<td></td>
<td>The number of residents per hectare</td>
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<td>Urban form and design</td>
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<td>Average parcel size</td>
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<td>Number of intersections per square km</td>
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<td></td>
<td></td>
<td>Internal street connectivity</td>
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<td></td>
<td></td>
<td>External street connectivity</td>
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<td></td>
<td></td>
<td>Open space availability and accessibility</td>
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<tr>
<td></td>
<td></td>
<td>Open space connectivity</td>
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<td></td>
<td></td>
<td>Pedestrian network coverage</td>
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<td></td>
<td>Pedestrian accessibilities</td>
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<td></td>
<td>Walkability, pedestrian friendliness</td>
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<td></td>
<td>Bicycle network coverage</td>
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<td></td>
<td></td>
<td>Bike installations (cycle paths and parking)</td>
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<td></td>
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<td>Traffic calming</td>
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</tbody>
</table>

5 Composite indicator method and framework of the model

The main characteristic of the composite indicators or indices is that in general, they do not have a unit, so that they are considered neutral and comparison between them is viable. Or, they have a unit (i.e. monetary units, ecological footprint, and so on) which make it possible to reflect the index with its original measurement.

As stated by Munda (2005), there are three steps followed in nearly every indexing studies - normalisation, weighting and aggregation. Normalisation is necessary to
eliminate the scale of different units and to make calculations with comparable units. It is done in various ways; however, normalisations using standard statistical distributions, ordinal scales (Likert), and central tendency dependent manipulations are the mostly used techniques (Singh et al., 2009). Weighting involves deciding upon relative importance of the variable or indicator. Various techniques such as multivariate analysis, factor analysis, public and expert opinion techniques, and so on, are employed for this procedure (Hák et al., 2007; Hass et al., 2002; Singh et al., 2009). Aggregation as the last step can be done using simple additive or functional forms.

The procedure followed in the generation of the indices also points out the main weakness of the composite indicators. Components are assigned weights with the proportion of variances in the original set of indicators, and then can be aggregated using an addition or a functional nature. Weights are used to correct the information overlap of correlated indicators, as to ensure that the results do not display a bias (Hanafizadeh et al., 2009). The weighting methodology carries value-dependent biases and, in some cases, weighting with linear aggregation causes substitution among indicators giving rise to acquiring overly-normalised index values (Munda, 2005). Moreover, aggregation of the indicators as an index can cause, in some cases, critical information losses which make it difficult to identify negative or positive changes in the indicator due to the offsetting effects of positive indicators on negative ones (Neuman, 2006).

Instead of simply using individual indicators as an entity to calculate composite indices, several studies propose somewhat sophisticated methodologies to create a composite index. To name a few, they are factor analysis, principal component analysis, multiattribute utility analysis, analytical hierarchy process, concordance analysis technique, evidential reasoning, fuzzy logic and so on (Black et al., 2002; Hanafizadeh et al., 2009; Jeon, 2007; Lautso, 2003; Rassafi & Vaziri, 2007; Tanadtang et al., 2005; Zietsman et al., 2006). In this study, the factors extracted at the data reduction step will be used to create a composite index. The details of calculation steps and factors are not given here, because the most of the indicator values and indicator weights are generated by simulations.

![Figure 2. A snapshot of indexing model (Yigitcanlar & Dur, 2010)](image-url)
At this early stage of the project it could only be tested with dummy figures in a case study in Gold Coast, Australia. The main purpose of this dummy pilot study is not to measure accurate sustainability levels, but to see whether the model works properly and provides meaningful findings. Figure 2 demonstrates an example of the composite index developed for part of the Gold Coast City by using hypothetical data. As it can be seen from the figure, low density and mostly residential areas, and surrounding areas of the roads have low sustainability scores due to given high weights to density and transport related factors. However, greenfield areas have high scores because of their undeveloped state. By using this output, it is possible to advise new locations for residential development, transit oriented urban development, densification or to monitor conservation areas and development pressure on greenfields.

6 Conclusion

In this paper, we presented an indexing model taking into account the major spatial qualities of KBUD and prominent features of the neighbourhood sustainability as a subset in SUD concept. Essentially, we tried to conceptualise an indicator-based assessment technique considering the urban form and transport related issues, which will have immense importance in terms of urban sustainability for both current inhabitants and the knowledge workers to be attracted. Moreover, to provide a practical tool, we pursued a pragmatic approach by mainly focussing on local planning agencies’ spatial intervention capabilities instead of indirect market- and social-oriented instruments.

The initial trial of the model has shown that indexing is a powerful technique to simplify the interrelated however fragmented aspects of an urban setting; however, it should be noted that oversimplification otherwise complex phenomena can cause, in some cases, crucial information losses. Yet, instability in model results caused by using different aggregation techniques, compensation of high scores with low scores and subjective nature of weighting methods are other important considerations that force model users to be cautious about model outputs. However, the model has a potential to aid involved parties in forming sustainable urban and transport development policies and in monitoring their impacts on the environment.

As the next steps, validity of the model should be tested via different aggregation and weighting schemas in terms of the sensitivity/stability and reliability of the model should be examined via trials on various urban settings. Moreover, further refinements are possible in terms of unit of analysis (from grid cells to lots) and indicator set of the model as to the criteria designated.

References


Town centre revitalisation in the shrinking age: 
challenges to town and transport planning

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Abstract
This paper deals with town centre revitalisation in medium-sized cities in Japan, and attempts to clarify the ways in which we can revive active and attractive urban centres, and promote cooperation between town and transport planning. Even though the central government of Japan began enacting laws accompanied by grant programmes in the 1990s, concrete results have yet to be seen regarding the revitalisation of its town centres. Because of weak development controls, until 2006, it was difficult to stop the development of large-scale shopping centre that is located outside of town. What’s more, population decline and the quality of life for the elderly are nationwide issues in Japan, and the high elderly rate and outflow of the labour population are particularly serious problems in small cities. To address these issues, we first review the existing plans for town centre revitalisation and how cities consider the connection between town and transport planning while planning for the revitalisation process. We then conduct an analysis of population statistics, densities, shops, sales revenue, and so on. We have selected two cities to follow, Aomori and Toyama, and examine how these cities may revitalise themselves via the cooperation between two planning systems.

From the study, we have developed four patterns for city development: a strict development control pattern, a market-oriented pattern with public transport, a market-driven pattern, and an incentive-giving pattern. Under the current urban planning power structure in Japan, the market-oriented pattern with public transportation and the incentive-giving pattern are the most feasible. However, local authorities should carefully consider the amount of incentives to be offered. In addition, a combination of regulation and deregulation is important tomorrow’s ‘shrinking age’.

Keywords – compact city, land-use, town centre revitalisation, public transport

Paper type – Academic Research Paper
1 Introduction

Town Centres used to be responsible for various types of functions, including culture, education, shopping, residential life, transport, business, and so on. Small cities in Japan used to have deep community networks, place streets at the service of culture and some have knowledge based functions. However, since the 1980s, a number of functions have unfortunately transferred to other areas. The reasons are various; however, we point to two main issues. The first is the competition between town centre and out-of-town retail businesses; the other is population decline and the growing rate of the elderly population.

The first issue is not a simple one. Problems such as a lack of successors, lack of knowledge of the market, and a decreasing number of customers have comprehensively and negatively affected the activeness of town centres, and broke local community networks. The situation is particularly serious in small to medium-sized cities whose populations are less than 30,000. Some cities are facing over 30% shop vacancy rates, and consumers tend to visit out-of-town shopping centres for both comparison and convenience shopping. This is also caused by urban development’s weak development control power, the urban sprawl of residential development, and large-scale shopping centre development, which could not stop until the amendment of the City Planning Act of 2006. Not only development control, but the central government has enacted laws accompanied by grant programmes since the 1990s for town centre revitalisation. The menu was rewritten to distribute a certain amount of funding to selected cities, and currently 97 cities have been selected. Despite these efforts, the actual revitalisation of town centres has hardly been seen. As retail businesses are one of the central elements of town centres, most of the selected cities have been focused on retail revitalisation.

How can urban planning assist in the revitalisation of town centres? A number of urban regeneration projects, such as the building of new road networks, mainly concern physical development, but the revitalisation requires a combination of physical and non-physical developments, as well as cooperation between various stake-holders. Even cities with serious urban sprawl issues have major problems at every level, such as fewer passengers in public transport systems, a high rate of fuel consumption, a decline in accessibility to public services and hospitals, and the cost and maintenance of water, sewer, road, and other public facilities in their present and unsustainable form. Life in these cities is dependent on a large degree of consumption and the use of automobiles.

The second issue of elderliness and population decline is now a nationwide issue in Japan and the outflow of the labour population and the high percentage of the elderly population are particularly serious in small cities. The notion of the ‘compact city’ has been widely discussed in recent years; the concept of the compact city matches the current requirements for sustainable cities, which includes consuming fewer fossil fuels, using fewer or no automobiles, and fit for population declined elderly society. Also compact city has many opportunities to foster face-to-face relations, one of the concepts of knowledge city. At the Council for the Promotion of the Provision for Social Capital in the Ministry of Land, Infrastructure and Transportation, the compact city and new regulations for becoming more compact were proposed in relation with town centre revitalisation (MLIT, 2006). What is the function of the compact city? Kenworthy (2006) pointed out the ten dimensions that severely constrain any attempt by a prosperous city to become sustainable; these ten dimensions relate directly to the revitalisation process, since the goal of the sustainable city is practically the same as that of a liveable and walkable town centre. They include compactness, mixed-use, the natural environment, a
walking and cycling infrastructure, circulation by modes of public transport, and so on. However, as most cities have already chosen a system of rapid development with urban sprawl, it is not easy to transform them into easily accessible compact cities. A number of cities introduced or examined LRT, BRT, and community bus services for supporting the elderly, and presented challenges for renewal. However, the importance of the coordination of town and transport planning is understandable, as they have less often been in conversation with one another.

This paper deals with town centre revitalisation in small to medium-sized cities in Japan, and attempts to clarify how we can revive active and attractive centres, and develop cooperation between town and transport planning. First, we review written statements of town centre revitalisation plans, and the ways in which cities consider the connection between two while planning for the revitalisation. We then conduct an analysis of the statistics regarding population density, number of shops, sales and so on.

2 Literature review

The decline of town centres has been caused by various factors; many researchers have pointed out the negative impact of regional shopping centres (Nakade, 1998), and there is a long history of competition between businesses inside and outside of the city. As Nakade notes, the most important issue is controlling both the location and size of the shopping centre. Another issue is finding suitable shopping centre sites within the town centre; the difficult of assembling land is indeed a hurdle for urban regeneration (Shoup, 2008). If the local planning authority had the power to prevent the construction of regional shopping centres, and was able to reach a consensus between urban planners, city officials and town centre business coalitions regarding what was appropriate for town centre (Lowe, 2005; Salcedo, 2003). On the other hand, the relationship between the decline of town centres and dependence on the automobile has long been discussed; the problem was addressed as early as the 1960s (Jacobs, 1961). The area with residential population could be safe and attractive, but the way towards compact city is not easy, because we have already accepted urban sprawl.

A number of researchers and governments are believed to have reconsidered the urban form under the pressure of sustainability issues (Cervero, 2009; Holden et al., 2005). The main grand visionary strategy is to revitalise cities within this century as improved places in which to live, work, and play through policies that would alter urban size, shape, density and form (Haughton & Hunter, 1988). Urban sprawl has resulted not only in a loss of attractiveness, but it has also negatively impacted deficit spending (Burchell et al., 2005). Burchell notes that more compact growth patterns will help the local authority’s budget; investments have already been made in central areas, and the use of that facility helps urban sustainability.

In terms of reshaping the city, the concepts of growth management and compact city construction have been widely discussed (Tsai, 2005). The goals of both theories include liveable communities and attractive town centres, and they comprehensively address the relation between land-use and transport (Song, 2005; Brown et al., 2008; Handy, 2005; Filion et al., 2007). The compact city closely resembles the goal of active town centre development, since the new urbanism suggests the usefulness of applying a land use and transport approach in tandem (Calthorpe, 1993).

The fundamental question is how to change transport and the way people travel. It is first important to reduce auto-dependency (Surinivasan, 2002; Jun, 2008; Kawabata et al,
Potential gains in household choice are important, because one’s home and office need to be situated along public transport networks. This helps the removal of barriers to alternative development forms (Levine et al., 2005). Rural cities in Japan face similar problems to those in urban areas, as the public transport system is new, and it has been difficult to increase the number of riders. Zhang (2006) believes a stepwise approach can work to reduce automobile dependency; with increasing access to choice, the second-tier goal of reducing driving becomes more feasible. Moreover, road pricing has strong impact to reduce automobile dependency. However, the challenges to meeting transport needs are also difficult in rural areas and areas of low density with people without cars, where it is hard to provide public transport services, or where services may have been cut altogether (Kumaki et al., 2006; Stommes et al, 2005). Less service can reach fewer riderships, and then service itself is difficult to maintain.

These findings have promoted us to investigate the relationship between land-use and transport policies, and how they may be implemented the next urban form.

3 Town centre revitalisation in Japan

What is town centre revitalisation in Japan? While revitalisation covers all of a town centre’s activities, its central goal is to secure business. A number of town centres in North America have established BIDs (Business Improvement Districts), as they create new opportunities, take calculated risks, and try new approaches (Levy, 2010). This is the new challenge for governance cooperation between private and public sectors (Mitchell, 2001), but here, we do not have BID. In Japan, the functions of town centre management have run by Town Management Organisations (TMOs) since late 1990s, and most works such as street cleaning, event promotion and the coordination of stakeholders are run by TMOs.

The current programmes of town centre revitalisation in Japan, the so-called three acts for town centre revitalisation, were enacted in 1998: the Act on Vitalisation in City Centres, the Act on the Measures by Large-Scale Retail Stores for the Preservation of Living Environment, and the Amendment of City Planning Act. These replaced the Act on the Measures by Large-Scale Retail Stores for the coordination of operations, an act that had secured local small businesses since 1973. The act regulated opening days and hours of operations, particularly in large-scale shopping developments (there were two types of development regulations for developments sized over 500m2 and 3000m2)

When these acts were first implemented, they were very challenging, with 11 central departments, 32 programmes, and a budget of 1000 billion yen in 1998; a large percentage of the funding was available for physical improvements, with 27 programmes out of 47. However, the changes in the town centres were hardly noticeable, even though the government issued such funding annually. Town Centre Revitalisation in Japan was understood as retail revitalisation by many stakeholders, and most programmes were run by chambers of commerce, with limited coordination between other stakeholders such as transport, police and citizens.

In 1990s, some issues were raised, and were related to following points. Firstly, most declining town centres established TMOs by the chamber of commerce to win funding, binding a number of city projects. Secondly, monitoring and evaluation were minimal.

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1 This is caused by the Structural Impediments Initiative talks in 1990, and has deregulates the newly opened business since 1991.
because there was no longer a legal requirement, thirdly, some of the programmes were similar to each other, and could have benefited from consolidation (MIC, 2004). Therefore, serious amendments to the act were required, particularly in the distribution of funding (MIC, 2004).

Under the Amendment of the Act on the Revitalisation of City Centres, the central government introduced competitions between town centres for receiving grants. The new programmes (instituted in 2006) now required town centre action plans, consisting of health checks - monitoring and review. This meant that each town centre should set targets and goals, such as footfalls, annual sales, vacancy rates, and so on. Then, the central government selected plans with ‘authorised’ status. The Town Centre grant-programmes issued 66.4 billion yen in 2009, mainly distributed to authorised town centres. These programs require the submission of monitoring reports in five years, and the areas that were first authorised are now evaluating their programmes.

What can town planning and transport planning do for town centre revitalisation? Strong regulation and deregulation programmes were prepared in the 2006 amendment of the City Planning Act. The former is for retail development controls related to the size, location, and development permission requirements for public facilities, such as schools, hospitals, and council offices. The latter decreased the regulation of land, including agricultural lands, and the designation of shopping centre districts. However, the act addressed neither transport nor the connection between town planning and transport planning. It addressed their relationship only in terms of compact city construction at the Council to Promote the Provision of Social Capital, stating that, ‘to be a compact city, a public transport network is essential between the urban core and areas in the region, and the urban core should be developed with integrated urban and residential facilities, provisions for transportation facilities and high-quality public transport services, cooperation between public sector and transporters, and the promotion of transportation policies’. (MLIT, 2006, p.19)

Town centre revitalisation began as a way to secure local small retail businesses, but now, after some external pressure, the task has been expanded to cover urban form, transport, pedestrian and cycle spaces, event promotion, residential development, and culture. Town centre revitalisation should now also be considered as a comprehensive package of programmes, otherwise it may not be secure; retail revitalisation has lost its status, and has become one of the targets of the compact city philosophy.

4 Reality and actions for town centre revitalisation

4.1 Data analysis

Although the goal of town centre revitalisation is an active and attractive town centre, each city faces different issues. The primary objective in this section is to categorise the cities with town centre problems, and find the relationship between these issues and their actions within a similar context. Currently, 97 town centres have been authorised by the Prime Minister of Japan and His Cabinet as the official town centres for revitalisation plans. We will analyse the progress of these 97 cities until March of 2010.

For the purpose of this evaluation, we focused on the activeness and attractiveness of each city, with 10 data sets concerning population, size, number of businesses and retail sales. Our data was taken from the 2000 Census, the 2002 Current Survey of Commerce, and the 2001 Basic Survey on Commercial and Manufacturing Structure and Activities,
which was conducted by the central government. We applied a hierarchical cluster analysis for 93 cities (we eliminated 4 cities due to lack of data). To identify the clusters, we applied Ward’s agglomerative hierarchical cluster algorithm, and the following 8 clusters were identified (Table 1). All of the data analysis was performed with JMP software, version 6.

Table 1. Result of cluster analysis

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<thead>
<tr>
<th>Group</th>
<th>Habitable Area/Local Authority Area (2000)</th>
<th>Number of Office (01/91)</th>
<th>Number of Retail (02/91)</th>
<th>Number of Workers (02)</th>
<th>Number of Retail Stores (02)</th>
<th>DID Area* (00)</th>
<th>Population Density in DID (00)</th>
<th>Number of Local Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>C 0.4060 0.9926 1.4189 1.0200 1.1353 83367 148435 3066 1.2983 0.6956 0.2047 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D 0.5376 1.0200 0.8279 1.2086 1.2484 129070 55505 1297 1.9173 0.5367 0.1661 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H 0.5819 0.9348 1.3269 1.1957 1.1175 948479 245542 5563 1.9887 0.7259 0.2171 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>A 0.3724 0.9717 0.9716 0.9715 0.9714 94892 410962 1166 1.2347 0.4111 0.0738 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E 0.4165 0.9726 0.9456 0.9456 0.9456 109324 95692 2973 1.3553 0.6361 0.2038 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F 0.5745 0.9842 1.2590 0.9842 0.9842 114023 17067 3840 1.0760 0.6726 0.1999 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B 0.6929 0.9842 1.2590 0.9842 0.9842 171435 185249 2351 1.0000 0.9705 0.0736 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SUM</td>
<td>0.5201 0.9997 1.3758 0.9997 0.9997 271420 134140 2929 1.5849 0.6480 0.2164 79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* DID Area (Density Inhabited District Area): the area exceeds 4000 people/km2 in basic census data area, forms over 5000 population.

To compare the results, we can divided them into two groups (I and II) according to the activeness of the cities by the data of number of offices, annual retail sales, population exceed the average. The former group (I) consists of C, D and H. The C group, in particular, could be the most compact city, because it has the smallest size of habitable areas, and the growth of Density Inhabited District (DID) area is reduced. Therefore, the cities belonging to this group fare well in growth-management, without serious urban sprawl. As a result, the greatest number of activities are integrated in the DID area.

On the other hand, the latter group (II) consists of two types of groups. The first group, consisting of A and E, have small populations and limited growth rates. The greatest number of local authorities belongs to these two groups; therefore, typical cases of town centre decline can be seen in those. The second group, consisting of B, F and G, have large populations, are the capital cities of each prefecture, and are ordinance-designated cities with population sizes over 800,000 (G).

While many cities need town centre revitalisation, the current situations and problems of each city vary. Although the typical case of town centre declines can be seen in Group A, our interest lies in understanding how planning and transportation planning can secure town centre revitalisation. Currently, cooperation between the two groups is lacking. Accordingly, we will focus on the group C for analysis, because it is easier to introduce cooperation in more physically compact cities.

4.2 Policy review in town and transport planning

In this section, we focus on how local authorities draw up policies for sustainable city construction by town and transport planning systems. We have reviewed the policies on the master plans of 14 cities in Group C, and attempt here to clarify how they suppose to develop the compact city. The preparation of a master plan is not a new practice in Japan;
it was introduced at the amendment of City Planning Act 1992, and local planning authorities have required preparing master plans that target 15-year planning with public participation. We have reviewed the contribution of policies in four areas concerning land-use, transport policies and connections of land-use and transport planning: 1) land-use in the town centre; 2) accessibility in the town centre; 3) accessibility to the town centre; 4) land-use along the network. Because the targets of policies are focused on space, it can be said that areas 2 and 3 are policies related to axis, area 1 is related to plane, and area 4 concerns both. Our results are summarised in Table 2, and the findings are summarised as follows:

- Not all the cities used the terminology of the compact city in their plans (just 43%), even though their related policies and future directions are in line with the compact city design;
- Town planning policies vary, even though they belong to the same cluster groups. However, the functions of the town centre consist mainly of similar uses; retail developments (93%), mixed-use developments (86%) and residential developments (79%);
- Neither the policies for land-use along the axis, nor the suburban development controls are drawn up in town planning policies, and most policies in group C focus intensively on land-use in the town centre;
- On the other hand, regarding transport planning policies, most cities maintain similar policies, and some of the policies, such as development of principle road network, counted as 100%;
- Accessibility both in and to the town centre are equally important for transport planning, and a number of cities develop both policies for the development of the compact city.

From the review of the master plan policies, we see that local authorities mainly establish similar policies for transport planning, but not for town planning. Transport planning focuses not only on the size of cities, locations and issues, but always on the development of new road networks, which are understood as fundamental policies in all cities. This means that, in many settings, transport policy has been skewed in favour of automobile usage at the expense of quality of life. The individualities of each city, therefore, can be seen in land-use planning policies.
Table 2. Policies in the group C

<table>
<thead>
<tr>
<th>Policy</th>
<th>Rate</th>
<th>1) Land-use in the Town Centre</th>
<th>2) Accessibility in the Town Centre</th>
<th>3) Accessibility to the Town Centre</th>
<th>4) Land-use along the Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td></td>
<td>plane</td>
<td>axis</td>
<td>axis</td>
<td>plane/axis</td>
</tr>
<tr>
<td>Compact City Construction</td>
<td>43%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Residential Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development in Town Centre</td>
<td>79%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development for Elderly</td>
<td>14%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Development in Town Centre</td>
<td>93%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revitalising Shopping Street</td>
<td>29%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed-use Developments</td>
<td>86%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention of Out-of-Town Shopping Centre</td>
<td>29%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of Public Utility in Town Centre</td>
<td>50%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Regeneration Projects</td>
<td>50%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development along Principle Transport Network</td>
<td>14%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development in Core Area</td>
<td>64%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Sprawl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protect Agricultural Lands</td>
<td>36%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention of Urban Sprawls</td>
<td>43%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Network</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of Principle Road Network</td>
<td>100%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve Local and Collector Street Connectivity</td>
<td>86%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well-connected Network Design for Local Community</td>
<td>86%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve Street Connectivity for Public Transport</td>
<td>100%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well-connected Network in Core Areas</td>
<td>71%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of Transport Cores</td>
<td>79%</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well-connected Network between Town Centre and Suburban Area</td>
<td>71%</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People and Bike</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Universal Design</td>
<td>71%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Public Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian Safety &amp; Cicle Lanes</td>
<td>93%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Parking and Cycle Parking</td>
<td>64%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Encouraging Public Transport</td>
<td>79%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Encouraging Bus Service</td>
<td>93%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Increase Rail Riderships</td>
<td>29%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Improve Rail-Bus Connections</td>
<td>21%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Park and Ride System</td>
<td>43%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Information System</td>
<td>21%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>TDM</td>
<td>59%</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

Source: Master Plans in Yamagata, Akita, Matsue, Aomori, Obihiro, Ootsu, Oita, Nagano, Nagaoka, Tottori, Nara, Toyama.

5 Case studies for a cooperation between land-use and transport planning (Toyama City and Aomori City)

In this section, we examine how land-use and transport planning work for the compact city, and analyse real, detailed policies. We define Group C of the cluster analysis at 4-1 as an attractive town centre group as compared to the other groups. Among the 14 cities of group C, we chose Toyama City and Aomori City as case studies, because they were selected as the first two cities for town centre revitalisation in 2007.
Toyama City is the capital city of Toyama Prefecture, and a major city in the north-west region, with 400,000 residents in 1200 km²; Aomori City is also a capital city, a major city in the north of Japan with 300,000 people in 824 km² (Figure 1).

In this section, we first review written statements of land-use and transport policies to be a compact city on master plans and transport plans, followed by an analysis of land-use and transport relationships.

5.1 Policies for compact city development

(1) Issues and Strategies

Of the issues that Toyama City faces, the local authority highlighted the following three points as fundamental problems: lack of accessibility for people without cars, the high maintenance cost of public facilities, and a less active and attractive town centre. The authority knows that the situation will worsen in the near future as the population declines and the rate of the elderly grows. In order to tackle these issues, the plan is to construct a compact city, and to integrate residential, commercial, office, and cultural functions along public transport lines. The strategy of the development can be seen in Figure 2.

On the other hand, in Aomori City, the following five points were considered: fewer children and elderly residents, suburban development and the emptiness of the town centre, the preservation of the natural environment, the characteristics of the city and citizen participation, and long-range planning. To solve the issues, the city decided towards a compact city model that would be snow safe, elderly safe, welfare safe, environmentally friendly,
and with a high level of disaster prevention: in short, an effective and comfortable city. They draw up a model for the city that is divided into three parts (inner, mid and outer), and show strategies for each area (Figure 3).

The review of transport strategies in Aomori selected five points as fundamental issues: auto-dependency and the decline of public transport ridership, heavy traffic jams, rail company management, poor public bus service, unrealistic road network plans, and an outdated, non-functioning parking information system. Aomori City also decided to develop compact city construction with three policies for tackling problems. These consist of the development of sustainable public transport, construction of street under the selection and integration of funding, construction of transport environment for town centre revitalisation, and the solution to transport problems.

The structure of the two cities differs greatly in two areas. Aomori City’s town centre connects to the suburban area along a concentric circle structure (Figure 3). On the other hand, Toyama City has a number of cores that are connected by public transport along an axis. In terms of transport, both cities have radial transport systems with rail and bus services originating at the town centre, and are required to improve their services and networks in order to construct a sustainable city.

(2) How can we become compact? A policy analysis

A number of cities highlighted the importance of compact city development, but the reality of its implementation is difficult. Table 3 shows the strategies and tools for developing the compact city in Toyama and Aomori City. From the table, we can see that the basic idea of the compact city differs between the two cities: Toyama City focuses on transport as the key strategy among three related strategies; on the other hand, as the key concept of Aomori City is ‘Walkable City Development’, all its five strategies are highly related to the town centre’s attractiveness and revitalisation.

Let’s take a more detailed look at Table 3. Toyama City’s strategy is composed of a combination of public transport systems and land-use, consisting of lines, plane and connections. The city first focused on 13 transit lines to improve the services between the town and district centres, including frequent service lines and bus services between the town centre and public buildings, such as universities, hospitals, airport and related facilities. Toyama’s great advantage is its rail system; rail ridership has been growing and the city plans to extend the network. Secondly, ‘Policy for Plane’; the city encourages the development of the residential population, especially in areas within walking distance from rail and bus stations. Thirdly, relationship between ‘plane’ and ‘axis’; these connections can ultimately affect the activity of the town centre. Accessible public transport can assist to reach attractive area and increasing residential population, which will eventually create a liveable town centre.

Is it possible to construct a compact city through public transport and promotions alone? A number of Japanese cities have tended towards policy packages of regulation and deregulation; in comparison, Toyama City proposed market incentives while lacking the power of enforcement. It’s useful facilities, shopping centres, cultural interests and of course, transport systems are located within walking distance, if residents live in the town centre or along the transport networks. This is possible only if the land-use and public transport systems effectively work together.
Table 3. Strategies and actions for compact city in Toyama and Aomori

<table>
<thead>
<tr>
<th>Table 3. Strategies and actions for compact city in Toyama and Aomori</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toyama City</strong></td>
</tr>
<tr>
<td>Transport</td>
</tr>
<tr>
<td>- Promotion of Public Transport System</td>
</tr>
<tr>
<td>*Network building between Town Centre and District Centres(#)</td>
</tr>
<tr>
<td>*Keeping the Frequent Service Lines(#)</td>
</tr>
<tr>
<td>*Network building between Town Centre and Public</td>
</tr>
<tr>
<td>Population and Transport</td>
</tr>
<tr>
<td>- Move-in Population along Transport Networks</td>
</tr>
<tr>
<td>*Public Buildings and Residential Developments around Rail and Bus Stops(#@)</td>
</tr>
<tr>
<td>Town Centre</td>
</tr>
<tr>
<td>- Town Centre Revitalisation</td>
</tr>
<tr>
<td>*Good Accessibility for Public Transport Systems(‡)</td>
</tr>
<tr>
<td>*Attractive Central Area(‡)</td>
</tr>
<tr>
<td>*Promotion of Town Centre Living(‡)</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

Source) Toyama City Master Plan, Aomori City Master Plan, Aomori Transport Plan
Legend) †: Strategy ‡: Action # Policies for Axis @: Policies for Plane +:the Other Policies
Note) Aomori Transport Strategies are from Transport Plan.

On the other hand, as previously mentioned, Aomori City focuses largely on town centre revitalisation, and has a concept of land-use in three areas. The goal for the compact city in Aomori is building a ‘walkable’ city. They plan to begin with pedestrian-friendly development, accessible networks, high-quality public transport services, and increasing the residential population. All of these strategies are geared towards the town centre, and are related to the deep snow of the region. Removing the snow is heavy task for elderly people living in detached suburban homes. A housing exchange programme between suburban detached homes to town centre flats is, therefore, proposed especially for the elderly, as well as to gradually increase the residential population in the town centre.

Secondly, the city is not large enough. Because Aomori has a population of 300,000 around the mountain, it is not easy to expand its trading area. The previous result shows that some cities lost sales revenue and witnessed serious shop vacancies by newly-opened rapid public transport systems. Aomori chose its original town centre as the primary and sole centre, and concentrated most of the city’s functions there, even developing a new Shinkansen (bullet train) station. Of course, Aomori’s land-use and transport systems are connected, but compared to the case of Toyama; the city is focused more directly on town centre revitalisation.

5.2 Reality of the cooperation between land-use and transport

This part of our research utilised a spatial analysis of retail, transport and population provided by Geographical Information System (GIS) to analyse how compact city policies work in Toyama City. Toyama City contains a large, flat area; its habitable area is wide, covering 470km², so that it is 5th largest habitable area of local authority in
Japan. The residential population has seen a 7% increase between 1980 and 2000; the DID area, however, has recorded a 34% increase. Therefore, it can be said that its urban sprawl is serious compared to Aomori (whose DID expansion is recorded at 17%). Plus, Toyama City is highly auto-dependent: its auto dependency is at 72.2%, which is very high compared to the national average. The public transport system has developed its network from Toyama Station, and most rail and bus lines run from that station; however, public transport ridership has rapidly declined, and a number of services and service lines have been cut in recent years.

Within this context, our interests lie in the ways in which the cooperation between land-use and transport can have a positive effect on daily shopping in Toyama City. We focused on the relation of the location of rail and bus stations to the population, as residents who live close to the stations have a greater ease in using public transport. The locations of retail stores are also strongly related to travel patterns. For our analysis methodology, we have used the GIS-based Basic Survey on Commercial and Manufacturing Structure and Activities from 2005, the census from 2000, and the Town Planning Data from Toyama from 2007. A 500-meter area with 500,000 yen in retail sales is defined as a ‘primary shopping location’. The coverage of public facilities is always discussed in terms of a 500 meter radius and, in general, the elderly can access 500 meters; accordingly, we define the adjacent areas to the primary shopping area as the ‘walking area of primary shopping district’, and the population of those cells is defined as the ‘population covered by the walking area of the primary shopping district’. A 500 meter area surrounding the railway stations and a 300 meter area surrounding the bus stations on 13 public transport access lines as mentioned above are defined as ‘public transport accessible areas’, and the population in those areas is defined as the ‘population covered by the public transport accessible area’.

If we compare the walking area of the primary shopping district and the public transport accessible area, we can see that the gap in coverage is large (Table 4 and Figure 4). Not surprisingly, the ‘population covered by the walking area of primary shopping district’ in Toyama City covers only 28% of the total population, and this coverage is much smaller if we consider public transport: only 24%. This means that the walking area of the primary shopping district is located in a suburban, less accessible and less populated area. Nevertheless, rail ridership is on the rise, the population covered by the public-transport accessible area is 64%, and with the new advantages gained by accessibility, retail stores can receive more consumers. In contrast, Toyama City suggests that with Transit Oriented Development (TOD) along rail lines, high land values will encourage high-density development (Knaap et al., 2001; Hess et al., 2007; Duncan, 2010). This is one answer to the compact city question, if residents’ homes and offices are both situated along rail lines (interview to the Vice Mayor of Toyama City, 2010).

In this new, ‘compact’ age, how we can maintain a high quality of life for the elderly is fundamental question. Table 4 shows our results regarding the elderly population. Currently, the size of the elderly population in less accessible areas is limited, and a certain percentage of people have preferred to move back to the city (Hirata, 2006); in this study, we did not estimate future populations, but believe that it will be possible that the elderly population will grow in less accessible areas. In this context, securing accessibility to both convenience and comparative shopping is necessary. In order to maintain a high quality of life, it is difficult to integrate the population in both areas without strong development controls. While it may take time, and the planning system is weak, there are great advantages to living in areas that are accessibly to public transport.

750
In this context, the tasks of developing land-use, transport planning, and a link between them are fundamental and required.

**Table 4. Relationship between accessibility and population**

<table>
<thead>
<tr>
<th>Area</th>
<th>Population</th>
<th>Households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Households</td>
</tr>
<tr>
<td></td>
<td>over 65</td>
<td>Single</td>
</tr>
<tr>
<td>Local Authority Area</td>
<td>327,210</td>
<td>69,809</td>
</tr>
<tr>
<td>Urbanisation Area</td>
<td>267,634</td>
<td>55,294</td>
</tr>
<tr>
<td></td>
<td>82%</td>
<td>79%</td>
</tr>
<tr>
<td>DID area</td>
<td>244,872</td>
<td>51,394</td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td>74%</td>
</tr>
<tr>
<td>Public Transport Accessible Area</td>
<td>208,563</td>
<td>45,387</td>
</tr>
<tr>
<td></td>
<td>64%</td>
<td>65%</td>
</tr>
<tr>
<td>Public Transport Accessible Area or Walking Area of Primary Shopping District</td>
<td>222,147</td>
<td>47,183</td>
</tr>
<tr>
<td></td>
<td>68%</td>
<td>68%</td>
</tr>
<tr>
<td>Walking Area of Primary Shopping District</td>
<td>91,847</td>
<td>20,262</td>
</tr>
<tr>
<td></td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td>Public Transport Accessible Area also Walking Area of Primary Shopping District</td>
<td>78,263</td>
<td>18,466</td>
</tr>
<tr>
<td></td>
<td>24%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Source: 2004 Basic Survey on Commercial and Manufacturing Structure and Activities, Census Data 2005 GIS Data Toyama City 2007
Table 4 Relationship between Accessibility and Population

<table>
<thead>
<tr>
<th>Area</th>
<th>Population</th>
<th>Households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>over 65</td>
<td>Household</td>
</tr>
<tr>
<td>Local Authority Area</td>
<td>327,210</td>
<td>69,809</td>
</tr>
<tr>
<td></td>
<td>122,890</td>
<td>8,731</td>
</tr>
<tr>
<td>Urbanisation Area</td>
<td>267,634</td>
<td>55,294</td>
</tr>
<tr>
<td></td>
<td>104,631</td>
<td>7,667</td>
</tr>
<tr>
<td>DID area</td>
<td>244,872</td>
<td>51,394</td>
</tr>
<tr>
<td></td>
<td>97,108</td>
<td>7,334</td>
</tr>
<tr>
<td>Public Transport Accessible Area</td>
<td>208,563</td>
<td>45,387</td>
</tr>
<tr>
<td></td>
<td>83,724</td>
<td>6,673</td>
</tr>
<tr>
<td>Public Transport Accessible Area or Walking</td>
<td>222,147</td>
<td>47,183</td>
</tr>
<tr>
<td>Area of Primary Shopping District</td>
<td>91,847</td>
<td>20,262</td>
</tr>
<tr>
<td>Walking Area of Primary Shopping District</td>
<td>28%</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>32%</td>
<td>33%</td>
</tr>
<tr>
<td>Public Transport Accessible Area also</td>
<td>78,263</td>
<td>18,466</td>
</tr>
<tr>
<td>Walking Area of Primary Shopping District</td>
<td>24%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Source: 2004 Basic Survey on Commercial and Manufacturing Structure and Activities, Census Data 2005 GIS Data Toyama City 2007

5.3 Moving towards the compact city

The case studies show that the concept of compact city in Toyama is based on town centre revitalisation, with most functions integrated in the town centre. Aomori, on the other hand, focuses on accessibility. There are a number of policies and programmes for compact city construction, but the following points are most important for securing sustainable living. For increasing the residential population in areas that are accessible to both transport and shopping, the retail functions in the centre of town be first maintained and improved; then, residential development should be encouraged in the town centre. Secondly, the current public transport routes and service quality should be at least maintained, and the development of a move-in population along the transport network should be promoted.

6 Conclusion

Compact city development is a new philosophy, but the theory itself is not new. Most towns were developed in front of castle, town hall, or other public buildings. Many functions were integrated with the surrounding residential areas, and cities used to be compact. Under the age of growth, Japanese cities tend to develop suburban areas, the younger generation moved up to the large city, and a large percent of the older population occasionally remained in less accessible areas.

We are now approaching a shrinking age that includes population decline and a high elderly rate. How can town planning and transport planning secure the vitality of cities in this age? The answer is unclear, but following four patterns of city development that track the relationship between regulation (control/incentive vs. market) and activity (town centre vs. suburbs) may lead to a solution (Fig. 5);
(I) Strict Development Control

A strict development and control pattern: Strict development controls are desirable in less accessible areas. Under the weak development controls in Japan, there are hurdles to introducing a system with local people’s understandings;

(II) Market Orientated with Public Transport

A market-oriented to the public transport system: The private sectors can decide the location of development. Shopping centres are normally designed to be fed primarily by car traffic, but accessibility to all people should be considered in the negotiations between applicants and the local planning authority;

(III) Market Driven

A market-driven pattern: All development is decided upon by the market. There is a paradox that in the (I) pattern, large-scale development tended to prefer ample space out-of-town with a lesser value; however, if most of the population are integrated in the town centre, most of the developments also have an opportunity to be back to the inner area.

(IV) Incentive Given

An incentive-giving pattern: Without a significant degree of development control, development is guided by incentives in the central area, if the market evaluates its value as high.

How can we promote the residential population in town centre? The answer is not easy. Under the current planning power structure and future prospects of Japan, patterns (II) or (IV) may be considered as feasible. If the local authority decides to introduce pattern (II), they should negotiate the routes and frequency of bus service; for pattern (IV), the variety and amount of incentives are key elements. Local authorities should carefully consider the amount of incentives that the market deems ‘good values’. Incentives, such as tax remissions for newly opened business in the town centre or subsidies for the move-in population of outlying, newly accessible areas are also feasible.
However, a combination of regulation and deregulation is most important in this new, shrinking age. The coordination between land-use and transport planning for local authorities, transport companies, and users is fundamental for sustainability, today. If functions which knowledge city expects to have are brought into the town centre, quality of life, active and attractive community can be secured, and of course, accessibility by the public transit services is highly important.

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Knowledge Cities Through ‘Open Design Studio’
Educational Projects: The Case Study of Jeddah City

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Abstract
The purpose of this paper is to document the approach, methodology and outcomes of the Knowledge Cities (KCs) ‘Open Design Studio’ (ODS) model, which allowed for the interaction of the three planning and design disciplines in the Faculty of Environmental Design (FED) at King Abdul-Aziz University (KAU). The three disciplines were: Urban and Regional Planning, Architecture, and Landscape Architecture. The methodology of the ‘ODS’ relied on the ability for each discipline to create its own approach to the study, according to the appropriate scale and interest; working under one roof and allowing for ongoing exchange of knowledge and findings. The methodology also called for periodical formal joint presentations leading to the alignment of all tracks.

In the first part of the paper, the rational motives behind the adoption of the subject area, the selection of Jeddah City as a case study, the utilization of educational projects as a tool, and the promotion of multi-disciplinary design studio as a work environment were introduced; addressing the aim and objectives of the study. Next, the formation of the ODS, development model, activities, and outcomes were presented. Lastly, a discussion highlighting the achievements of the experience, the challenges it faced, and directions for future developments was presented.

Keywords – Knowledge Cities, Design Studio, Jeddah
Paper type – Practical Paper

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1- Introduction

The 'city' is the location where most activities take place, the bulk of population live and work, most job opportunities are created, and numerous profound social problems and highest incidences of poverty are located (Coats, 2005; and Jones et al, 2006). As cities of the past were built along railroads, waterways and interstate highways, 'cities of the 21st century will be built along information highways and broadband communication links; playing together with the digital age smart and sustainable communities a central role in the rebirth of civilization in the 21st century' (Eger, 2001). These cities are promoted to work 'smarter; not 'harder', adopting the principles of dematerialization, demobilization, mass customization, intelligent operation and soft transformation (Mitchell, 2000).

The rise of 'Knowledge Economy' (KE); or the so-called 'knowledge-based', 'weightless', 'high skill', and 'dynamic' economy (Coats, 2005), is argued to increase the awareness of knowledge as a key factor for economic growth and performance (Rehfeld & Hamburg, 2001), providing the ground on which 'Knowledge Cities' (KCs) can be built. In turn, ‘KCs’ are seen to be associated with a wide range of terms, such as: ‘intelligent city’, ‘smart city’, ‘educating city’, ‘creative city’, ‘science city’, ‘region of the future’, ‘media village’, ‘high tech knowledge corridor’, ‘knowledge commons’ and ‘knowledge innovation zones’; acknowledging the flow of knowledge through networks (Amidon & Davis, 2006).

Recent literature argued that there is a disparity between the interpretations of the terms KE and KCs, not only because of the varying vitality of a nation’s economy and the advancement of society as a whole (Amidon 1993), but also because of the varying demands placed on these terms (Dvir, 2004). In investigating how UK cities, as an example, can become drivers of the KE, and what the implications of becoming a KC might be, Jones et al (2006) addressed three basic challenges; each started with 'lack of clarity about'. The study showed the 'lack of clarity about' the terms 'knowledge' and 'city' to become an obstacle for the city to navigate its path towards becoming an 'Ideopolis'; where knowledge, creativity, enterprise, connectivity and the quality of life combine to create a dynamic local economy and provide a wide spectrum of economic, social and cultural opportunities.

On the other hand, over simplifying the concept of KE; and therefore KCs, in terms of concentrating only on: the association with the Internet (Coats, 2005), the shift into the informational mode, the production of technology, the unbalanced focus on it, the promotion of higher exploitation of ICT without understanding the implications of application (Kreisler, 2001); and the lack of attention to the cultural aspects and the varying standards of nations (So et al, 2001), would lead to bad choices. In response to that, Coats (2005) promoted the concept to be the subject of a serious analysis.
1-1 Motivation:

Why Knowledge Cities?

According to Landry (2000), the 21st century is identified as the ‘Century of Cities’. The world’s population living in cities is overcoming the 50%, and is expected to become 75% by 2025; this percentage has been already reached by most developed countries. The 21st century is also identified as the ‘Century of Knowledge’ (Sakaiya, 1999) or the ‘Century of Learning’ (Longworth, 1999). After World War II, over 50% of GDP in an increasing number of industrialized countries moved consistently from material-based to be knowledge-based. As a result, the United Nations, the European Union, the OECD, and the World Bank have all stressed the critical importance of the KE as a global reality. Currently there are 65 urban development programs worldwide managed to integrate the development in these cities closely with the knowledge-based economy; to be formally termed KCs (Carrillo, 2006).

These emerging urban development programs managed to offer cities influential opportunities, including: international competitiveness, global prosperity and leadership (Jones et al, 2006), economic growth (Coats, 2005), increasing capital investments and lifecycle savings (Brambilla & Heer, 2001), and innovative conservation of resources (Mitchell, 2000). At a local scale, Ergazakis, Metaxiotis & Psarras, (2006) argued that these cities are to promote strong dynamics of innovation across all economic and social sectors; pursuing better educational services, involvement of citizens in the city development, identity, unique character, more sustainable economy, and the creation of a tolerant environment toward minorities and immigrants.

Due to the inevitability of urban mobility to the cities, the accelerated shift towards the KE-based development, and the quantitative and qualitative local and global opportunities offered by this transformation, the concept of KCs can be considered a rich and useful subject area for educational and research purposes.

Why Jeddah City?

In the “European Cities in the Knowledge Economy”, Berg et al. (2005) identified and developed seven foundations on which cities can succeed in the era of KE, including: knowledge base, economic base, quality of life, accessibility, urban diversity, urban scale, and social equity. However, the degree of importance differs; the knowledge and economic bases can be considered fundamentals, since cities without sound scores in these fields will find it very difficult to successfully build up and maintain KE. The other five foundations can be considered supportive; adding extra strength to the fundamentals. Despite the fact that the authors used these seven foundations to comparatively analyze nine KCs in Europe, these foundations can be prompted as a generic tool to find out how knowledge-intensive is the local economy, and what are the city’s prominent assets and resources to become a KC.

In another sense, Richard Florida (2002) argued that the economic competition of KCs is based on the capacity to attract, hold, and integrate talented and creative individuals. As a result, cities can compete in three main areas: (1) the quality of local
culture (unique cultural vitality, ethnic diversity, and social tolerance); (2) a dense labour market (job abundance and opportunities for knowledge workers); and (3) the presence of local facilities and attractions which are highly valued by knowledge workers (access to outdoor activities and artistic events). According to Florida (2002), creatively talented individuals prefer to live in cities with populations characterized by diversity, tolerance, and openness; because such an atmosphere stimulates cross-fertilization of ideas and practices, and promotes faster flow of knowledge.

In light of the above mentioned criteria, Jeddah City, KSA, appears to have the historical, geographical, cultural, economic, and knowledge potentials to move towards becoming a KC; or at least have the rational motives to investigate its capabilities to be a KC. Jeddah is a Saudi Arabian city located on the Red Sea coast and is the major urban center of western Saudi Arabia, with a population stands at over 3.4 million. It is the principal gateway to Mecca, Islam's holiest city, which able-bodied Muslims all over the globe are required to visit at least once in their lifetime. It is the largest city in Mecca Province, the second largest city in Saudi Arabia after the capital city, Riyadh, the largest sea port on the Red Sea; i.e. it was ranked the 32nd busiest seaport in the world in 2008 handling about 29.98% of Saudi Arabia's commercial movement, the most liberal, cosmopolitan and tolerant of all Saudi Arabian cities, and can be considered the primary resort and the commercial capital of Saudi Arabia (Farsi, 1991). Jeddah has grown during the last two decades of the 20th Century to become a center for businesses with 320 commercial centers and establishments; approximately 21% of all centers in the Kingdom of Saudi Arabia (Taibah & Al-Nuaim, 2009).

For over one thousand years, Jeddah has received millions of pilgrims and Umrah performers; 5 million annually by air alone (Taibah & Al-Nuaim, 2009). They are of different ethnicities and backgrounds; from Africa, Central Asia, Southeast Asia, Europe and the Middle East. Some of them remained and became residents of the city. As a result, Jeddah is much more ethnically and culturally diverse than most Saudi cities; in contrast to geographically isolated and religiously strict Arabian cities (Farsi, 1991).

The Old City, the historical area of Jeddah, or Al-Balad, with its traditional multi-storey buildings and merchant houses, continues to shape the identity of the Saudi culture, and attract both Saudis and foreigners, the fact that promoted the municipality of Jeddah to begin historical preservation efforts in the 1970s. In 1991, Jeddah Historical Preservation Society was established to preserve the historical architecture and culture of Al-Balad (Fakkar, 2007; Baker, 2007; and Bradley, 2005).

During the oil boom in the late 1970s and 1980s, there was a focused civic effort to bring art to Jeddah's public areas. As a result, Jeddah contains a large number of modern open-air sculptures and works of art, situated in roundabouts, along the ‘courniche’, the city’s costal promenade and other major pedestrian spines, making the city one of the largest open-air art galleries in the world. Sculptures include works by a variety of artists and international stars such as Jean/Hans Arp, César Baldaccini, Alexander Calder, Henry Moore, Joan Miró and Victor Vasarely. They often depict elements of traditional Saudi culture: coffee pots, incense burners, palm trees, etc. (Farsi, 1991).
Concerning the knowledge base, a study on the city-university relationship for nine European cities, by Russo et al. (2007), argued that good management of academic communities and the planning of high-quality facilities for higher education, research, and daily life activities are important. The study concluded that the chances of success are enhanced when a balance is maintained in the relationships between three key ingredients of the knowledge economy: the city and its institutions, the local private sector, and the student population and academic community.

As for Jeddah city, King Abdul Aziz University (KAU), founded in 1967, King Abdullah University of Science and Technology (KAUST), which was officially opened in 2009 focusing on four strategic multidisciplinary research fields including: resources, energy and environment; biosciences and bioengineering; materials science and engineering; and applied mathematics and computational science, and the Hajj research center, which started under the umbrella of KAU then became an independent facility studying the unique phenomenon, formulate in their totality the knowledge spine of Jeddah City region.

KAU witnessed much development since it was established until it became one of the most distinguished universities in the country; due to the number of scientific and theoretical fields of study and the exclusiveness of certain specializations, such as: seas sciences, geology, nuclear engineering, medical engineering, meteorology and aviation, and mineralization. It is also unique in terms of the number of students, and its equal opportunities for women students; approximately 50% male and 50% female. It has more than 120,000 students, 2213 faculty staff members, 2381 teacher assistants in 25 colleges, 6 research centers, faculty development and media centers, 2 institutes (tourism, research and consultancy) and 9 deanships with 5363 technical, administrative and support staff. KAU took the initiative of consolidating efforts along with large academic and scientific infrastructure through the initiation and implementation of the Knowledge and Business Alliance (KBA). The KBA is a smart working environment that is strategically designed to integrate the university’s academic research with knowledge-based businesses (Taibah & Al-Nuaim, 2009).

KAU has successfully utilized its IT infrastructure by creating in house software systems integrated through a single point of entry through KAU’s website for 4 main categories of users: faculty, administration, students, and society. All students and employees in KAU databases can receive necessary validated paperwork required by other institutions. Students can receive most of their services, academic or administrative through the website. Management receives reports and information on performances to help assess productivity. It took courage on the part of KAU’s upper management to implement and insist on immediate adoption of the electronic academic and administrative systems that led citizens of the university to improve their technical skills and embrace these systems to move forward towards an e-university or e-campus; creating a model for the city (Taibah & Al-Nuaim, 2009).

As for the accessibility, Jeddah is served by King Abdul Aziz International Airport, which has four passenger terminals. One is the Hajj terminal, a special outdoor terminal covered by enormous white tents, which was constructed to handle more than two million pilgrims during the Hajj season. The southern terminal is used for Saudi airlines flights,
while the northern terminal serves foreign and other national airlines. The royal terminal is a special terminal reserved for VIPs, foreign kings and presidents, and the Saudi royal family.

A study to assess KAU’s function and role in the development of Jeddah as a KC was conducted (Taibah & Al-Nuaim, 2009); based on indicators suggested by Martinez-Fernandez & Sharpe (2008), Russo et al. (2007), Jones et al. (2007), and city e-governance models. Solutions were proposed to fall in 8 categories including: generation of relevant knowledge, transmission of knowledge, transfer of knowledge, university ICT infrastructure, university redevelopment, university reputation, university cultural and urban milieu, and city use of university ‘iconic’ structures.

In brief, one can argue that the city of Jeddah has the historical determinants, unique culture, spatial and temporal potentials, economic base, knowledge infrastructure, and the access to local and non-local markets; especially to the markets in Mecca and Medina that annually receives millions of pilgrims and Umrah performers. The seven foundations of KCs, as proposed by Berg et al. (2005), are present in Jeddah city; which proved its capacity to attract, hold, and integrate regional and international talented and creative individuals. The potentials of the multi-ethnic, culturally diverse, maritime gate city to become a KC promoted it to be the case of this study.

**Why via educational projects in an ‘Open Design Studio’ (ODS)?**

According to Dutton (1991), Attoe & Mugerauer (1991), Correa (1997), Potts (2000), and Kurt (2009), design studios can be considered the heart of most architecture curricula. The practice in a design studio setting is learned through project-based teaching processes; “learning by doing”, offering a prime example of a collaborative, multisensory, learner-centered, constructivist, experiential problem-based teaching environment (Kurt, 1994 and Kurt, 2009). In the design studio, students investigate needs, define problems, develop goals and objectives, express and explore concepts, generate and evaluate alternatives, determine resources, make decisions and take actions (Gross & Do, 1997). It is expected to provide an environment for cooperative learning; students work side by side and collaboratively share concepts and information openly (Chiu, 2002; Waks, 1999, 2001; Goldschmidt and Tatsa, 2005).

The atmosphere of collaboration, instructiveness, openness, interactivity, experimentation, and decision making inside a design studio helps to pursue a creative environment; through which rich and sophisticated subject areas, such as KCs, can be better investigated. Within this environment the capacity of Jeddah to be a KC was examined, developing visions for transformation and identifying the needed projects. Students of different roots, backgrounds and cultures, with no fixed references or preconceived notions, were argued to add a lot to the equation, especially in the brainstorming phase; providing visions and enriching debate.

Further, the multi-disciplinary nature of the design studio is argued to support the atmosphere of creativity and cooperation, thereby making the debate wealthier and opening the door for perception wide. The ODS model was argued to allow the interaction of the three planning and design disciplines in the Faculty of Environmental
Design (FED) at KAU on the topic. The disciplines include: urban and regional planning, architecture and landscape architecture. It is argued that the multi-disciplinary nature would promote the creation of multi-dimensional approaches to the subject area; while permitting the transfer of knowledge and findings between the three specializations through periodical formal joint presentations.

Summing up, the importance and novelty of the KCs subject area, the wide scope of opportunities it offers, the global and regional adoption of the idea, the cultural, economic, historical, geographical and knowledge potentials of Jeddah city, the availability of innovative, multi-specialization human resources, and the existence of creative atmosphere for investigation proposed in their totality the adoption of the subject area as an educational multidisciplinary project in an ODS setting.

1-2 Scope and Limitations

By the end of the ODS tasks, 3 aspects of the experiment were noteworthy and consequently deserve to be investigated. The experiment can be perceived as a methodology to investigate the real capabilities of Jeddah to become a KC; providing the vision through which the transformation can take place and identifying the particular procedures and projects needed in this regard. Therefore, the output of ODS can be then analyzed and evaluated in terms of how far it managed to help the city determine its path to be a KC; i.e. the end product is of extreme importance. On the other hand, the experiment can be looked at as a methodology to allow for multidisciplinary education; incorporating three specializations of interrelated subject areas and common interests. In this context, the experiment is to be analyzed and evaluated depending on the value added to the educational process; and how the multidisciplinary approach is beneficial for students and instructors in this context. From this angle, the most important issue would be the impact on the educational settings. Furthermore, the experiment can be perceived as a tool to investigate the capabilities of educational projects in catalyzing the concept of KCs, raising the awareness of the subject area and providing provisional solutions for the city to become a KC; i.e. the process is the most significant.

Despite these three aspects seem exciting and worthy to be scientifically analyzed and evaluated, this paper will focus only on the third aspect; investigating the capabilities of educational projects, in its brainstorming phase, to catalyze the concept of KCs, while the other two perceptions would be the issue of future research work.

1-3 Aim and Objectives

The aim of this paper is to investigate the capabilities of educational planning and design projects as a catalyst to induce a KC. For the aim of the research to be attained the following objectives are to be accomplished:

- Reviewing the formation and implementing of the KCs ODS.
- Experience analysis, evaluation and assessment.
- Arguing the significance of educational planning and design project as a catalyst to KCs.
- Identifying future directions.
2- KCs Open Design Studio (ODS)

2-1 Formation of KCs ODS

The notion that design is a multidisciplinary process; involving contributions from an increasingly broad range of specializations, is well understood and generally accepted. Recent literature argued that multidisciplinary programs managed to create new modes of collaboration among academic institutions to achieve a wide spectrum of objectives. According to Thomas Kvan (2000), design is already a cooperative process with brief episodes of collaboration; where team members resolve issues through negotiation and evaluation. For example, the ‘process concept studio’, as an experiment of academic/industrial collaboration, managed to put together mixed teams to apply novel systems methodologies in a series of industrial projects (Rotstein et al, 1997). In another sense, Craig and Zimring (2002) extended the notion in an anti-spatial context, pursuing the concept of “collective reflection-in-action” via proposing a VR-shared workspace in which collaborators were able to exchange ideas, make proposals and respond to feedback. Similarly, the collaborative design and multimedia usage in virtual design studio managed to strengthen the connection between architecture and VR for the purpose of better way-finding and more realistic architectural perception (Ali, 2004; and Yea et al, 2006).

In order to achieve the objectives of the project, three architecture and planning disciplines were promoted to work under one roof for the purpose of investigating the capabilities of Jeddah to become a KC. A number of 15 students in the three disciplines under the supervision of 5 faculty members of the same three specializations formulated the body of the KCs team. According to the developed methodology in its ‘brainstorming phase’, each discipline was invited to create its own approach to the study; parallel processing, allowing for ongoing exchange of knowledge, feedback and findings. Periodical formal joint presentations supported the alignment of all tracks.

2-2 ODS Development Model

In developing a model to regulate and integrate efforts, two main approaches were primarily proposed: serial processing and integrative processing, fig. 1(a) and 1(b). While the serial processing model suggests each discipline to start upon completion of the tasks assigned to the preceding discipline and based on its findings, the integrative model promotes the three disciplines to work collectively. Each approach appeared to prove well and serve many purposes, the fact that promoted them to be incorporated with the study proposed model. After weighing the advantages of each model against its disadvantages; taking the local educational context and considerations into account, the final 3-phase study model was developed, fig. 1(c); not only to organize the roles of each discipline, but also to identify in particularity the expected outputs and the involved bodies.

According to the proposed model, the three disciplines were invited to work in parallel in the brainstorming phase; creating their own approaches to the subject area, while permitting at the same time the transfer of basic knowledge through joint presentations. The objective was to expand the horizons of perception and widen the platform of selection in the following phase, since students would be free from
collaboration constraints. The targeted outcomes of the brainstorming phase included: building a solid theoretical background, analyzing benchmark and relevant case studies, investigating the local context, sketching probationary visions, identifying the needed projects, and making detailed designs. The purpose to provide detailed designs of some selected projects was to allow students of all disciplines to achieve the planning/architectural studio skill they should gain, according to the curriculum, and to provide a better view of the subject area to external parties that would participate in the next phase; e.g. private sector, NGOs, and governmental bodies.

Fig. 1(a): Serial Processing

Fig. 1(b): Integrative Processing

Fig. 1(c): Study Proposed Model
In the second phase of the project, more coherent and realistic visions and strategic
directions are targeted through the participation of interested, responsible, related and
professional bodies. How to enable the worked out visions and strategic directions would
be the mission of the three disciplines in this phase which can expand over 2 academic
semesters or more. In the third phase, the whole experience is to be analyzed and
assessed; identifying the most important achievements, gains, strengths and weaknesses,
and directions for future development in a following cycle(s) of the project.

2-3 Activities and Outcomes

The activities of the KCs ODS, in the brainstorming phase, went through three
stages: introduction, visions, and detailed design. In the first stage, students were invited
to build the theoretical background for the visions to be sketched. KCs related definitions
and base concepts; e.g. modern economic sectors, and KCs foundations, activities,
ingredients, and common features were reviewed. Further, 25 benchmark, leading and
relevant KCs, such as Barcelona, Manchester, Melbourne, Helsinki, Dublin, Amsterdam,
and Bilbao, were analyzed. Local and regional experiences related to the subject, such as
Medina Knowledge Economic City, King Abdullah Economic City and Dubai
Knowledge Village were considered as case studies from the region. In light of the KCs
seven foundations, as developed by Berg et al. (2005), students conducted a SWOT
analysis of Jeddah’s local context to better understand the knowledge, economic,
geographical, historical and cultural potentials of the city. Upon completion of the
analysis, the initial features of students’ visions began to emerge. By the end of this stage,
a joint presentation took place allowing for ‘knowledge transfer’ between different
groups, suggesting that students and staff members would, at this particular juncture in
the process, experience what was identified by this study as a ‘knowledge moment’,
rectifying students’ perceptions, and permitting feedback and exchange of valuable
information.

In the second stage, each group of students was asked to develop a vision through
which Jeddah can be developed as a KC, and identify similar and most relevant KCs
experiences. Students managed to develop visions, in accordance to Jeddah Strategic
Plan, as issued by the local authority; following two main approaches. The first approach
dealt with Jeddah as a free standing KC, whereas the second approach expanded the
concept far beyond the geographical boundaries of the city, suggesting Jeddah to become
a Knowledge City Region; having strategic partnerships with other cities and research
hubs in the western region.

Following the first approach, a group of students adopted the concept of ‘evolution
rather than revolution’. The group tried to integrate the strategic plan of Jeddah, which
mainly focuses on accessibility, quality of life and tourism, closely with the concepts they
developed. The group defined its vision in terms of incorporating knowledge values into
the lifestyle of citizens, redistributing existing economic and knowledge centers, creating
knowledge hubs close to the commercial activities, encouraging cultural events, and
pursuing local context-oriented and knowledge-based economic projects. Based on the
suggested knowledge cycle, fig. 2(a), the group proposed a number of projects as a
driving force; starting from the neighborhood, the district, and finally to the city level.
These projects included: research centers, a center for Islamic media, book translation
centers, public libraries, art galleries, museums, and knowledge parks. Adopting the ‘Sudoku’ concept, the locations of these projects were determined; avoiding the repetition of facilities in the same territory. In order to insure that the students would achieve the design/planning skills they should gain, each student was to provide a detailed design for one of the projects that the group proposed. Fig. 2(b) introduces the projects allocation methodology, while fig. 2(c) shows some detailed designs.

Fig. 2(a): First Group Proposed Knowledge Cycle

Fig. 2(b): Projects Allocation Methodology

Center of Islamic Media

Center of Islamic Media

Gallery

Public Library

Fig. 2(c): Detailed Design Projects

Following the second approach, another group defined its vision in terms of integrating the knowledge and economic capabilities of Jeddah city with the research hubs at King Abdullah University for Science and Technology (KAUST) and King Abdul Aziz University (KAU), the industrial base in Industrial Yanbu City and the mass commercial/religious activities in Mecca and Medina. The issue was to enhance
the performance of existing knowledge and economic infrastructure and promote Jeddah residents to become knowledge citizens, while at the same time developing new strategies exploiting KAUST research potentials and targeting the industrial sector in Yanbu. Similar to the first group, this group proposed a number of projects to act as the driving force of the proposed knowledge economic cycle, including: local industry-oriented research centers, a media center, an auditorium, public libraries, museums, educational entertainment parks, and cultural innovation centers. These projects were allocated in three zones according to the administrative boundaries of the region. Further, the group provided a detailed design of a concept the group called ‘The Little Galaxy’, which housed a wide range of activities directed to support and upgrade the knowledge level of children. Fig. 3(a) introduces the knowledge cycle proposed by the group, while fig. 3(b) shows a number of the projects that the students’ designed.
In the aftermath of the detailed design stage, students presented their work in front of a jury that included staff members of the Faculty of Environmental Design at KAU, honor guests and college administration. Emaar Middle East, a subsidiary of global property developer, hosted a presentation of some projects in the presence of Emaar senior engineers and invited experts. Further, the KCs ODS team held an exhibition that presented the work of students and the outputs of the studio. Executives of the Knowledge and Business Alliance project at KAU were invited to share their views and showed significant enthusiasm towards many of the ideas proposed. In addition, representatives of the vice presidency for business and knowledge creativity at King Abdul Aziz University attended the exhibition, participated in the discussions, and enriched the debate. A presentation of the concept, activities and outcomes of the KCs ODS was put on the agenda of the official and international delegations visited the College in this period; e.g. University of South Florida, US.

Moreover, the concept, activities and outcomes of the KCs ODS were presented in the ‘GCC Municipalities and Towns Development Global Competitiveness Strategy Conference’, which was held in Dubai in June 2010, and attended by many mayors, heads of municipalities, secretariats, executives and decision makers in the GCC countries. In brief, the presentations in front of many local and regional entities provided valuable academic as well as professional feedback which added new depths to the experience, and helped the KCs ODS team identify future directions.

3- Discussion

By the end of the first phase of KCs ODS; i.e. the brainstorming phase, it was important to pause before starting the second phase. The experience was to be analyzed and the path was to be adjusted and refined; addressing the achievements, challenges, weaknesses and future directions. This part of the paper addresses, inventories and determines the evidence for the proceeding remarks rather than technically arguing them; the issue that would be the aim of future research work.

At the top of the achievements comes the success of the ODS to raise the awareness of the subject area; through multiple, local/regional juries and presentations that were attended by students of the three disciplines, FED staff members, KAU high administration representatives, private sector officials, governmental bodies, heads of municipalities and executives, fig. 4(a). Further, Saudi Gazette, an English language daily newspaper published in Saudi Arabia and is currently available both in print and online, covered the activities and outcomes of the KCs ODS. The journal devoted half a page to cover the event, fig. 4(b), which led to the expansion of the awareness of the subject area outside the university community. The term ‘KCs’ is no longer new or ambiguous. The term, its implications and related experiences are now well known to the journal readers and those who participated in any of the multiple juries and presentations.

Another achievement is the ability to widen the scope of proposing educational projects; not to mention the value added to the educational process itself. Instead of introducing students to abstract educational projects, they were introduced to up-to-date, vision-oriented, local context-sensitive, multi-disciplinary ones. In this project, students...
were given the chance to ‘think global and act local’; being aware of recent international fields of interest, while at the same time developing solutions appropriate for the local context. Moreover, they were given the chance to adopt the concept of ‘design-by-subject’ rather than ‘design-by-project’; requiring from each student to provide an individual detailed design in harmony with the projects of his peers in the group, and supporting the achievement of the objectives stated by the team.

In another sense, multiple presentations in front of audience of different backgrounds and orientations, authority figures, and virtual clients and users promoted the exchange of information and the openness of the discussion. As Luck & McDonnell (2006) argued, the presence of authority figures, as an example, would be beneficial for the educational design process due to the potential influence on the information shared in conversations; since they are part of everyday interaction; being far beyond the architect’s control and sometimes perception. One of the important achievements of the experience was the establishment of a strong connection between the university and the private sector, particularly Emaar Middle East, benefitting from the vast experience of the institution, as a real estate developer with a significant role and influential impact in the Middle East, in the issues that were raised in the visions of the working groups. Further, the connection managed to open the door for more collaboration in the future.

As for the challenges, the experience faced a number of difficulties and obstacles in its brainstorming phase. Adhering to the curriculum, as an example, the process was forced to go through detailed design projects; in order to promote students achieve the knowledge, cognitive, and practical skills, as addressed in the course specification; facing multiple enquiry, and sometimes paradoxical, situations. In another sense, undergraduate students took a relatively long time to get on track, realize the significance of the subject area, build up the needed theoretical background and understand previous experiences. Despite the fact that the methodology, activities and outputs are all documented, it would be time and effort consuming to start again from scratch with new students, in order to follow up in the next phase.

To overcome these difficulties, some suggestions for future directions were proposed to be extensively discussed by the team members. Regarding the human resources and the structure of the KCs ODS, the possibility to promote post-graduate students get involved
is to be studied. The issue is to create and maintain a research atmosphere, and ensure the continuity, integration and accumulation of effort. Specialists related to the subject area can be invited to enrich the ODS with their views of the subject. Hence, professional and technical investigation of the achievements, weaknesses, challenges and future directions could be improved. The ODS, as an educational-research entity, would then be capable of establishing stronger partnerships with local and international experienced bodies and individuals. This would promote more university-municipality-private sector collaboration.

4- Conclusion

In this paper, the experience of the KCs ODS was introduced, documented and generically analyzed. The motives behind the selection of the subject area and case study were addressed, and the aim, objectives, methodology, and development model were introduced. After displaying the activities and outcomes of the ODS in its brainstorming phase, a discussion took place, highlighting the achievements, challenges, weaknesses and future directions. The paper focused on one aspect of the study; i.e. the capabilities of educational projects to catalyze the concept of KCs, while the experience showed two other aspects worthy of further investigation: the potential of Jeddah to become a KC, and the impact of multidisciplinary projects on the educational settings and process. Through analyzing the experience, the paper proposed a number of procedures and actions to support and enhance the performance of the ODS, and ensure continuity, integration and accumulation of effort.

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The trails of two cities

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Structured Abstract

Purpose — What might be learnt from the mostly divergent development of Melbourne’s and Sydney’s fixed rail infrastructure to cope with the sustained demand growth which has long not been adequately factored into planning processes? We look into the potential for tighter coupling with the Victorian Government’s detailed and accessible Planning Maps Online service and its the more familiar capabilities of Google Maps, together with the possibility of facilitating user-created overlays to locate discussions of longer term corridor planning options.

Approach — We look at the inner and outer circle lines introduced to the otherwise radial Melbourne network by wise planners of the late 19th century, but progressively broken up by short term imperatives across much of the 20th, contrasting this with the more flexible routing options provided by the very different topography of the Sydney rail network. We drill down to the role of communities from local "not in my backyard" reactionaries to the more visionary Rail Trails Australia which have ensured those circle line reservations are largely retained as public space. This is contrasted with the apparent unwillingness of network planners to canvas reviving the circle routes or comparable opportunities for adding network flexibility to serve newer growth regions as they struggle to address immediate political imperatives. We look at ongoing debates in both cities including the recent shelving of some expensive plans for a standalone Sydney Metro which had failed to address the growing body of evidence in favour of a "build on your strengths" approach.

Originality — These questions are tackled within the framework of the emergence of unexpected new phenomena in complex systems. Eusocial insect colonies have long been identified as exemplars of such emergence, as clearly adaptive, autopoetic, etc. as other living organisms. Modern human megacities can be seen as a much larger step in that same direction. Australia is blessed with a pigeon pair of proto-megacities which inescapably have much in common, but which also diverge in instructive ways.

Practical implications — The possibility of facilitating wider and earlier involvement in the planning process is looked at in the light of the legacy of long enshrined demarcations and the inescapable need to properly authorise and complete specific projects on a timely basis. What policies might better facilitate more sustainable and resilient support for affirmative participation in the accelerated diversification of transport options away from the roads?

Keywords — fixed rail, planning, Sydney, Melbourne

Paper type — Academic Research Paper
1 Background
Marvellous Melbourne

In 1891, the 55-year-old settler city, of Melbourne contained almost 500,000 people. It was larger than the ancient cities of Cairo, Mexico City, and Madrid. It was also 15% bigger than Buenos Aires, 30% bigger than Sydney 80% bigger than San Francisco, 550% bigger than Sao Paulo, and 900% bigger than Los Angeles. Three hundred trains a day serviced its suburbs, taking workers to 3,000 factories and workshops. Melbourne had 300 buildings with elevators, one of them twelve storeys high, reportedly the tallest building in the southern hemisphere. One hotel had seven storeys and 500 rooms. Standing on the corner of the two main streets, you could see at least twenty banks, built like temples. Government House was larger than India’s; Parliament House was the biggest in the British Empire. ‘No British city outside London could boast of as many large public buildings.’

Figure1. The Melbourne heavy rail network in 1890.2 (More details of the inner section and of the further out Victorian network are provided on the original VRMaps page from which this was extracted.)

2 http://www.vrhistory.com/VRMaps/Vic1890.pdf
In 1890, Melbourne’s heavy rail network already covered almost all of the tracks used during the subsequent 120 years. During those subsequent 120 years Melbourne transport moved more and more to the roads, though the trains remained a significant means of moving people in and out of the central city through 16 radial lines which, since the early 1980s, converge on a five station inner city loop.

Seventeen cable tram routes were opened in Melbourne between 1885 and 1891. These formed the core of what has become the world’s largest electric tram network, a century after the commencement of electrification in 1906.

While Melbourne was trimming its heavy rail network throughout the 20th Century, Sydney continued to build new lines, though mostly through interconnects within a very different topography dictated by only half the number of lines continuing outside the Sydney basin compared to radial lines and former lines out of Melbourne spread around a larger arc with less geographical barriers. Meanwhile, like most cities outside continental Europe, Sydney scrapped its tram network during the post-war years in a move to preference private vehicles.

With increasing dependence on roads during the last half of the 20th century, successive governments prioritised cost saving on fixed rail and proposed many more closures than Melbourne public and union resistance would let them get away with before the tide started to turn as petrol price rises locked in and environmental arguments started to gain mind share. But it took into the new millennium for fixed rail capacity limits to start to be stretched and for a need to become evident for the restoration of network planning and extension to levels that had been unthinkable for a century. By then whatever relevant skills there may have once been locally had been well and truly lost, so the challenge had to be thrown to people not used to working with serious growth expectations.

In 2010, what rate of growth of fixed rail is a reasonable planning target? In this paper we will assume planning should be to service at least a quadrupling of fixed rail usage in Melbourne by 2050. This is based on Australian Bureau of Statistics projections for a 2050 Melbourne population around 6.5 million and the obvious need to continue to move a disproportionate share of trip growth off a road system which is inexorably growth limited. It is consistent with the use of fixed rail in cities of similar size in advanced economies. Unlike the Port of Melbourne projections for 240% growth in international container traffic within 25 years which justified the channel deepening project, there does not appear to be any underlying unsustainability that might avoid such growth rates for urban fixed rail usage. Four fold in 40 years is only 3.5% per annum.

2 **Topographical contrasts**

Greater Melbourne and most broad outbound corridors have a gentle topography making it easy to spread development in many directions. While Port Phillip Bay is large, its gently curved shoreline hardly intrudes. So Melbourne has finished up with 16 essentially radial lines in its suburban network. Only the Alamein line remains as a remnant of an outer circle route from Holmesglen in the south east to Alphington in the

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northeast which was progressively abandoned after instant demand failed to materialise. A once essential inner northern circle route from Rushall to Royal Park was also abandoned as alternatives developed, while the long-established western orbital freight route from Newport to Jacana is not used for suburban services, despite its potential to provide a route to Melbourne Airport.

**Figure 2.** The current Melbourne heavy rail network’s radial topology. Note that earlier outbound lines to South Gippsland and several shorter routes in the eastern arc have been abandoned.
In contrast, routes out of Sydney were much harder won as evidenced by familiar tales of historic explorers crossing the Blue Mountains. Closer to the ocean, Sydney is often hilly and the sunken river valleys that provide famous harbours also provide barriers. So each of the rail routes into Sydney gained junction stations which provided opportunities for trains and travelers to take alternate routes and increasingly cross town linkages which avoid the central city altogether. (fig. 3) Much of the expansion and planned expansion of the Sydney suburban network involves linkages between existing routes, a very different mental model from that prevailing in Melbourne.

![Figure 3. Recent map of the Sydney heavy rail network. Note the several loop-forming links including the recently opened Chatswood-Epping line which allow cross-city journeys to avoid the inner city. Closing the next gap from Epping to Carlingford was a major policy (re-)announcement in the lead up to the 2010 federal election.](image)

There are other notable differences between the Melbourne and Sydney systems which give a user of both systems the impression that Sydney heavy rail has improved
faster than Melbourne across the past half century, though any such observation must be
counterbalanced by the tram and ferry differentials. Ticketing systems are an even more
visible concern, with Melbourne struggling to “upgrade” from Metcard to Myki and
Sydney struggling to achieve ticketing integration across several transport modes. In
Melbourne a community organisation, Rail Trails Australia, has done more than its share
in adapting abandoned rail reservations as shared use trails for cycling and walking and
thus reducing the risk that the reservations may be permanently excised. Legislative
differences have made such a tactic largely inapplicable in Sydney.

3 Who is doing the planning?

During 2009 it was a notable step forward that the planning of the first significant
new Melbourne rail corridors in living memory, the Regional Rail Link and the (new)
Outer Circle, was coupled with planning for urban growth boundary revision, sensitive
environment protection of the Werribee Plains grasslands and the Outer Circle and E6
road corridors. But that came off the back of long traditions of planning separation
between land use, road and rail which may not yet have been truly overcome. During her
mid 2010 series of transport forums, The Greens’ Colleen Hartland commented that there
seemed to be no relevant co-ordination between her fellow Western Metropolitan Region
MLCs Planning Minister Justin Madden and Public Transport Minister Martin Pakula.
The Greens are far from alone in wanting to fill that vacuum with an increasing pool of
offered plans from a range of groups and individuals.⁶

At the start of June a seminar session on the Economics of Increasing Rail Capacity
was presented by consultant Simon Lane at the Victorian Department of Transport. Lane
is a former head of Melbourne's Met Trains, Sydney's Cityrail and Singapore's railway.
He identified signaling as one key problem with the current network which places limits
of how close trains can run on the same track, a problem that can only really be tackled
by a system wide maintenance refit and which thus would be much better actioned once
the whole suite of long term technical objectives have been resolved. There are clear
opportunities for technologically assisted train driving to greatly increase train per track
densities once all the sensing, communications and control systems can be put in place.
Within a site developing many detailed arguments against some of the mythology which
had long discouraged public transport, the Public Transport Users Association makes a
detailed case that the capacity of the current network is greatly underestimated through
historical data comparisons and suggests that the lack of contemporary experience with
network extension may be at the heart of the problem.⁸

In both Melbourne and Sydney the flagship Fairfax papers continue to play a serious
role in keeping attention on public transport development. In August 2007, The Age
reported that it had obtained a “leaked copy of the blueprint, ‘Transit Opportunities Kept
Open’ (which) envisages a plethora of new rail lines and the reopening of several old
ones.”⁹ The Age goes on to describe many of those lines which are mostly familiar to

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⁶ The Greens’ public transport plans are at http://peopleplan.greens.org.au/
⁷ The author has his own notes and recollections from the seminar but these are enhanced by notes
looks-at-rail-options/2007/08/08/1186530447227.html
those following the field with an accompanying map in the print edition. Of particular note, this may have been the first public exposure of the West Werribee to Deer Park via Tarneit outer section of the Regional Rail Link’s actual alignment and it included the less often mentioned option of a tunnel under the lower Yarra.

**Figure 4.** Map featuring possible new routes as printed in The Age on 9 August 2007. Note the lower Yarra crossing from a revived Port Melbourne line, under Newport and connecting to the Altona-Werribee line and the underutilised Spotswood to Sunshine freight line, the latter potentially continuing via Albion-Jacana to one omitted potential reservation following the Ring Road from Jacana to Diamond Creek.
While *The Age* has continued its detailed reporting of public transport issues, most notably the Eddington Report\(^{10}\) which led to the current proposal for a rail tunnel from Footscray to the Domain interchange and eventually on to Caulfield, *The Sydney Morning Herald* was not to be outdone. In 2009 an “Independent Public Inquiry was established with the support of *The Sydney Morning Herald* to create a Long-term public transport Plan (...) independent of government.” That inquiry produced its final report at the end of May 2010.\(^{11}\) While that inquiry appears to slightly postdate the announcement and subsequent cancellation of a proposed Sydney Metro separate from the extant heavy rail network, their temporal overlap provided plenty of opportunity for the progress of the inquiry to influence the course of events and the apparent wisdom of building on strengths to prevail.

In the age of the interweb, interested individuals find plenty of scope to float ideas and to get tied up with trying to find better ways to communicate them than the severely limiting point and path overlays on top of ever more outdated Google Maps or the time consuming editing of even simplified rail network diagrams with available graphical software. Some interesting suggestions for Sydney, Melbourne and other places are put forward in a busy but obscure thread “another fantasy rail map” on the also busy but obscure Skyscraper City forum site under Australian transportation headings.\(^{12}\)

\section{4 A new set of assumptions}

Of course there is a lot more to rail system planning than just determining where the tracks should run. The first step atop the network map is an overlay of routes (esp. Melbourne tram), also known as “stopping patterns” (Sydney CityRail). In each system there is tension between network flexibility and wishes to break control down to manageable small units.

Melbourne trains are constrained by the allocation of each of the four city loop tunnels to network regions identified by their outermost shared junction stations: South Yarra, Burnley, Clifton Hill and North Melbourne, with some lines not going through the loop, especially peak hour services, terminating at Flinders Street and any switching of trains between the network regions also done at Flinders Street where timetables typically allow some minutes between arrival and departure.

Sydney CityRail has opted to try to disentangle its network so that five “clearways” can operate effectively independently to try to prevent disturbances propagating through the whole network. “The delivery of the Rail Clearways infrastructure will allow all CBD lines to operate at maximum practical capacity. This will enable additional peak services to the CBD as well as service improvements on the Illawarra/Cronulla, East Hills, South, Bankstown, Inner West and West/Richmond lines.”\(^{13}\)

The Melbourne tram network has a long entrenched depot-centric culture where almost everything is organised around the eight tram depots: Essendon, Brunswick, East Preston, Kew, Camberwell, Malvern, Glenhuntly and Southbank.\(^{14}\) In all fixed rail

\(^{10}\) East West Links Needs Assessment final report
\(^{12}\) http://www.skyscrapercity.com/showthread.php?t=815854
\(^{13}\) http://www.cityrail.info/news/projects/rail_growth_plan
\(^{14}\) http://www.vicsig.net/index.php?page=trams&section=depot
systems, track junctions with switching points are seen at least as much as a point of risk to reliability as they are as a source of flexibility and redundant capacity, so they are not added everywhere they might be, nothing like it.

This study is very much informed by the theoretical perspective on Organisational Knowledge Management of Hall et al., but as much as this allows analysis of costly loss of organisational knowledge, in the case of entrenched organisations it can equally be applied to the persistence of habituated framing which severely constrains the ability of challenged organisations to respond adaptively. No Melbourne planners seem able to contemplate the current activity at Glenfield railway station on the south-western fringe of Sydney where it is possible to choose any of four separate routes towards the city. This blind spot will become obvious to a much wider public if, as planned, the Regional Rail Link comes online before electrification is extended to meet it at South Werribee with the moderately patronised direct link from Geelong to Werribee suddenly becoming a nightmare.

In Sydney much of the rail planning is about making it easy for workers to get from dormitory suburbs to an employment arc in the middle suburbs. Reincorporating Melbourne’s largely abandoned but still reserved outer and inner circle lines into future planning would offer the prospect of a much wider range of destinations within reasonable travel times, as would the addition of passenger services along a western circle line potentially formed by the Newport-Sunshine and Albion-Jacana freight lines shown above on figs. 2 and 4.

While mindful of the difficulties of eventually needing to wind down what had once seemed sustainable infrastructure production (e.g. Tasmanian Hydro), the magnitude of the catch up task ahead of Melbourne suggests that any sustainable rail building capacity could expect to still have work to do beyond 2050. One big gain in sustainable capacity is the development and retention of locally based skills which can potentially overflow into export capacity. Such an idea was recently proposed, albeit at a national level, by Jason Dowling in The Age:

Maybe it is time for a federal department to order a pipeline of rail projects in cities around Australia, providing certainty to industry, building rail expertise and reducing the time and cost of rail projects.

Before another month was done, his colleague Clay Lucas was able to report the first small step: a contract to build 50 new trams locally.

Given the well documented problems with the Myki ticketing system roll out, transport authorities could almost be forgiven if they became even more reluctant adopters of the information technologies that are transforming other aspects of society. The successful and very useful deployment of Yarra Trams’ iPhone TramTracker App suggest there are at least pockets excited about new potentials.

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15 E.g. Hall and Nousalla (2010) Autopoiesis and Knowledge in Self-Sustaining Organizational Systems
5 Where to from here?

It should be worth seriously testing the idea that the “not in my backyard” problem which bedevils planning processes might be significantly alleviated by more genuine processes of community consultation to the point of public participation in all levels of the planning process. It should not be too big a step to develop a more publicly accessible interface to the Victorian Government Department of Planning & Community Development’s Planning Maps Online20 which well serves the need to manage private land use. Such an interface might best follow the style made widely familiar by Google Maps, extended in the direction of the community input capabilities of Open Street Map,21 hopefully with even more emphasis on usability. The cost of not getting this right was again illustrated by the negative publicity generated over the belatedly and poorly communicated detailed plans for the Regional Rail Link route through a tight spot near Footscray station which at least briefly saw this widely supported rail project confounded with the widely opposed plan for the West Link road tunnels under Footscray.

The 2009 release of plans for new “Growth Areas”, primarily in the outer west and north of Melbourne, presented a, to then unprecedented for modern Victoria, coming together of road, rail, land use and conservation planning. While these plans were widely paraded, the only real channel for feedback was to give directly affected landholders a chance to make detailed points about the impact of the new corridor reservations. There appeared to be no channel to bring to account input from an interested public with concerns about the usability of new public services. But if the system still appears slow to respond to the possibilities of better integration and consultation, it is at least being pushed by the Victorian Government’s Transport Integration Act 2010.

If there is a problem in planning, there may appears to be an even worse problem in operational scheduling according to Clay Lucas’s recent report in The Age on a paper by Melbourne University’s Dr John Stone and Kathren Lazanas for a conference in Canberra.22 In the smaller Australian cities things are even more varied. The Perth to Mandurah line, while not without controversy during construction, was a more ambitious undertaking than anything recent in the eastern states and is now widely seen as very successful, no doubt in part due to coming into service in late 2007 as demand for public transport was on the rise throughout the country. Southeast Queensland remains very much in planning mode, with the draft Connecting SEQ 2031 open for public consultation until 26 November 2010.23 Meanwhile too many stay stuck in their comfort zone of business as usual.

21 http://www.openstreetmap.org/
The life-cycle environmental impact of exhibition buildings: a case study

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Structured Abstract

Purpose – The purpose of the paper is to demonstrate what the most significant factor is directly and indirectly degrading environmental quality and land use. The principal questions, do exhibition-related economics have real negative effects on the environment and what is the most significant factor directly and indirectly generating the exhibition-related environmental impact, are addressed.

Design/methodology/approach – The Ecological Footprint, the main methodology for this research, was created in the 1990s and it is currently seen as a useful measurement of environmental sustainability after many modifications. In this paper, this method is applied to quantify and examine the impact (ecological footprints) on the environment of a case study building, including the ecological footprint of building construction, visitor travel to exhibitions and the exhibition-related economic impacts. The Shanghai Exhibition Centre, as the case study building, was built in 1955 in Shanghai and is a typical exhibition building in China. It was structurally reinforced and renovated with the main elevation redecorated and two exhibition halls added in 2001. The ecological footprint in terms of the building and visitor travel and exhibition-related stock of this case study building, thus, is analysed in detail.

Originality/value – Although global environmental issues have attracted much research and some valuable results have ensued, there is at present no research considering the “whole life-cycle” environmental impacts of expositions. The analysis of whole life-cycle environmental impact in this study is different from the conventional concern. It is widely
defined as the direct and indirect environmental effect of large commercial buildings (exhibition buildings in this study), the effects of visitor travel-related transportation, and more importantly the effect of the exhibition-related economic activity.

**Practical implications** - The results of the study show that the environmental measurement should be broader and capable of considering the economic aspect, when the exhibition activities are studied. At this moment, for some developing countries, such as China and India, the percentage of exports (e.g., clothing and textile industry) in the total national GDP is dramatically increasing from year to year. The international exhibitions give them good opportunities to enlarge the national trade and increase the rate of employment, resident income and revenue, but at the same time, it should be noticed that exhibitions indirectly increase the local resource consumption and bring more environmental pollution to the countries. The questions, of how to accurately measure the real environmental impact and how to balance an increasing economic perspective for every country with less effect on the environment, need to be considered further by environmental researchers and policymakers.

**Keywords** – buildings, transportation, exhibition-related economy, overall environmental impact

**Paper type** – Academic Research Paper

1 Introduction

Over the past 16 decades, fairs (e.g., exhibitions and expositions) have become relatively common and large scale in the global community since the Great Exhibition of 1851. Globally, there were 1,062 venues identified (with a minimum size of 5,000 m²) and 27.6 million m² of total indoor exhibition space in 2006 (UFI, 2007). Much literature has reviewed and demonstrated the remarkable exhibition-related economic growth generated following exhibition activities. Netzer (1978) illustrates the positive impact on the local economy resulting from exhibitions in terms of the local tax revenues and tourist-type revenues. Skinner (2006) also estimates and explores the short run economic growth increased by art exhibits using intervention analysis in Jackson, Mississippi.

However, the booming negative effect on the natural environment that has resulted from the exhibition-economy has been paid little attention in many developed and developing countries so far. Although global environmental issues have attracted much research and some valuable results have ensued, there is at present no research considering the “whole life-cycle” environmental impacts of expositions. The whole life-cycle environmental impact in this study is different from the conventional concern. It is defined as the direct and indirect environmental effect of large commercial buildings (exhibition buildings in this study), the effects of visitor travel-related transportation, and more importantly the effect of the exhibition-related economic activity. On the contrary, some misunderstanding of sustainable expositions is starting generated by economic development strategies made by sponsors in reality. For instance, the implementation of environmental protection techniques for the exhibition buildings, such as solar water heating and low energy lighting, seems to be an attractive selling point for expositions in some countries, of which however the purpose is to attract more visitors and promote the products. Also many sustainable practices focus solely on the building construction and materials, without considering the invisible and potentially more significant factors, which it seems cause much more environmental damage.
This research estimates the overall environmental impact caused by a typical exhibition building in China. The principal questions, do exhibition-related economics have real negative effects on the environment and what is the most significant factor directly and indirectly generating the exhibition-related environmental impact, are addressed. The study calculates the ecological footprint in terms of the building and visitor travel and exhibition-related stock. The results show that the largest direct and indirect environmental impacts are generated from exhibition-related economic growth. In addition, the paper proposes that boundaries of assessment need to be widened and that factors such as industry-related economic impact should be considered by policymakers seeking to encourage sustainable development of commercial activities and buildings.

The Ecological Footprint, the main methodology for this research, was created in the 1990s (Rees, 1992; Wackernagel and Rees, 1996; Folker et al, 1997). The Ecological Footprint is currently seen as a useful measurement of environmental sustainability after many modifications (Bicknell et al, 1998; Warren-Rhodes et al, 2001; McDonald and Patterson, 2004; Lu et al, 2009). In this paper, the method is applied to quantify the impact (ecological footprints) on the environment of a case study building, including the ecological footprint of building construction, visitor travel to exhibitions and the exhibition-related economic impacts.

2 Do exhibition-related economies have real negative effects on local or global environment?

Since increasing economic and political benefits were obtained by the UK government through the Great Exhibition of 1851, the question of whether exhibition-related economy degrades the environmental quality is actually a part of the larger question of whether national economic growth obstructs urban sustainable development of the environment. Recent decades have seen many debates on whether there is a relationship between negative environmental quality and economic growth.

From the answer of some idealistic economists, the answer to the question whether growth damages the environment was no. The rationale was based on an econometric estimation with “the inverted-U relation”, which was called an environmental Kuznets curve (EKC), hypothesised by Kuznets in 1950s (Kuznets, 1955). The EKC hypothesis states that “At low levels of development both the quantity and intensity of environmental degradation is limited to the impacts of subsistence economic activity on the resource base and to limited quantities of biodegradable wastes. However, at higher levels of development, structural change towards information-intensive industries and services, coupled with increased environmental awareness, enforcement of environmental regulations, better technology and higher environmental expenditures, result in levelling off and gradual decline of environmental degradation” (Panayotou, 1993; Stern et al, 1996). This hypothesis obviously implies that economic growth does not threat the sustainability of the human community and the so-called advanced industrialization will be able to grow without environmental limits. The research from Grossman and Krueger (1991) estimates the environmental impacts of a North American Free Trade Agreement. It measured three air pollutants in urban areas of 42 countries. They finally found sulphur dioxide and “smoke” increased, together with the GDP per capita, at lower levels of national development, while they decreased at higher levels of national income. Panayotou (1993) also demonstrates the U-shape curve’s relationship between SO₂
emissions per capita and income per capita. Does the curve apply to environmental quality generally, which was what economists conjectured?

The current literature indicates that the inverted-U relationship of an EKC curve is very problematic (Ekins, 1997). An increasing relationship between economic growth and environmental damage is shown from the research. For instance, Gale and Mendez (1998) explore that “Increases in economic activity have a negative effect on the environment separate from changes in per capita income, whose relation to the environment is now positive and linear not inverted U-shaped.” And Arrow and Partners (1995) demonstrate that the inverted-U curve was just applied to a selected set of pollutants only, such as SO₂, NOₓ, SPM, and CO.

The most significant aspect is the mode of production and consumption of different countries, which is shown by the international trade. Increasing the amount of imported raw materials and production from other countries in some developed countries reduces the national energy intensity and decreases their national environmental impacts. The most typical example is Japan. Japan has imported most of its raw materials over several decades, which means Japan has exported a large amount of environmental impacts to the countries with which they trade (Herendeen, 1994; Stern et al, 1996). Also the Office of Technology Assessment reported that energy intensity of imports in US is increasing over the past 20 years (Stern et al, 1996). The truth is the natural resource consumption and natural environmental deterioration with the booming population is actually increasing every year in the global area. As Ekins (1997) states, “Even where there may be an EKC relationship, most of the world’s population is still on the section of the curve that is increasing, so that growth in income on the basis of this relationship would result in considerable further environmental damage”. It is clear that increasing imports is not an appropriate and problem-solving approach to reduce national environmental impact. If the hypothesis of the EKC curve is accepted, does it mean the poor countries will continue to undertake more pollution and environmental devastation?

As for the exhibition-related economy, it is an indispensable part of national trade, and even a significant factor stimulating local and national economies. It is also an invisible factor to affect the natural environment, which may be a worse environmental impact than others factors for commercial buildings in developing countries (the detailed reason is shown in the next section). Kirkwood (2002) illustrates the multiplier effect derived from the exhibition industry, which includes output, employment, income, value-added, tax and imports. The multiplier effect, sometimes seen as the indirect effect, is bigger than imagined before. According to Kim and Partners’ analysis for the Korean Exhibition Industry, the total exhibition receipts of US$645.7 million produced US$1.2 billion in output; 21692 full-time equivalent jobs; US$260 million in personal income for residents; US$ 577.4 million in value-added; US$ 54.2 million in indirect tax; and US$ 104.3 million in imports (Kim et al, 2009). In practice the potentially immense effect of this economic activity on environmental degradation is always ignored by government and policies.

3 Is exhibition-related economic impact the most significant factor directly and indirectly generating the environmental impact?

Many sustainable research projects and practices focus on the visible and short term matters, for example building construction and materials. However the invisible and potentially more significant factor (economic aspect) can cause much more environment
damage. As a case study of exhibition activity, a typical exhibition building in Shanghai has been selected (7,000,000 visitors per year) which is used to analyse the ecological footprint of three factors. The results will show the relationship between construction, transportation and exhibition-related economic impact.

3.1 Building

The embodied and operating energy, HVAC leakage, and demolition related carbon footprint of an 80,000m² generic exhibition building is quantified in this study. The Shanghai Exhibition Centre, as the case study building, was built in 1955 in the city centre of Shanghai, China. It was structurally reinforced and renovated with the main elevation redecorated and two exhibition halls added in 2001.

The embodied energy-related environmental impact of the building is derived by quantifying the carbon footprint of the initial and recurring embodied energy. The initial embodied energy is calculated and estimated by using the quantities of materials and the relevant energy intensities. The bills of quantity and drawings are used for calculation and some relevant parameters are sourced from literature (for detailed information of quantisation, see Shen et al, 2009a). It is noted that the energy intensities from Australian data (Treloar, 1994) are used for the calculation of the case study building. Owing to the fact that establishment of the Chinese embodied energy database (SinoCentre) is ongoing, values for Chinese energy intensities are substituted with Australian data for carbon dioxide emissions, because of the similar proportions of fuel mix for electricity generation. After the calculation, the initial embodied energy of the Shanghai Exhibition Centre is estimated at 887,883 GJ; and the recurring embodied energy is 150,590 GJ, which includes the energy required for repairs, maintenance, and refurbishment (Cole et al, 1996) in fifty years (1955-2005). The total carbon footprint generated from the embodied energy is 2,480 t CO₂ per year (the related method of calculation is not described in this paper, it is shown in Shen et al, 2009a, b).

Secondly, the operating energy of the Shanghai Exhibition Centre is quantified by multiplying the total construction area and the value for electricity usage per square metre (for detailed explanation, see Shen et al, 2009b). The factor of unit energy intensity uses a value of 175kWh/m²/year for this study. As a result, the electricity consumption and carbon footprint of the Shanghai Exhibition Centre is assumed to be 14,000,000kWh/yr and 14,000 t CO₂ per year.

Furthermore, interior air conditioners were installed in the case study building in 2001. The air conditioners can be assumed to be using either a CFC or an HCFC as their refrigerant. These refrigerants are detrimental to the ozone layer, and have huge global warming potentials (Camilleri et al, 2001, p.35). Jurasovich (2003, p.526) demonstrated that the amount of CO₂ emissions resulting from the leakage of refrigerants used in air-conditioned office buildings in New Zealand can be assumed to be around 28.2 kg/m²/year. This average factor for the leakage of refrigerants is assumed for this case study building. After the air conditioners were installed into this building, the leakage-related carbon footprint can be assumed at around 2,256t CO₂ every year.

Finally, the energy and carbon footprint from demolition are assumed to be negligible in this study. The reason is because "the demolition-related CO₂ emissions resulting from office buildings are too small to be of significance, when compared with the other office-related CO₂ emissions" (Camilleri et al, 2001, p.41). This case study building is assumed
to be similar to general office buildings, for which the ecological footprint related to demolition is calculated as zero.

Owing to the energy consumption for the building being from fossil fuel, the data on carbon dioxide emissions are translated into global hectares, within a full Ecological Footprint calculation. The method is based on the research from Monfreda, Wackernagel and Deumling (Monfreda et al, 2004). The quantitation is shown in Table 1. Forest carbon sequestration is assumed to be 8.0 t CO₂/ha/yr and the equivalence factor of forest land is from the Living Planet Report 2004, which uses the multiplication factor of 1.35 (WWF, 2004).

Table 1. Total carbon footprint of the Shanghai Exhibition Centre (1955-2005)

<table>
<thead>
<tr>
<th>Energy use</th>
<th>Carbon footprint (t CO₂/yr)</th>
<th>Ecological footprint (gha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embodied energy</td>
<td>1,038,473 GJ</td>
<td>2,480</td>
</tr>
<tr>
<td>Operating energy</td>
<td>14,000,000 kWh/yr</td>
<td>14,000</td>
</tr>
<tr>
<td>HVAC leakage</td>
<td>0</td>
<td>2,256</td>
</tr>
<tr>
<td>Demolition</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>18,736</td>
</tr>
</tbody>
</table>

3.2 Visitor travel

The energy consumption of visitor travel to exhibitions in Shanghai and the related impact on the environment is quantified in terms of the number of users, the distances of travel, and the carbon emission factors of different transportation modes.

In Shanghai, the public transport modes include underground, taxi and bus. The official reporting category ‘private automotive vehicles’ consists of cars and motorcycles; whereas ‘non-motorized transport’ means bicycle, electric bike and scooter even though a scooter uses oil as its energy source. According to an interview with the Party Committee Associate Secretary of Shanghai Transportation Bureau, transport usage in Shanghai shows 27% of people taking trips using public transport, and 4.86%, 6.21% and 15.93% of people choosing underground, taxi and bus respectively. The detailed percentage of each mode of transportation is shown in Table 2. The assumption here is that all exhibition visitors come from Shanghai, but it should be noted that users from outside Shanghai are likely to have larger transport-related emissions because of their greater travel distance. This means that the figures given in this paper for transport emissions related to attending the exhibitions are likely to be a lowest estimate (detailed information is shown in Shen et al, 2009b).

Table 2. Average percent. of users going to Shanghai Exh. Centre by different modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Percentage</th>
<th>Mode (detail)</th>
<th>Percentage of people per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public transport</td>
<td>27%</td>
<td>Underground</td>
<td>4.86%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Taxi</td>
<td>6.21%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bus</td>
<td>15.93%</td>
</tr>
<tr>
<td>Private automotive vehicle</td>
<td>17.5%</td>
<td>Motorcycle</td>
<td>2.10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small (1.78%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium (11.06%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large (2.56%)</td>
<td></td>
</tr>
<tr>
<td>Non-motorized vehicle</td>
<td>28.5%</td>
<td>Bike</td>
<td>22.14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electric bike</td>
<td>5.53%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scooter</td>
<td>0.83%</td>
</tr>
<tr>
<td>Walk</td>
<td>27%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
The number of users travelling with regard to taking different transport modes was calculated from the percentage breakdown of the total Shanghai population living in different districts (19 districts in all). Another variable was the distance from the Shanghai Exhibition Centre to every district. The average point at which users can take the underground or buses to reach the destination was chosen by using the mid-point of access to public transport. Using the proportions in every district, the numbers of people choosing different transport modes in every district were calculated. Then, carbon emissions of user travel by transport were given by multiplying the average distance from the Shanghai Exhibition Centre to the centre of every district in Shanghai by the number of people and appropriate carbon emissions factor. The results for carbon footprint of visitor travel are 39,790t CO₂ per year.

The energy for transportation is derived from fossil fuel, and the amount of carbon dioxide emissions are translated into land area. The method is illustrated above. The total ecological footprint for visitor travel to the Shanghai Exhibition Centre is 6,715 gha per year.

3.3 Exhibition-related economy

The exhibition-related economic impact of environmental deterioration can be separated into two principal parts – one is the direct effect from the exhibition activities (e.g. the input of exhibitions, such as input of tickets and related services), the other part is the indirect impacts, which means the additional effect on the environment generated from the increasing production of manufacturers or the amount of goods consumption stimulated by the exhibitions. The exhibition industry, as a service industry, generally consumes fewer natural resources than manufacturing industries. However, the second part, which has extremely large potential economic profits, can be assumed to be the much more significant factor in terms of consuming resources and reducing environmental quality.

The direct environmental effect from the exhibition activities is estimated by the amount of the input of local exhibitions industry, population, and the national Ecological Footprint intensity of China. From the literature review, the monetary output of the Shanghai exhibition industry was 1,800,000,000 RMB in 2001, which accounted for about 0.4% of total GDP in Shanghai (OLGMEDIA, 2002). Additionally, Shanghai Bureau of Statistics reported the population of Shanghai in 2001 was about 16,800,000. The other factor, the Ecological Footprint intensity, defines “the ratio of the EF and the real status of the economic output, which depicts the resource consumption intensity corresponding to unit economic output”. The ratio of GDP to EF per capita directly shows the close relationship between the ‘land demand’ and economic output (Farber et al, 2002). For China, Qi (2008) concludes that the Ecological Footprint intensity (per capita) decreased steadily over the period 1981–2001, from 429 RMB/gha in 1981 to 5,139 RMB/gha in 2001 (Figure 1). Therefore, the related per capita ecological footprint of direct economic impact of the exhibition industry in Shanghai was just 0.021gha in 2001, which is much lower than other industries.
The indirect exhibition-related economic impact cannot be measured by one criterion, because the effect derived from exhibitions is integrated and compounded. The most significant function of holding an exhibition is to stimulate local and international consumption of products manufactured by exhibitors. It means the additional effect on the environment may be increased invisibly and sustained in the long run. In this paper, the indirect economic impact is depicted and demonstrated by several typical categories of industries, which account for most exhibitions held in Shanghai. There were 167 and 211 exhibitions held in Shanghai in 2008 and 2009 respectively. The main categories of exhibitions were Clothing, Leather, Textiles; Machinery, Industry, Process; Chemicals, Energy, Environment protection, and etc. Figure 2 shows the number of exhibitions in the main categories from 2008 to 2009. It can be seen that the category of clothing and textiles was the major focus of exhibitions displayed in Shanghai in these two years.

The carbon footprint is derived from the multiplication of the output of different industries and the CO₂ emission intensity of each category for China (Table 3). Moreover, the ecological footprint of each category in 2008 is calculated by the amount of the Shanghai GDP of each industry, Shanghai population (19,000,000 people), and the national Ecological Footprint intensity of China (5,139 RMB/gha). The amount of the GDP of each category is multiplied by the total GDP of Shanghai (1,370 billion RMB) in 2008 and the percentage of output of each industry. On this basis the total ecological footprint of products of the selected five categories is 181,360,000gha, or 2.0gha/capita.
Table 3. Carbon footprint of different categories of products held in Shanghai in 2008

<table>
<thead>
<tr>
<th>Categories</th>
<th>Percentage of output in GDP (%) (NBS. 2006)</th>
<th>Output (thousand USD)</th>
<th>CO₂ emission intensity of each category for China (t CO₂/ USD thousands) (Guo. 2009)</th>
<th>Carbon footprint (thousand tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing / Leather / Textile</td>
<td>7.03 (A8M. 2009)</td>
<td>13,896,680</td>
<td>1.84</td>
<td>25,569,891</td>
</tr>
<tr>
<td>Machinery / Industry / Process</td>
<td>45.4</td>
<td>90,129,896</td>
<td>0.81</td>
<td>73,005,216</td>
</tr>
<tr>
<td>Food / Beverages / Wine</td>
<td>1.9</td>
<td>18,065,684</td>
<td>1.10</td>
<td>19,872,252</td>
</tr>
<tr>
<td>Real Estate / Construction / Decoration</td>
<td>7.3</td>
<td>14,492,252</td>
<td>0.62</td>
<td>8,985,196</td>
</tr>
<tr>
<td>Car / transport</td>
<td>6.4</td>
<td>12,705,536</td>
<td>0.95</td>
<td>12,070,259</td>
</tr>
</tbody>
</table>

The experts predict that the total GDP of Shanghai could be increased 5% by organising the World Expo 2010 (Cai et al, 2009). If the percentage (5% of GDP increased) could represent the indirect exhibition-related economic effect, the potential increased ecological footprint of related products is 9,068,000gha in a year, or 0.1gha/capita/yr (Table 4). It means that ecological footprint in Shanghai could be reduced by 0.1gha/capita per year if there is no exhibition.

Table 4. Ecological footprint of different categories of products held in Shanghai in 2008

<table>
<thead>
<tr>
<th>Categories</th>
<th>Percentage of output in GDP (%) (NBS. 2006)</th>
<th>Output (thousand RMB)</th>
<th>Total Ecological Footprint (thousand gha)</th>
<th>Average Ecological Footprint (gha/capita)</th>
<th>Potential increased Ecological footprint (thousand gha)</th>
<th>Average potential increased Ecological footprint (gha/capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing / Leather / Textile</td>
<td>7.03 (A8M. 2009)</td>
<td>96,311,000</td>
<td>18,741</td>
<td>0.99</td>
<td>937</td>
<td>0.05</td>
</tr>
<tr>
<td>Machinery / Industry / Process</td>
<td>45.4</td>
<td>621,980,000</td>
<td>121,031</td>
<td>6.37</td>
<td>6052</td>
<td>0.32</td>
</tr>
<tr>
<td>Food / Beverages / Wine</td>
<td>1.9</td>
<td>26,030,000</td>
<td>5,065</td>
<td>0.27</td>
<td>253</td>
<td>0.01</td>
</tr>
<tr>
<td>Real Estate / Construction / Decoration</td>
<td>7.3</td>
<td>100,010,000</td>
<td>19,461</td>
<td>1.02</td>
<td>973</td>
<td>0.05</td>
</tr>
<tr>
<td>Car / transport</td>
<td>6.4</td>
<td>87,680,000</td>
<td>17,062</td>
<td>0.90</td>
<td>853</td>
<td>0.05</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>932,011,000</td>
<td>181,360</td>
<td>2.0</td>
<td>9,068</td>
<td>0.1</td>
</tr>
</tbody>
</table>

4 Comparisons and discussions

Generally, the fact that the environmental effect of transportation is worse than that of building construction is perhaps entering the awareness of researches and users, because petrol is seen being consumed more and more every day. This study shows that the
environmental impact of visitor travel has double the effect than that of the building construction. (The results of the Ecological Footprint analysis for the Shanghai Exhibition Centre and Shanghai exhibition industry is shown in Table 5.)

However, the invisible impact generated from the economic growth, stimulated by the exhibitions, is huge and not something of which people is aware. The analysis in this study shows that the average ecological footprint of exhibition-related economic impact is 100 times greater than the impact of visitor travel to attend the exhibitions every year. The factor of exhibition-related economy is the most significant aspect compared to the other two impacts in this case study. The results tell us that the environmental measurement cannot be just focused on the energy consumption of building construction or infrastructure.

Comparing the ecological footprint of the exhibition industry and exhibition-related other industries, it is interesting to find that the exhibition industry itself is generally one of the lowest resource-dependent industries and the input of the exhibition industry is much lower than other industries. In fact, many national governments have held and apply to hold the international exhibitions (World Expo) every year, although the input of some international exhibitions is negative (e.g. EXPO 2000 in Germany). This phenomenon not only shows the close relationship between exhibitions and economic growth, but also tells us how economic benefits connect to the policy orientation and the awareness of the public.

Table 5. Average ecological footprint of environmental impact generated from the building, visitor travel and exhibition-related economic impact

<table>
<thead>
<tr>
<th></th>
<th>Building impact</th>
<th>Visitor travel impact</th>
<th>Exhibition-related economic impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average ecological</td>
<td>0.0005</td>
<td>0.001</td>
<td>0.1</td>
</tr>
<tr>
<td>footprint (gha/capita/yr)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the other hand, people are not yet aware of the findings of environmental research. For example, the current global average footprint demand is 2.7 global hectares (WWF, 2008). The average footprint of China is 2.1gha (WWF, 2008). Although this figure is nearly equal to the average demand, the amount of ecological footprint is dramatically increasing every year corresponding to the increase of the national GDP. It can be reasonably assumed that the average footprint of China will overtake the global demand after World Expo 2010 in Shanghai. The exhibition-related economy directly and indirectly enhances the national input but may leads to an overshoot in resource consumption which directly influences the living environment. It is possible for China to reduce ecological footprint but perhaps only if there are no more exhibitions.

In the last years, the economic and management literature has largely stressed the importance of knowledge assets for company’s competitiveness. Grounded in the knowledge-based view of the firm, which interprets the NPD as a cognitive process characterized by the use, development and management of knowledge assets, this paper, by means of a multi case studies analysis, stresses the importance of taking knowledge assets into consideration as value drivers that can support NPD process performance improvements.
5 Conclusions

This research demonstrates what the most significant factor is directly and indirectly degrading environmental quality and land use. The case study shows that the environmental measurement should be broader and capable of considering the economic aspect, when the exhibition activities are studied. At this moment, for some developing countries, such as China and India, the percentage of exports (e.g., clothing and textile industry) in the total national GDP is dramatically increasing from year to year. The international exhibitions give them good opportunities to enlarge the national trade and increase the rate of employment, resident income and revenue, but at the same time, it should be noticed that exhibitions indirectly increase the local resource consumption and bring more environmental pollution to the countries. The questions, of how to accurately measure the real environmental impact and how to balance an increasing economic perspective for every country with less effect on the environment, need to be considered further by environmental researchers and policymakers. On this can then be based the development of energy efficiency techniques and the design of sustainable buildings.

References


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Knowledge-based approach for planning healthy cities: the case of Logan-Beaudesert, Australia

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Structured Abstract

Introduction - The planning for healthy cities faces significant challenges due to lack of effective information, systems and a framework to organise that information. Such a framework is critical in order to make accessible and informed decisions for planning healthy cities. The challenges for planning healthy cities have been magnified by the rise of the healthy cities movement, as a result of which, there have been more frequent calls for localised, collaborative and knowledge-based decisions. Some studies have suggested that the use of a ‘knowledge-based’ approach to planning will enhance the accuracy and quality decision-making by improving the availability of data and information for health service planners and may also lead to increased collaboration between stakeholders and the community. A knowledge-based or evidence-based approach to decision-making can provide an ‘out-of-the-box’ thinking through the use of technology during decision-making.
making processes. Minimal research has been conducted in this area to date, especially in terms of evaluating the impact of adopting knowledge-based approach on stakeholders, policy-makers and decision-makers within health planning initiatives.

**Purpose** – The purpose of the paper is to present an integrated method that has been developed to facilitate a knowledge-based decision-making process to assist health planning.

**Methodology** – Specifically, the paper describes the participatory process that has been adopted to develop an online Geographic Information System (GIS)-based Decision Support System (DSS) for health planners.

**Value** – Conceptually, it is an application of Healthy Cities and Knowledge Cities approaches which are linked together. Specifically, it is a unique settings-based initiative designed to plan for and improve the health capacity of Logan-Beaudesert area, Australia. This setting-based initiative is named as the Logan-Beaudesert Health Coalition (LBHC).

**Practical implications** - The paper outlines the application of a knowledge-based approach to the development of a healthy city. Also, it focuses on the need for widespread use of this approach as a tool for enhancing community-based health coalition decision making processes.

**Keywords** – knowledge-base decision-making, decision supports systems, knowledge cities, healthy cities, participatory action research

**Paper type** – Academic Research Paper

1 **Introduction**

There has been emerging evidence of clear established links between the application of ‘knowledge-based’ approaches to planning and its output for quality of life and place (Moutinho, 2006). For instance, there is evidence that ‘knowledge-based’ approaches may lead to enhanced decision-making processes, increased collaboration between stakeholders and the community, and improved accuracy and quality of planning processes. Consequently, research has emphasised that community health stands to gain significantly from healthy and high quality urban planning. Conversely, the process of developing healthy cities has become an important focus for urban planners (Schulz & Northridge, 2004). However, to make this link effective, some researchers have argued that a new knowledge-based approach is required (Doyle, 2002). This approach should be based on local information, collaborative practice and the engagement of the public in decision-making. The literature emphasises that knowledge-based approaches are associated with a number of benefits including: scientific and evidence-based decision-making, effective planning processes, and more accurate policy making. Conversely, thus far, little research has been conducted on the potential of knowledge-based approaches in planning processes to improve our understanding and knowledge upon the growing impact of social determinants of health on the society wellbeing, create sharing culture and inclusive systems, and develop health and quality of life and place. Therefore, identifying the gap in the knowledge and suggesting effective and practical frameworks to address these issues, forms the basis of this ongoing study. Thus, this paper describes a healthy cities initiative that is based on a knowledge cities approach and suggests applying a new framework and specific methods (e.g. Participatory Actions Research) which are aiming to address these research components.
The healthy cities approach: the role of knowledge

In many cities around the world, the cost of health to society will significantly increase in the next few decades (Anderson et al. 2006). Varying responses have emerged regarding the best way to address rising health costs, one of which is the Healthy Cities initiative. The ‘Healthy Cities’ initiative was officially introduced in 1986 by Ilona Kickbusch at a conference of the World Health Organisation (WHO) in Copenhagen, Denmark. To date, over 1000 cities around the world have initiated healthy city programmes (WHO, 1999). The most commonly used definition of a healthy city is ‘one that is continually creating and improving those physical and social environments and strengthening those community resources which enable people to mutually support each other in performing all the functions of life and achieving their maximum potential’ (Flynn, 1996). Healthy cities movement is also seen as a key component of the knowledge cities movement. In order to plan effectively for healthy cities, it is necessary to revive the historic collaboration between urban planning and public health professionals, and together conduct informed knowledge-based decision-making (Northridge et al., 2003). In other words, health planning efforts must focus on the creation of structures and processes that actively work to dismantle existing health inequalities and to create economic, political, and social equality (Schulz & Northridge, 2004).

One of the reasons why planning has not been able to contribute to the healthy cities movement is that there are no models to define the type of information that must be considered by health planners and there is no method for sharing this information in a meaningful form. It is, therefore, important for planners to have a clear understanding of a healthy city so they are clear about the desired outcomes. In this regard, Duhl and Sanchez (1999) defined six fundamental characteristics (see Figure 1) that would be necessary to create a healthy city. If these characteristics are facilitated, it is likely that a healthy city will emerge. Interestingly, one of these characteristics is innovation, an element that is often missing from many public health initiatives (Kendall et al. 2009). However, as Flynn (1996) concluded, every community is unique, with different physical, social, political and cultural contexts that must be understood in the planning process. Therefore, it is necessary for planners to develop a thorough understanding (based on a knowledge-based approach) of each individual community health profile and the local features that are likely to influence health. Consequently, planners require both a broad framework within which to understand a healthy city and a structure that will allow them to collate localised data in a meaningful way.
Schulz and Northridge (2004) have developed a public health framework for health impact assessments (see Figure 2) that provides some utility for urban planners who are engaging in healthy cities initiatives. This framework summarises the different levels of factors that impact upon health and, therefore, should be considered in health planning.
processes. According to Northridge et al. (2003), factors that contribute to health can be divided into four levels, namely: Macro, Meso, Micro and Individual. According to the model, these factors interact to contribute to health in the community. For instance, the natural environment, macro social factors, and inequalities (i.e., macro factors) influence health outcomes and well-being (i.e. individual level factors) via multiple pathways through differential access to power, information, and resources. These macro factors, in turn, influence meso factors (i.e. the built environment and the social context). Meso factors include the development of land use policies. At this level, the impact of the built environment on health is especially important to policy management by planners. Some researchers have argued that meso factors have been given greater scientific attention in recent years (Northridge et al., 2003). However, the micro factors are more commonly the realm of public health practitioners and have been the focus of research for many years. Three domains are considered relevant at this level: stressors, social integration/support, and health behaviours. The last column in Figure 2 contains two domains: health outcomes and well-being, as these in turn influence the individual habits. Thus, an individual’s eventual health outcome could be explained by the impact throughout his or her life course of multiple factors contained in this framework.

3 Knowledge cities: prospects, challenges and tools

The concept of knowledge cities plays a fundamental role in knowledge creation, economic growth and development. Research has emphasised that if Knowledge cities are to be developed, a more knowledge-based urban development (KBUD) approach should be adopted within urban planning initiatives (Yigitcanlar et al., 2008a). For instance, Van Winden et al. (2007) suggested in their framework that quality of life is one of the essential characteristics of a knowledge city. Thus, it would seem that the healthy cities movement and the knowledge cities movement are inherently linked and may complement each other. According to the literature, features of a Knowledge City include a knowledge sharing culture, the use of knowledge-based development and decision-making and information and communication technology (ICT) systems that are similar to the common features of Healthy Cities. In this sense, Meang and Budic (2010) suggested ICT tools were essential to understanding Knowledge-based development approaches, and should be an integral component in urban planning processes. Hence, ICT tools should also be considered to be an essential component of healthy cities planning efforts.

The literature points out that the prospects and challenges faced by today’s decision-makers are to move beyond decision-making by intuition to what was identified as knowledge-based decision making (KBDM) (Doyle, 2002). Broadly, it is suggested that data must be transformed to knowledge; knowledge needs to be translated into wisdom, and wisdom needs to guide action. So, it could be outlined that data collection is a resource. But, even with data and solid evidence, that in theory should improve decision-making practice, yet, it is not a recipe for successful decision-making processes. Thus, decision-making is much more complicated than translating data into knowledge, it is some times moral, political or intuitive decision which is based partially on high-quality data. In this sense, decisions could still be made on solid data, but overall judgment and comprehensive sight of the larger context are essential components too. For instance, Doyle (2002; page 33) summarises (in an adequately manner) the way decision-making should be supported as: “it should be informed by facts; it should be supported by rigorous analysis; and it should be subject to constant re-analysis and reinterpretation”
Given that decisions are being made some times under uncertainty and ambiguity conditions, it is expected that they will be based on intuition too. Thus, overall, it can be suggested that KBDM are mixture of scientific evidence-based on information and professional judgment, experience, insight and intuition which can lead to informed and effective decisions.

However, the literature also draws great potential benefits by using ICT tools as a facilitator of KBDM. Decision support system (DSS) are ICT tools, which include geographic information systems (GIS), provide mechanisms to help its users to assess complex problems and solve these in a meaningful way. Some researchers claim that GIS-based DSS have the potential to improve both the availability of information and quality of decision making processes by combining “communication, computing and decision support technologies to facilitate formulation and solution of unstructured problems by a group of people” (Desanctis & Gallupe, 1987; page 589). Further, another advantage of GIS-based DSS is that they visualise input information, decision-making processes, assessment, analysis and results (Yigitcanlar 2008b). According to the literature, this capacity to share information visually improves stakeholders’ involvement in decision-making, promotes ‘horizontal’ knowledge sharing and helps simplify the decision-making process (Dur, Yigitcanlar & Bunker 2009). Accordingly, GIS provides the computational, analytical, problem-solving and visualisation capabilities necessary for a spatial DSS (Dur, Yigitcanlar & Bunker 2009). Thus, ‘spatialised information’ in the form of maps generated from local knowledge, private, government or commercially available datasets can be mapped. These maps can then be superimposed in an unlimited range of variations, to provide the basis for analytical analysis.

Yet, understanding how GIS-based DSS works in practice is critical if we want to influence planning processes and re-orient health planning towards more knowledge-based approaches (Rushton et al. 2010). For instance, Mooney and Fohtung (2008, page 27) urge that: “Making adequate and relevant information available becomes paramount if health policy-makers are to embrace adequately the prospects of attracting investments in and, equally important, interest in the social determinants of health”. Yet, the literature also emphasises that there is a limited amount of research upon collaborative technologies and group decision-making processes (Chen et al. 2007). Also, it seems right that questions such as, what constitutes ‘evidence’, ‘scientific reasoning’, potential impact and knowledge-based decision-making processes will need to be re-examined if we want to adopt a truly local, inclusive approach for planning healthy cities. Thus, based on our literature findings, we have recognised that a new conceptual framework to re-examine these questions is essential to be developed.

4 Conceptual framework for the planning of healthy cities

Broadly, it is proposed that the overall conceptual framework will be based on knowledge-based decision-making approach. It is expected to contribute to a broader conceptualisation of the health-related issues to be addressed in a particular city. In this regard, Mooney and Fohtung (2008) stated, that thorough understanding of the complex relationships between social determinants and health outcomes may lead to more knowledgeable interpretation of health-related findings. It is therefore imperative that the DSS be based on a broad information framework. This in turn, allows health planners to develop powerful knowledge-based and effective spatial techniques to address complex questions about the determinants of health. A broad framework has been proposed for
health planning (see Figure 3) that illustrates the overall place of DSS within a healthy cities’ planning initiative. Specifically, it is suggested that the health profile component which is based on Schulz and Northridge (2004) model, should guide the development of a community health profiling, with information being derived from multiple sources. The ability to present this information in meaningful, accessible and usable ways is a critical challenge for establishing healthy cities. Particularly, this framework suggests that by utilising a DSS as part of a broader healthy city planning process, and a knowledge-based approach, it is more likely that healthy city will be established. Thus, accordingly, the proposed framework suggests integrating some of the previous shown models into one comprehensive framework. However, it was also recognised that it was necessary to test the application of the proposed framework in a real case-study.

Figure 3. A conceptual framework for planning a healthy city (Modified after World Health Organization 1997; Schulz & Northridge 2004)

5 Case study: the Logan Beaudesert health coalition

The Logan Beaudesert health coalition (LBHC) is a partnership established to address the growing level of chronic disease risk factors in the Logan Beaudesert region of Queensland, Australia. The initiative intended to build on work that had preceded it, enhancing existing services and infrastructure, establishing formal partnerships and mechanisms to improve the coordination of existing resources as well as planning for additional services and strategies. It was initiated with a view to improving health capacity at multiple levels through improved and responsive localised planning. The coalition has a central board committee which oversees six health initiatives or working
groups, each focusing on a specific area identified as needing attention. These working groups focus on the early years of life (0 to 8 years), multicultural health, prevention and management of existing chronic disease, integration between general practice and acute settings, efficient management and transfer of health information and health promotion. Each group has a leader or project manager and a selected group of key stakeholders from across multiple sectors or relevant organisations. The working groups are responsible for facilitating decisions, polices or strategies by providing recommendations and information to the LBHC board. The LBHC board role is to coordinate and direct the coalition as a ‘whole’. The Queensland State Government funded the LBHC and has given mandate to its board to modify, alter or adapt any of the current programs in response to evidence (based on a knowledge-based approach) and performance data with the scope to design and to implement new health initiatives as required. The six health initiatives and their advisory groups are responsible for facilitating decisions polices or strategies by providing recommendations and information to the LBHC board. Additionally, at the board level, decisions are being made whilst decisions are reflected back to the six health initiatives and the advisory groups. So, overall, the LBHC was an ideal platform to evaluate the effect of the DSS, because of considerable challenges it faces in creating a simple, engaging, and usable DSS interface to help members of the board make better decisions. However, subsequent to reviewing the relevant literature, it was also recognised that the process plays an important role in the dissemination and analysis of information by decision-makers, particularly as part of a broader KBDM approach. Also, it is suggested that knowledge-based approaches could be better understand if quantitative and qualitative data are to be collected upon the needs and the prospective impacts in planning responses (Meang & Budic, 2010). In this sense, according to Nan et al. (2009), one of the key requirements of a knowledge-based system is the flexibility to adapt users’ needs and therefore, increasing planning processes’ efficiency. So, piloting a prospective knowledge-based system is subject to gain important feedback before developing the final product. Thus, in order to collect the overall feedback and evaluate its impact from health planners’ perspectives, a specific Participatory Action Research knowledge-based method was designed.

6 Participatory action research, a method for evaluating and implementing a knowledge-based decision-making approach

Participatory action research (PAR) has increasingly been used as an overarching name for an orientation to research practice that places the researcher in position of co-learner and puts a heavy accent on input from participants or end-users and the ongoing translation of research findings into action (Minkler, 2000). Recently, this approach is gaining increased attention in health research, particularly in the public health context (Minkler & Wallerstein, 2003). One of the most important characteristics of PAR is the fact that participants whose lives are affected by the research initiative take an active role in its design. In this regard, Israel et al. (2001) defined PAR as adhering to the following principles:

- Participatory;
- Engaging community members and researchers in a joint process in which both contribute equally;
- A co-learning process for researchers and community members;
- A method for systems development and local community capacity building;
An empowering process through which participants can increase control over their lives, nurturing community strengths and problem-solving abilities; and

A way to balance research and action.

Amongst its advantages in the healthy cities and knowledge cities contexts is that it is a ground-up approach driven by the communities rather than top-down driven by experts. This approach strengthens the input from participants by using democratic participatory process driven by community priorities and based on community contribution to create a healthy community. Doyle (2002) suggested that PAR is community-driven approach oriented toward social change, but it is also based on a broader approach to knowledge that recognises multiple forms of knowledge and ways of knowing. Thus, researchers involved in a PAR initiative enter the community as co-learners rather than teachers (Minkler, 2000).

However, a few important limitations need to be noted. Specifically, implementing a PAR approach within a health planning initiative is a time consuming task and requires attention to issues of power, trust, research rigor and conflicting interests for scientists and citizens. However, the literature reveals that through community consultation meetings, many healthy cities have effectively incorporated a high level of community participation (Minkler, 2000; Stern, Gudes & Svoray, 2009). As Minkler (2000) emphasised, PAR offers a promising approach for realising community participation and conceptualising the vision of the healthy cities movement through the process of sharing knowledge.

Enthused by the PAR approach, we suggest using a similar approach while developing a knowledge-based DSS interface. It is suggested to incorporate focus groups, consultation meetings and survey, as suggested by Rowe and Frewer (2009) in their study dealt with public participation methods. Figure 4, illustrates our suggested PAR method for developing a DSS interface. Also, and not less important, this method structures the ways research data may be collected.

Specifically, it is suggested to collect the research data by disseminating a survey to the target group, in our case study it is the Logan Beaudesert Health Coalition (LBHC) consisted of approximately 50 members. Also, it is suggested to incorporate two phases of research data collection, Pre-DSS intervention and Post-DSS intervention. The rationale stands in the basis of this method, is to identify the way decisions were being made prior to the DSS intervention, and to draw the differences subsequently to the DSS intervention. The Post-DSS research data can be collected after few months of trialling the DSS interface. Consequently, it may give decision-makers sufficient time to be familiar with the DSS interface and to work with it on their day-to-day routine. In Figure 4, this is being represented by the Outcomes Evaluation dimension. Importantly, and following Meang and Budic (2010) recommendation, it is also suggested that a qualitative research data will be collected in addition to quantitative data. Thus, it is suggested to execute series of consultation meetings or focus groups, in order to obtain data from end-users in relation to the prospective functionality, data content and features to be included in the DSS interface. These steps should be adopted from the early stages of the design, followed by refinement stages (e.g. represented by the End-users Implementation Dimension in Figure 4) which are designated to obtain feedback from end-users on each version of the DSS interface. This way, stakeholders (e.g. health planners, community representatives etc) could be consulted in iterative cycles, with each consultation feeding into the further refinement and development of the DSS interface. Further iterations should be focused on the development of an interactive and usable interface, preferred
features of the DSS, use of the system and perceived reliability of the outputs. So, this in turn, may generate a mechanism improving the DSS interface on time, and it is being represented in the different refinement circles illustrated in Figure 4 on the PAR Dimension.

![Figure 4. PAR framework for developing a DSS and collecting research data](image)

Additionally, Appendix 1, displays in more detail, the ways in which the PAR approach was executed. Broadly, it is suggested that the dimensions drawn earlier (e.g. in Figure 4) are associated to input or output, related to the development of the DSS interface. Moving right within Appendix 1, we can observe more details such as, the collected data by sub-dimension, sample, method of data collection, duration or timing and the analysis method. Thus, by adopting this specific method, we can identify whether the DSS interface would have a positive impact on the decision-makers as part of a broader knowledge-based decision-making approach. The next sections draw our preliminary findings from the Actual decision-making sub-dimension by adopting qualitative analysis method.

### 7 Qualitative data-analysis method

Given that this is an ongoing study, only part of our findings will be outlined. As for the Actual decision-making processes sub-dimension (see Appendix 1), we have obtained the research data by collecting the qualitative data based on recordings of LBHC board meetings, minutes and notes. Additionally, we have designed a scale measuring the way decision-making were made during the LBHC board meetings. Specifically, a random selection of seven meetings were analysed to identify the number and nature of decisions made during each meeting. Then, each identified decision was scored (based on five steps Likert scale) and analysed and by two independent researchers. The scale consists of the following measurements:
1. Degree to which information, evidence and/or knowledge was used to underpin decisions;
2. Quality of the evidence used (i.e., what source, validity and breadth of evidence was used?);
3. Participation in decision-making (i.e., who participated in the decision-making process and what each party brought to the process?);
4. Degree of collaboration (i.e., what latitude was available to the board in the decision-making process? Was the decision already made? Were diverse views taken into consideration etc.?)
5. Degree of consensus (i.e., what was the outcome of the decision-making process? Was there consensus or dissent? How was disagreement handled?);
6. Action orientation of the decision (i.e., were there any planned actions as a result of the decision? How clear were these planned actions?);
7. Opportunity-cost of the decision (i.e., what other decisions or actions were displaced by this decision? Were these opportunity-costs considered, by whom?); and
8. Conclusiveness of the decision (i.e., were there non-decisions or deferrals of decision-making and for what reasons?).

Textual data from minutes, observational notes and audio recordings were analysed for themes relating to decision-making. The abovementioned data was combined and analysed with the Likert score-based data, and this in turn formulated our preliminary qualitative findings of the actual decision-making processes in the Pre-DSS intervention phase.

8 Preliminary qualitative findings

Based on the qualitative analysis, inferences can be drawn about some aspects of the actual decision-making processes. Broadly, analysis of the qualitative data, supports the general statement that lack of information, evidence, deferral of decision-making processes and sense of ‘disconnectedness’ exists in the LBHC board. For instance, our analysis revealed that only few decisions were actually made during any of the LBHC board meetings, because the board was rarely required to make decisions and the decisions were regularly deferred. Further, during discussions, members often expressed the fact that they did not have sufficient information, knowledge or evidence to formulate a decision. They lacked clarity about how to make decisions and whether or not these decisions would be meaningful. There were usually many unknown parameters which prevented a knowledge-based decision-making process. From the decisions that were finally made, the focus was mostly on internal matters and existing programs with little external focus or relevance to the goals of the LBHC coalition. Based on our findings, only few decisions were made on the basis of any evidence. As a result, the decisions reflected the views of those who participated in the discussion. Generally, only a few members were involved in discussions where a decision was required. Further, when decisions were finally made, they were often reported to the board as an outcome, indicating that a number of decisions were being made outside of the LBHC board meetings and not by board members. Besides, this was occasionally reflected by the minutes and notes. These findings were also supported by the following LBHC members’ comments:
“Very few decisions have ever been made by the LBHC Board, most decisions are made by a few outside the meeting, and therefore there is no rigour or transparency to the processes” or “Need to identify priority actions, need to be more pro-evidence in decision making” or “I thought a decision had been made prior to our input”.

Other findings support the fact that discussions in the LBHC board demonstrated significant levels of vision, but most decision-making processes lacked the steps to translate these decisions into practice or deliver these decisions more broadly (outward to the LBHC coalition). Also, no processes were applied to manage that lack of consensus in decision-making. This could be underpinned by the following LBHC members’ comments:

“Problems existed in relation to decision-making processes impact the LBHC sense of connectedness as a whole”.

Overall, from the above mentioned findings we can conclude our preliminary qualitative findings that LBHC suffers from lack of evidence and information, which are defined in the literature as essential components for knowledge-based decision-making approach. Even though the decisions were made, we have identified lack of action associated with some of them. Some of the decisions were not made consensually or in a participatory manner, this in turn contributes to the sense of disconnectedness, observed in the LBHC coalition.

9 Conclusion and future research

The literature emphasises that knowledge-based development approaches should be an integral component in urban planning processes. Accordingly, our study focuses upon the need for the proposed knowledge-based framework as a tool for planning healthy cities. We have suggested a comprehensive framework to make health information accessible in the light of adopting a more knowledge-based approach. The study has shaded light on the importance of this framework and accordingly suggested a practical PAR approach, as part of broader knowledge-based approach. In this regard, not only the study has discussed the need for an access to effective information (by utilising DSS interface), it also suggested practical method to design and measure their impact (e.g. PAR). So, practically, we have structured our suggested methods to underpin our overarched knowledge-based approach by collecting and evaluating quantitative and qualitative data. Moreover, “making the difference” is subject not only on displaying effective spatial data; it is more about being understandable. Thus, the methods and approaches introduced in this study may play an important role in planning knowledge-based healthy cities. On the other hand, questions about how the suggested framework and methods are actually applied in planning knowledge-based healthy cities, the impact of the DSS interface on decision-making processes and its ability to facilitate knowledge-based health planning approaches and the application of PAR method in practice, remain unanswered. These important research questions form our ongoing and longitudinal research objectives. In conclusion, it can be summarised that it is essential that city leaders, community agencies and planning bodies will make every effort to acquire new collaborative technologies, or spatial-based collaborative technologies into the healthy cities planning processes, as part of a broader long term knowledge-based development approach of the knowledge cities.
Acknowledgment

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References


Rushton, C., Gudes, O., & Kendall, E. (unpublished). The role of GIS DSS for enhancing health coalition decision making.


## Appendix 1. Detailed suggested PAR method for developing a DSS interface and collecting research data

<table>
<thead>
<tr>
<th>Themes</th>
<th>Dimension</th>
<th>Data to be Collected by sub-dimension</th>
<th>Participants or Sample</th>
<th>Method of data collection</th>
<th>Duration or timing</th>
<th>Analysis method</th>
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<tr>
<td>Inputs to the DSS</td>
<td>Implementation and Content dimension (establishment and refinement stages)</td>
<td>Information request (establishment stage) and feedback related to actual data (refinement stage)</td>
<td>LBHC Board members (approximately 12 participants)</td>
<td>Ongoing workshops, notes, questionnaire s and one on one meetings with pilot participants (LBHC board members)</td>
<td>(based on 3 time intervals)</td>
<td>Descriptive and inferential statistics</td>
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<td>Features request (establishment stage) and system's feedback (refinement stage)</td>
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<td>Outputs evaluation from the DSS</td>
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<td>Textual description that outlines the process undertaken within the LBHC, starting from the early days till the establishment of the DSS prototype interface up to these days. The implementation dimension is based on three phases: introduction, interaction (with end-users for design purpose) and trialling the interface. * Data is based on a log book that was prepared to document all activities which were undertaken</td>
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Survey (hardcopy and online) Survey

Both post and pre DSS intervention analysis

Descriptive and inferential statistics
Agglomeration and labour productivity in Australian cities

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Abstract

The purpose of the paper is to develop the understanding of the relationship between agglomeration and labour productivity in Australian cities. There is a considerable amount of international literature which focuses on the relationship between labour productivity and agglomeration but the evidence based in Australia is limited.

The method employed in this paper has been built on the Australian System of National Accounts (ASNA) to allow the results to be placed in context of Australia’s overall economic and productivity performance. Aggregate labour productivity estimates have been developed using the ASNA for each major capital city in Australia. Melbourne has then been used as a case study to produce industry labour productivity elasticities. This involved creating a synthetic gross value added and labour productivity dataset and the estimation of an effective job density for each Statistical Local Area in Melbourne.

The analysis produced for Melbourne allows the productivity improvements which would be brought about by various land use or transport changes to be estimated.

Keywords – agglomeration, labour productivity, national accounts

Paper type – Practical Paper

1 Introduction

Australia’s major capital cities (Sydney, Melbourne, Brisbane, Adelaide and Perth) are a driving force behind the national economy. Microeconomic reforms over the past twenty five years have provided a great uplift to the productive capacity of the industries which make up the economies of our cities. The macroeconomic policy settings over the same period have also supplied the opportunity for the cities to prosper.

However, macroeconomic and microeconomic reforms can no longer provide the productivity improvements which will drive the Australian economy forward. Currently, Australia and most of the developed world are faced with a similar problem. That is, with ageing populations, increases in Gross Domestic Product (GDP) which in the past were...
driven by more people entering the labour force, will now have to be achieved in most part via increased productivity (Australian Government, 2007).

The last frontier to boosting Australia’s productivity is in the way we spatially organise our cities. Until very recently the economic planning of our cities has fallen between all levels of government. State and Local Governments have long been focused on providing housing (with varying degrees of success) and a supply of land to house employment. However, there has been little attention paid to the distribution and type of employment across the urban landscape. There has also been a lack of alignment between the location of population growth and the location of employment.

Much of this is due to a lack of basic data and empirical evidence with which to understand how our cities currently function in a spatial sense. To develop this understanding there is already a considerable amount of international literature which focuses on the relationship between labour productivity and agglomeration (the density of economic activity).

Increasing the level of agglomeration - via improved transport linkages, increasing employment densities within existing employment clusters, or expanding the area of employment clusters - can boost labour productivity. This labour productivity boost is brought about in a number of ways such as economies of scope and scale, access to skilled labour and knowledge transfer.

Different industries gain differing increases in labour productivity from increases in agglomeration. This relationship partially explains the vigorous competition for centrally located sites amongst service-based firms. The premium paid for such sites is more than compensated by the increased labour productivity from their operations in these strategic locations. This also explains why it is difficult to attract these types of businesses to suburban locations, notwithstanding the sound urban planning arguments for setting such a goal.

This paper constructs a dataset to examine the labour productivity of Australian cities. Melbourne is then used as a case study to demonstrate the relationship between agglomeration and labour productivity. The next section briefly outlines the conceptual framework underlying agglomeration. Section 3 outlines the agglomeration (effective job density) measure. Section 4 describes the labour productivity estimates. Section 5 presents the Melbourne level labour productivity estimates. The regression analysis and the industry results are outlined in Section 6. Section 7 provides some concluding remarks, areas for further research and policy implications.

2 Conceptual framework underlying agglomeration

The term agglomeration is used in spatial economics to describe the benefits which flow to firms from locating in areas which have a higher density of economic activity. Macroeconomic theory would describe agglomeration as part of economies of scale and scope. This section provides a brief description of the conceptual benefit which arises from agglomeration. Many of the theoretical benefits are well established in economic theory and are outlined in detail in most economic text books. Therefore, only a brief explanation is provided here. A more comprehensive review of the nature of agglomeration can be found in Rosenthal (2003) which provides an excellent summary and analysis of the literature.

Locating in an area which has a higher density of economic activity (as measured by employment) allows firms to achieve economies of scale via the large customer base.
Within that large customer base, the opportunity for economics of scope is presented to firms. That is, with increased numbers of clients firms will be able to specialise in a particular field and hence gain improved efficiencies through specialisation.

The competitive marketplace also presents a firm with many potential clients, freeing it from reliance on a single client. This provides firms with a form of diversification of risk. The automotive manufacturing supply chain provides examples of the dangers of poor diversification of risk for firms. The closure of the automotive assembly plant generally results in the closure of component manufacturers.

Agglomeration also provides opportunities for firms to access a deep and diverse pool of skilled labour. With so many firms located together there will be a high level of technological / knowledge transfer between firms, which will help bolster innovation. This innovation is vital for firms to survive in a very competitive market place. Much of the knowledge transfer is provided by skilled labour moving between firms.

Literature related to agglomeration can be traced back to the work of Marshall (1920). Marshall’s work, despite the passage of a century, still provides an excellent description of the conceptual benefit which firms can gain by locating in a particular location. Since that time agglomeration has been measured in a number of ways including city population (Aaberg, 1973; Tabuchi, 1986), industry employment (Nakamura, 1985; Henderson, 1986), the number of industrial plants (Henderson, 2003) and effective job density (Graham, 2006).

Although all these methods attempt to measure the same basic economic phenomena, there are two somewhat distinct effects at work. The first is that the larger the city (in terms of population, employment, or economic production), the higher the labour productivity. The literature often refers to this as urbanisation. The second is related to the actual spatial organisation of the city (the ease at which firms can interact with each other). The literature often refers to this as localisation.

For example, consider two cities, City A and City B, each with a population of five million people. Each city will gain a labour productivity premium from their size. However, City A is poorly organised with economic activity spread widely and poorly linked together. City B has distinct employment centres linked tightly together via robust transport links. In this case the labour productivity in City B will be higher than City A.

There is also a third effect, which is related to the overall size of the economy in which the city itself is located, or that it has access to. This is generally not explicitly accounted for as the analysis is usually conducted within a particular country.

This paper examines the impact of the relative size of each major capital city on labour productivity. However, the main focus is more on the spatial organisation aspects of agglomeration. Effective Job Density (EJD) is used to measure agglomeration for Melbourne. The next section explains EJD in more detail.

3 Measuring effective job density

A simple measure such as looking at the employment density of an area does not effectively demonstrate the phenomena of agglomeration. A firm in a relatively low-
employment area but located on the edge of a Central Business District (CBD) could potentially capture agglomeration benefits by being close to the CBD. Thus a measure of agglomeration must “incorporate both proximity and the scale of the economic activity and …be calculated for very small areas” (Graham, 2006).
Accordingly, this study has used the level of employment relative to the time taken to gain access to that employment and the mode split that is currently experienced by those employees. The travel time matrix (sourced from the Victorian Government’s Melbourne Integrated Transport Model) is available for 2,253 travel zones in Melbourne. A travel time matrix shows how long it takes to travel from one zone in the city to all other zones by both car and public transport. In the analysis presented in Section 5 the travel times have been converted from the travel zone level to a Statistical Local Area level.

This measure of EJD enables a more ‘real life’ representation of the proximity (in terms of travel time) component of agglomeration that other more basic measures overlook. That is, 68% of people working in the CBD of Melbourne travel to work on public transport and thus the proximity to those jobs is closely related to public transport travel times. The other extreme can be seen in locations such as Cranbourne (an outer location of Melbourne), where 98% of workers travel to work using private vehicles.

Therefore, effective job density has been estimated as follows:

\[ EJD_i = \sum \left( \frac{\text{PT Mode Share}_i \times \text{Emp}_i}{\text{PT Travel Time}_i} + \frac{(1 - \text{PT Mode Share}_i) \times \text{Emp}_i}{\text{PV Travel Time}_i} \right) \]  

Where:

- \( EJD_i \) is the Effective Job Density for zone \( i \);
- \( \text{PT Mode Share}_i \) is the percent of work trips which involve public transport for zone \( i \);
- \( \text{Emp}_i \) is the number of jobs/employment within zone \( i \);
- \( \text{PT Travel Time}_i \) is the time it takes to travel on public transport from zone \( j \) to zone \( i \); and
- \( \text{PV Travel Time}_i \) is the time it takes to travel by private vehicle from zone \( j \) to zone \( i \).

This method also provides insight into the costs associated with travel in various parts of the city. A rational commuter would use the mode of transport which would minimise their travel costs including value of time and any monetary cost. Therefore, the mode split between public transport and private vehicle at a particular origin-destination pairing should provide insight into the overall travel cost.

### 4 Labour productivity

Labour productivity is calculated by dividing the Gross Value Added (GVA) for an industry by the total number of hours worked in that industry.

\[ LR_i = \frac{\text{GVA}_i}{\text{Hours Worked}_i} \]  

Where:

- \( LR_i \) is the Labour Productivity for zone \( i \);
- \( \text{GVA}_i \) is the Gross Value Added for zone \( i \); and
- \( \text{Hours Worked}_i \) is the number of hours worked for zone \( i \).

Labour productivity is a partial measure of productivity as changes in GVA could be driven by changes to other factors of production such as capital. The most comprehensive measure of productivity is known as Multifactor Productivity (MFP). MFP measures the ratio of growth in GVA to growth in both labour and capital inputs and also represents that part of the change in GVA that has not been explained by changes in labour and / or capital.

1 This method does exclude travel times from other modes (bicycle or walk.)
The Australian Bureau of Statistics produces Labour Productivity, Capital Productivity and MFP for each industry at the Australian level on an annual basis. However, due to data limitations in estimates of the capital stock at the state level, labour productivity is the only measure available at this time to be used to investigate the impact of agglomeration.

The estimate of GDP for each capital city including Melbourne is derived from industry data published in the Australian National Accounts: State Accounts (cat. no. 5220.0) publication.

There are three approaches to measuring GDP; the Production approach (the sum of the GVA for each of the industries and taxes less subsides on products); Expenditure approach (measures final expenditure on goods and services) and the Income approach (sum of income generated by all factors of production).

At the Australian level the Production, Expenditure and Income approaches are averaged by ABS to produce GDP. However, at the State level due to a lack of data on interstate trade, the Expenditure and Income approaches are combined and averaged with the Production approach.

In developing the GDP for each capital city the production approach is used, firstly because of this lack of data on intrastate trade. The other major reason is that the data available to calculate the Production approach is more robust (and hence requires fewer assumptions to be made) than that available for the Expenditure or Income approaches. For each industry, wherever possible, the same data sources which have been used to produce industry Gross Value Added at the State level are used to produce industry Gross Value Added at the city level. Some of these data sources include:

- Agricultural Commodities: Small Area Data, Australia (cat. no. 7125.0);
- Business Indicators, Australia (cat. no. 5676.0);
- Manufacturing Industry, Australia (cat. no. 8221.0);
- Regional Population Growth, Australia (cat. no. 3218.0);
- Household Expenditure Survey (cat. no. 6530.0);
- Education and Training Experience (cat. no. 6278.0); and
- Labour Force, Australia, Detailed, Quarterly (cat. no. 6291.0.55.003).

In order to maintain consistency with the wider National Accounts, the Production approach estimate of Gross City Product is benchmarked to the Gross State Product using a statistical discrepancy method. Via the use of the implicit price deflation technique, the Chain Volume Measures of the Gross City Product are converted into Current Prices. This method overcomes the non-additivity issue with the Chain Volume Measure.

The estimates of hours worked are derived from Information Paper: Implementing New Estimates of Hours Worked into the Australian National Accounts, 2006 (5204.0.55.003) which provides the total hours worked within the economy for 2004-05. The index of total hours worked from Australian System of National Accounts, 2007-08 (cat. no. 5204.0) has been used to advance the 2004-05 estimate for the years between 2005-06 and 2007-08.

This Australian ‘total hours worked’ figure has then been allocated for each industry in each capital city based on its share of total hours worked from the Labour Force, Australia, Detailed, Quarterly (cat. no. 6291.0.55.003).

2 GDP (Gross Domestic Product) refers to Australia, GSP (Gross State Product) refers to a State, while GCP (Gross City Product) refers to a city. But for simplicity’s sake in this paper all different measures are referred to as GDP.
There are several advantages of using this measure of labour productivity. It is built on the National Accounts framework. This allows the agglomeration benefits to be viewed in the context of the wider economy. This includes the Australian, State and City economies. The National Accounts also provides a clear methodology for measuring economic activity and labour productivity. Direct comparisons of the benefits of agglomeration can be made between and within Australian cities.

It should be noted that, in conducting this analysis, industries outside the Australian Bureau of Statistics Market Sector are included. The four non-Market industries are Property & Business Services, Government Administration & Defence, Education and Personal & Other Services. ABS excludes these industries from the Market Sector owing to the difficulty of estimating volume measures of output for those industries. However given that this analysis is a single point in time this should not produce any unforeseen consequences. Analysis of the productivity of non-Market Sector industries across time, however, would require more detailed analysis of this issue.

As shown in Table 1, the larger cities of Melbourne and Sydney have higher labour productivity than the smaller cities. Table 2 provides the population and GDP for each city. The population is the estimated resident population which relates to the 30th of June of each year while the GDP and labour productivity relates to financial year ending on the 30th of June.

Table 1 provides the first clear indication that the size of the economy of a city can provide improved outcomes for labour productivity. The industry mix within each city would also have an influence on the outcome. That is, more productive industries may tend to locate in particular cities.

Table 1. Major capital cities labour productivity (dollar of gross value added per hour worked)

<table>
<thead>
<tr>
<th>Year</th>
<th>Sydney</th>
<th>Melbourne</th>
<th>Brisbane</th>
<th>Adelaide</th>
<th>Perth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>46.5</td>
<td>41.6</td>
<td>41.0</td>
<td>41.6</td>
<td>45.9</td>
</tr>
<tr>
<td>2003</td>
<td>50.9</td>
<td>46.8</td>
<td>45.0</td>
<td>43.0</td>
<td>47.8</td>
</tr>
<tr>
<td>2008</td>
<td>53.0</td>
<td>49.4</td>
<td>45.4</td>
<td>45.5</td>
<td>48.1</td>
</tr>
</tbody>
</table>

Table 2. Major capital cities economy\(^2\)($ billion) and population (million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Sydney GDP</th>
<th>Sydney Pop</th>
<th>Melbourne GDP</th>
<th>Melbourne Pop</th>
<th>Brisbane GDP</th>
<th>Brisbane Pop</th>
<th>Adelaide GDP</th>
<th>Adelaide Pop</th>
<th>Perth GDP</th>
<th>Perth Pop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>177.9</td>
<td>3.9</td>
<td>135.5</td>
<td>3.4</td>
<td>61.7</td>
<td>1.6</td>
<td>39.8</td>
<td>1.1</td>
<td>58.5</td>
<td>1.3</td>
</tr>
<tr>
<td>2003</td>
<td>209.9</td>
<td>4.2</td>
<td>160.5</td>
<td>3.6</td>
<td>75.7</td>
<td>1.7</td>
<td>44.3</td>
<td>1.1</td>
<td>64.4</td>
<td>1.4</td>
</tr>
<tr>
<td>2008</td>
<td>231.2</td>
<td>4.4</td>
<td>187.5</td>
<td>3.9</td>
<td>90.1</td>
<td>1.9</td>
<td>50.7</td>
<td>1.2</td>
<td>75.7</td>
<td>1.6</td>
</tr>
</tbody>
</table>

5 Melbourne’s labour productivity

The lack of Australian data to provide small area information on the characteristics of firms has meant that a synthetic dataset examining the issue has had to be created. Rather than attempting to focus on individual firms or workers the focus has been on creating robust estimates for defined geographical areas (Statistical Local Areas). For Melbourne,

\(^2\) Chain Volume Measure reference year 2006-07.
the labour productivity estimates have been disaggregated by industry for each Statistical Local Area (SLA), using the principles set out in the Australian System of National Accounts (ABS, 2000).

For capital intensive industries (Manufacturing, Wholesale and Transport & Storage), GVA per employee using the two digit ANZIC level sourced from Australian Industry, 2007-08 (cat. no. 8155.0) has been combined with detailed employment estimates for each SLA to calculate the GVA share of each SLA. This share has then been used to allocate the Melbourne total industry GVA to each SLA.

For labour intensive industries (all other industries except for Electricity Gas & Water and Communications which have been excluded from the analysis for technical reasons explained in the next section) a quality adjusted labour input method was used. That is, average industry wage rates were estimated for each SLA and combined with total hours worked for each industry for each SLA. This provides a proxy for total factor income for the SLA. The SLA share was then used to allocate the Melbourne total industry GVA to each SLA. Table 3 presents the labour productivity and EJD for a selection of Melbourne SLAs.

<table>
<thead>
<tr>
<th>Rank</th>
<th>SLA</th>
<th>Labour Productivity</th>
<th>Effective Job Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Melbourne - Inner</td>
<td>4.8</td>
<td>11.7</td>
</tr>
<tr>
<td>2</td>
<td>Melbourne - Southbank &amp; Docklands</td>
<td>4.7</td>
<td>11.7</td>
</tr>
<tr>
<td>3</td>
<td>Gr. Dandenong Bal</td>
<td>4.6</td>
<td>10.8</td>
</tr>
<tr>
<td>4</td>
<td>Port Phillip - West</td>
<td>4.5</td>
<td>11.4</td>
</tr>
<tr>
<td>5</td>
<td>Boroondara - Hawthorn</td>
<td>4.5</td>
<td>11.1</td>
</tr>
<tr>
<td>10</td>
<td>Monash - Waverley West</td>
<td>4.4</td>
<td>11.1</td>
</tr>
<tr>
<td>15</td>
<td>Monash - South-West</td>
<td>4.3</td>
<td>11.1</td>
</tr>
<tr>
<td>20</td>
<td>Melton - East</td>
<td>4.3</td>
<td>10.3</td>
</tr>
<tr>
<td>25</td>
<td>Whitehorse - Nunawading West</td>
<td>4.3</td>
<td>10.9</td>
</tr>
<tr>
<td>30</td>
<td>Hume - Broadmeadows</td>
<td>4.2</td>
<td>10.7</td>
</tr>
<tr>
<td>35</td>
<td>Banyule - Heidelberg</td>
<td>4.2</td>
<td>10.8</td>
</tr>
<tr>
<td>40</td>
<td>Whitehorse - Nunawading East</td>
<td>4.2</td>
<td>10.9</td>
</tr>
<tr>
<td>45</td>
<td>Whittlesea - South-West</td>
<td>4.2</td>
<td>10.4</td>
</tr>
<tr>
<td>50</td>
<td>Nilimbik - South</td>
<td>4.2</td>
<td>10.2</td>
</tr>
<tr>
<td>55</td>
<td>Moreland - Brunswick</td>
<td>4.1</td>
<td>11.0</td>
</tr>
<tr>
<td>60</td>
<td>Banyule - North</td>
<td>4.1</td>
<td>10.4</td>
</tr>
<tr>
<td>65</td>
<td>Wyndham - West</td>
<td>4.1</td>
<td>10.1</td>
</tr>
<tr>
<td>70</td>
<td>Mornington Psula - South</td>
<td>4.0</td>
<td>9.8</td>
</tr>
<tr>
<td>75</td>
<td>Wyndham - South</td>
<td>3.7</td>
<td>10.3</td>
</tr>
</tbody>
</table>

The analysis revealed that the highest labour productivity SLAs are clustered around central Melbourne, the industrial zones in the south east, and the airport in the north. Much of the variation can be attributed to industry mix within each SLA. That is, the
higher labour productivity service based industries tended to cluster around the CBD, which in itself is not clear proof of the impact of agglomeration.

To observe agglomeration, then, we should be able to observe variation in labour productivity across the city for a particular industry. Table 4 presents such variation for the Property & Business Services industry. That is, a worker located in the central area of Melbourne (where there is high agglomeration) has a higher labour productivity than a worker in the same industry located on the fringe of Melbourne (where there is low agglomeration).

Table 4. Selected SLA property & business services log labour productivity & EJD

<table>
<thead>
<tr>
<th>Rank</th>
<th>SLA</th>
<th>Property and Business Services</th>
<th>Effective Job Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Melbourne - Southbank &amp; Docklands</td>
<td>4.8</td>
<td>11.7</td>
</tr>
<tr>
<td>2</td>
<td>Port Phillip - West</td>
<td>4.8</td>
<td>11.4</td>
</tr>
<tr>
<td>3</td>
<td>Melbourne - Inner</td>
<td>4.8</td>
<td>11.7</td>
</tr>
<tr>
<td>4</td>
<td>Bayside - Brighton</td>
<td>4.8</td>
<td>10.8</td>
</tr>
<tr>
<td>5</td>
<td>Hobsons Bay - Altona</td>
<td>4.7</td>
<td>10.5</td>
</tr>
<tr>
<td>10</td>
<td>Moonee Valley - Essendon</td>
<td>4.7</td>
<td>11.0</td>
</tr>
<tr>
<td>15</td>
<td>Monash - South-West</td>
<td>4.7</td>
<td>11.1</td>
</tr>
<tr>
<td>20</td>
<td>Boroondara - Camberwell South</td>
<td>4.6</td>
<td>11.1</td>
</tr>
<tr>
<td>25</td>
<td>Glen Eira - Caulfield</td>
<td>4.6</td>
<td>11.1</td>
</tr>
<tr>
<td>30</td>
<td>Gr. Dandenong Bal</td>
<td>4.6</td>
<td>10.8</td>
</tr>
<tr>
<td>35</td>
<td>Moreland - Coburg</td>
<td>4.5</td>
<td>10.8</td>
</tr>
<tr>
<td>40</td>
<td>Maroondah - Ringwood</td>
<td>4.5</td>
<td>10.8</td>
</tr>
<tr>
<td>45</td>
<td>Maribyrnong</td>
<td>4.5</td>
<td>11.0</td>
</tr>
<tr>
<td>50</td>
<td>Gr. Dandenong - Dandenong</td>
<td>4.5</td>
<td>10.9</td>
</tr>
<tr>
<td>55</td>
<td>Frankston - West</td>
<td>4.4</td>
<td>10.5</td>
</tr>
<tr>
<td>60</td>
<td>Hume - Sunbury</td>
<td>4.4</td>
<td>10.0</td>
</tr>
<tr>
<td>65</td>
<td>Knox - North-East</td>
<td>4.4</td>
<td>10.6</td>
</tr>
<tr>
<td>70</td>
<td>Cardinia - Pakenham</td>
<td>4.3</td>
<td>10.0</td>
</tr>
<tr>
<td>75</td>
<td>Melton Bal</td>
<td>4.3</td>
<td>10.0</td>
</tr>
</tbody>
</table>

6 Regression analysis

The degree to which agglomeration affects labour productivity for each industry is now estimated using a translog regression where the natural log of labour productivity levels for the respective industry is regressed against the natural log of effective job density by SLA. The relationship has been estimated as follows:

\[
\ln(\hat{L}_i) = \beta_0 + \beta_1 \ln(D_j) + \varepsilon_i
\]

Where: \(\hat{L}_i\) is the Industry Labour Productivity for SLA \(i\); \(D_j\) is the Effective Job Density for SLA \(j\); and \(\varepsilon_i\) is a zero mean random disturbance.

Due to their small size within the metropolitan economy, both the Agricultural and Mining industries have been excluded from the analysis. Communications and Electricity, Gas & Water industries have also been excluded due to the inability to effectively
measure labour productivity at an SLA level. In both of these industries the vast bulk of GVA is attributed to the capital infrastructure covering the city. The labour productivity measure would allocate the GVA to the clusters of workers in these industries, which is clearly incorrect.

Figure 1 shows the relationship between the labour productivity levels of Property & Business Services and effective job density. For all industries, SLAs which have less than 100 workers and / or contribute less than 0.25% of GDP have been excluded from the analysis, as the data is considered to be potentially unreliable.

![Figure 1](image-url)  
**Figure 1.** Property & business services labour productivity versus effective job density, 2007-08

The results of this regression analysis is summarised in Table. As would be expected, the strength and degree of this relationship varies across industries, with some industries linked closely with agglomeration while others are predominantly linked to other factors. Using the translog regression formulation allows us to look at the effect of doubling EJD on labour productivity for each industry.

The impact of doubling effective job density is referred to as the elasticity of the industry and allows the coefficients to be easily interpreted. Table 5 presents the elasticity for each industry. The weighted total for all industries included in the analysis is 0.07. That is, a doubling of the EJD will result in a 7% increase in labour productivity in an area. This is within the range of results from international studies of agglomeration (see Table 1 of Graham (2006) for a summary of results of previous studies) and Trubka (2009) who estimated 0.07 for Melbourne. It is worthwhile to note that Trubka used a significantly different methodology to the one employed in this paper but arrived at a similar outcome for Melbourne.
Table 5. Summary regression results

<table>
<thead>
<tr>
<th>Industry</th>
<th>Elasticiies</th>
<th>Intercept ($\beta_0$)</th>
<th>Slope ($\beta_1$)</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>-0.04</td>
<td>4.87</td>
<td>-0.061</td>
<td>0.062</td>
</tr>
<tr>
<td>Construction</td>
<td>0.11</td>
<td>2.52</td>
<td>0.148</td>
<td>0.00</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>0.01</td>
<td>4.52</td>
<td>0.008</td>
<td>0.718</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>0.08</td>
<td>2.42</td>
<td>0.111</td>
<td>0.00</td>
</tr>
<tr>
<td>Accom, Cafes &amp; Rest.</td>
<td>0.09</td>
<td>2.07</td>
<td>0.122</td>
<td>0.011</td>
</tr>
<tr>
<td>Transport &amp; Storage</td>
<td>-0.09</td>
<td>5.91</td>
<td>-0.138</td>
<td>0.00</td>
</tr>
<tr>
<td>Finance &amp; Insurance</td>
<td>0.13</td>
<td>3.53</td>
<td>0.170</td>
<td>0.00</td>
</tr>
<tr>
<td>Property &amp; Business Serv's</td>
<td>0.18</td>
<td>2.02</td>
<td>0.236</td>
<td>0.00</td>
</tr>
<tr>
<td>Govt Admin &amp; Def</td>
<td>0.01</td>
<td>3.74</td>
<td>0.017</td>
<td>0.834</td>
</tr>
<tr>
<td>Education</td>
<td>0.05</td>
<td>3.44</td>
<td>0.065</td>
<td>0.00</td>
</tr>
<tr>
<td>Health &amp; Community Serv's</td>
<td>0.10</td>
<td>2.56</td>
<td>0.137</td>
<td>0.00</td>
</tr>
<tr>
<td>Cultural &amp; Recreational Serv's</td>
<td>0.29</td>
<td>-0.06</td>
<td>0.367</td>
<td>0.00</td>
</tr>
<tr>
<td>Personal &amp; Other Serv's</td>
<td>0.07</td>
<td>2.37</td>
<td>0.092</td>
<td>0.121</td>
</tr>
<tr>
<td>Total</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The differing industry results highlight the specific preferences of each industry when it comes to agglomeration. In choosing a location, firms in the Manufacturing and Wholesale Trade industries do not appear to be influenced by agglomeration.

Given the diversity within the Manufacturing industry, there is likely to be a great deal of variation in the relationship between the type of manufacturing and agglomeration. For example, medical surgical equipment manufacturing may gain a greater benefit from agglomeration than sheet metal manufacturing.

Firms in these industries are more attracted by the availability of large (relatively inexpensive) sites to locate their operations. They gain relatively little from agglomeration and hence, unlike firms in other industries, are not prepared to pay a premium for these locations.

The historical migration of manufacturing and wholesale firms from the City of Melbourne, first to areas like Fitzroy, then to areas like Dandenong and now into newer areas such as Wyndham, provides an example of the negative impact of increasing agglomeration over time. That is, as the agglomeration in an area increases over time, rents / land prices increase as firms which gain a benefit from agglomeration compete for sites within the area. The increased rent / land prices encourage manufacturing firms to move to less expensive locations.

For much the same reason, firms in Transport & Storage (the only industry with a statistically significant negative elasticity) would have their labour productivity adversely affected by increasing EJD.

The capital intensive nature of these industries would also anchor firms to particular sites for long periods of time, even in the face of increasing agglomeration.

Finance & Insurance, Property & Business Services, Education and Health & Community Services are industries in which firms gain a boost in labour productivity from improved agglomeration. Economies of scope and scale, access to a deep and diverse pool of skilled labour and technological / knowledge transfer are most likely the benefits which agglomeration offers firms in these industries.

It should be noted that for Education, it is likely that tertiary level educational institutions would gain the most from agglomeration. Schools would gain less from agglomeration as they are linked closely to their population catchments and lack the ability to concentrate in particular locations.

The Personal & Other Services industry (which includes Video Hire, Dry Cleaners, Hairdressers and Police) is one which is also closely linked to the distribution of
population and shows little increase in labour productivity from increasing agglomeration.

The relationship between agglomeration and labour productivity for Cultural & Recreational Services reflects the clustering of these types of firms around existing employment centres which provide a broader range of uses. This environment provides a range of customers for the industry. For example, the range of theatres in the Melbourne CBD and the Crown Casino complex on Southbank enjoy economies of scale from locating close to such a large pool of potential customers (in the form of employees, residents and tourists). The Retail Trade industry exhibits a similar outcome.

A similar result could have been expected for the Accommodation, Cafes & Restaurants industry. However, it appears as if this industry is linked to a location’s ‘attraction’ or amenity, rather than agglomeration itself. That is, this industry is most productive where it is connected to highly attractive locations such as the beach (St Kilda, Mornington Peninsula, Williamstown), or the wine region (Yarra Ranges), or Arts and Culture (CBD and the Inner City). Therefore, in some cases where the ‘attraction’ is linked to agglomeration (such as arts and culture) the industry of Accommodation, Cafes & Restaurants will be aligned with highly agglomerated areas.

Employment in Government Administration & Defence is also closely linked to the spatial distribution of population and lacks the ability to migrate to particular locations. However, the highest labour productivity SLA for Government Administration & Defence is located in the CBD of Melbourne. This reflects the concentration of State Government employment in and around the CBD.

The result for Construction reflects the increased demand for multilevel buildings which occurs in areas of high agglomeration. In areas with low agglomeration, single level buildings are more prominent. Single level buildings are far more inefficient in their construction than larger buildings. For example, the construction of ten 500 square metre buildings would require the preparation of 10 sets of foundations and roofs. Utilities would have to be linked to all 10 buildings. Meanwhile, a single 50,000 square metre building, although more complex to construct, provides far more opportunities for economies of scale. The need to provide new infrastructure (roads, sewage, water telecommunications etc) in greenfield areas with low levels of agglomeration may also contribute to the result for this industry.

7 Conclusion and policy implications

When compared to the international evidence base, information about the relationship between agglomeration and labour productivity for Australia is severely limited. The research presented in this paper should be seen as the first phase in an on-going research program. A considerable number of the methodological and data issues faced when attempting to understand the agglomeration and labour productivity relationship have been solved, but further work is still required to incorporate refinements into the methodology. There are a number of areas where the method can be extended, including:

- The introduction of capital stock estimates, thus allowing Multifactor Productivity to be used as the dependant variable;
- SLA weightings to reflect the scale of economic activity within each SLA;
- Calculation of the impact of agglomeration over time;
- Inclusion of additional explanatory variables;
- Regression analysis on a panel dataset for all Australian cities; and
Conversion of the ANZSIC93 based industry estimates to ANZSIC06.

The results do, however, provide a clear challenge for policy makers. As outlined in Section 2 there are two distinct effects at work; size of the city and the spatial organisation of the city. Understanding that larger cities (in terms of population and/or employment) boost labour productivity does not provide any clear policy lever for the government. An extra half a million people in Melbourne would boost labour productivity, however, providing employment and housing to attract such a population increase over the medium term would present its own challenges.

A similar boost to labour productivity can be achieved by ensuring that agglomeration is maximised within the city’s existing structure. This can be affected by providing high density employment space building on existing employment hubs (outside the CBD) which already experience high agglomeration.

Policy can also assist with agglomeration maximisation by curbing the oversupply of employment land in the middle and outer ring suburbs. Ensuring a generous supply of employment lands in the right location may appear to be an appropriate policy setting, on the grounds that providing a supply of cheap land will foster employment growth in new firms which need sites. However, what tends to happen in reality is that low density buildings dominate these areas as the price of land is too cheap. This results in employment being spread out over larger distances. Having more appropriate land supply would encourage development to build upwards, as is the case in CBD environments, rather than continuing to sprawl outwards. While higher density development has additional costs, the labour productivity boost gained by the increased agglomeration will help firms pay for it. This would apply to both existing and new firms.

Ensuring that the transport network can provide quick and effective access to different employment hubs will also help to maximise agglomeration. With the increasing size of our cities, the private motor vehicle, which long provided the key transport mode for our economies, is becoming less viable due to congestion and fuel costs. Investment in high capacity public transport (light or heavy rail or metro networks) has to return as a priority for governments of all levels.

However, this requires interventions in land markets; interventions which have at times been out of favour due to local community opposition to some proposed developments. Occupied land around new station sites has to be acquired by government and developed appropriately. High density dwellings and employment space also has to be provided within these station precincts to help maximise the infrastructure investment.

Increasing agglomeration will provide a labour productivity boost for the overall economy. However, it could place pressure on an already stressed Manufacturing industry. Manufacturing gains relatively little from agglomeration, while firms in other industries are able to pay a premium for locations and staff as the agglomeration increases in a particular area. This will reinforce Manufacturing employment’s shift to regional or offshore areas.

As the skills of Manufacturing workers are relatively difficult to transition into other industries, a period of structural adjustment would be required for particular areas of cities where agglomeration is displacing manufacturing. This would not be a new problem faced by policy makers, as the decline in manufacturing employment has been well established over the past twenty five years, but a problem which has to be acknowledged as an outcome of increased agglomeration within a city.
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Closing knowledge gaps on the urban fringe of Australian capital cities: an investment worth making

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Structured Abstract

Purpose – The purpose of the paper is to demonstrate that Australia’s capital cities follow a similar development profile; knowledge based jobs, and indeed a large portion of all jobs, are concentrated in the inner urban areas. As a result, the accessibility of jobs and services, particularly knowledge intensive jobs and services, is poor in the outer urban areas. This paper goes on to argue that by creating a more accessible and equitable distribution of jobs and services, significant productivity benefits would be conferred across Australian cities, primarily through agglomeration economies, human capital enhancements and transport based savings.

Design/methodology/approach – Socio-economic statistics are used to contrast the development patterns of Australian capital cities. Case study analysis is subsequently used in Campbelltown, Sydney to isolate the types and broad costs of interventions needed to substantially close the gaps in jobs/service accessibility. The benefits of this closure are then speculatively assessed in a cost benefit framework, before being scaled nationally to provide a broader impetus for government action.

Originality/value – This methodology puts in evidence the significant disadvantages facing Australia capital city growth area residents. It also provides a scoping of the likely benefits of addressing these disadvantages, highlighting that while the costs will be significant, net benefits are achieved as is a significant and permanent boost to GDP. Underpinning these benefits will be a better engagement of growth area residents in economic activity, including heightened levels of workforce productivity and transport efficiency.

Practical implications – The outcomes of the application can be used by all tiers of Australian governments to better understand and manage the equitable development of Australian cities. Interventions for improving the distribution and accessibility of jobs and services are discussed, including improved government service delivery on the urban fringe, promoting vibrant town centres and improving transport links across the metropolis.

Keywords – urban economics, accessibility, disadvantage, productivity.

Paper type – Practical Paper
1 Introduction

Australian cities are experiencing a sustained period of rapid urban growth, with significant growth earmarked for the urban fringe. This growth is predicted to remain strong for the next 25 years or more. The councils located on the urban fringe face the challenge of building socially vibrant, economically viable and environmentally sustainable communities; a difficult task indeed given their limited funding for delivering required infrastructure and services.

SGS Economics & Planning (SGS) was commissioned by the National Growth Areas Alliance (NGAA), an alliance of 25 of Australia’s fastest growing municipalities accommodating some 3.2 million people, to:

- Profile the traits of Australian capital city growth areas1;
- Identify the interventions required to ensure that growth areas develop as sustainable and balanced communities;
- Measure the net triple bottom line benefits and economic effects of making such interventions in case study growth areas; and
- To reconfigure the findings of the above at the national level by appropriately scaling the case study results to reflect national growth areas circumstances.

In essence, this paper reports those findings and elaborates on the relevance of the work to knowledge based economic and urban development.

2 Comparative socio-economic profile

While the outer urban growth areas play an integral role in accommodating growth in metropolitan regions across the nation, they do not fare well across a variety of indicators. As can be seen in Table 1, when compared to their host metropolitan areas as a whole, the outer urban growth areas record poor performances with respect to:

- The mix and depth of resident skills;
- Local employment opportunities and employment rates;
- Access to education, health and community services, as well as cultural and recreational services;
- Housing diversity; and
- Housing stress.

Earlier work by SGS (2007) has already established that growth areas residents are generally younger, are employed in relatively low value added population servicing industries (e.g. retail, construction), earn lower incomes and are highly dependent on car transport.

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1 Capital city outer urban growth areas include: NSW – Blacktown, Camden, Campbelltown, Liverpool, The Hills and Penrith; VIC- Casey, Cardinia, Wyndham, Hume and Whittlesea; QLD – Moreton Bay, Logan; WA – Wanneroo, Swan, Cockburn, Mandurah, Serpentine-Jarradale, Kwinana, Armadale, Rockingham, and Gosnells; NT – Palmerston; and SA – Mount Barker.
Table 1. Capital city – growth area comparison

<table>
<thead>
<tr>
<th></th>
<th>Capital city growth areas</th>
<th>Capital cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual pop growth (2001-08)</td>
<td>2.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Overseas born migrant population ratio</td>
<td>27%</td>
<td>29%</td>
</tr>
<tr>
<td>Jobs to population ratio</td>
<td>27%</td>
<td>43%</td>
</tr>
<tr>
<td>Unemployment rate (Dec 2008)</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>White collar working residents*</td>
<td>41%</td>
<td>51%</td>
</tr>
<tr>
<td>Education, health &amp; community, cultural &amp; recreation service index**</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Persons aged 15 years+ with Yr 12 education</td>
<td>39%</td>
<td>48%</td>
</tr>
<tr>
<td>Persons with bachelors degree or higher</td>
<td>10%</td>
<td>19%</td>
</tr>
<tr>
<td>Detached dwellings</td>
<td>82%</td>
<td>65%</td>
</tr>
<tr>
<td>Housing stress***</td>
<td>19%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Source: Derived from ABS Census and Journey to Work.

Notes:
* Persons employed in professional, managerial, clerical or administrative roles.
** Ratio of jobs in these sectors to residents.
*** Households in the 10th and 40th deciles of income distribution paying more than 30% of income on rent.

From a knowledge economy perspective, this translates to an industry and employment profile that is far from knowledge intense, as well as a resident base that is somewhat disengaged from the knowledge economy.

Indeed when access to jobs in Australian capital cities is mapped from a travel time perspective (refer Figure 1 and 2), the disadvantage facing capital city growth area residents is stark. The figures show the proportion of jobs that can be accessed by residents via a 30 minute travel time using private cars and public transport respectively. The darker shadings, which indicate high levels of jobs accessibility, are unsurprisingly in the inner urban areas, signifying the far superior access these inner residents enjoy.

Additional mapping undertaken by SGS highlights that access to jobs in relatively knowledge intense industries (e.g. finance & insurance) is even more poorly spread.

From a service delivery perspective, the relative access to employment in industries such as health and education can be used as a broad proxy for service accessibility, acknowledging that financial affordability and other factors are also determinants of true accessibility. Again the results mapped in Figures 1 and 2, indicate that access to important social services is compromised in growth areas.

This conclusion is supported by sector specific research such as Marston et al (2003), which highlighted that growth areas in Melbourne recorded:

- Higher rates of low birth weights amongst infants;
- A lower likelihood of infants being breast fed;
Figure 1. Jobs within 30 minute drive time

Source: ABS Journey to Work Data, Travel Time Data sourced from respective State Governments
Figure 2. Jobs within 30 minute public transport trip

Source: ABS Journey to Work Data, Travel Time Data sourced from respective State Governments

- Higher rates of post natal depression; and
- Higher rates of child protection notifications, substantiations and care and protection orders.

Given these results, it is not an unjust leap of faith to think that growth area residents are not being equipped as best they could to engage with the knowledge economy.

This paper now explores how the aforementioned gaps preventing growth area residents engaging with the knowledge economy can be closed, at least partially, and subsequently scopes the broad costs and benefits of this. To do this, the case study of Blacktown in Sydney’s southwest is developed, with some speculative modelling subsequently presented.
3 Campbelltown case study

3.1 Case study approach

The case study draws from data analysis similar to that presented above, particularly data contrasting the performance of Campbelltown against the Sydney metropolitan area. It also draws from other benchmarking and consultative exercises, including:

- Infrastructure facilities provisioning levels articulated in accepted social infrastructure benchmarks\(^2\);
- ABS Journey to Work employment statistics, ABS industry cost structures reflective of participants in infrastructure service provision, and other data sets; and
- Rounds of consultation with local and state government representatives.

The basic aim of the case study was to identify the nature and level of interventions required to (reasonably) close the gap in growth area communities with respect to:

- Access to jobs;
- Public transport servicing; and
- Social infrastructure servicing, particularly health, education, recreation and community services.\(^3\)\(^4\)

To do this we have compared the scale of intervention required in Campbelltown to close the existing servicing gaps and to maintain this improved provisioning rate as constituent populations grow in future. The interventions include both ‘capital’, e.g. infrastructure provision, as well as ‘recurrent services’ provision, i.e. ongoing services to the community enabled by these infrastructure facilities but which require ongoing funding commitment. In essence, the interventions required are the unfunded investments that are required over and above the Business As Usual (BAU) scenario, which have been defined to include ‘existing’ facilities and services, as well as ‘committed’ facilities (Refer 3).

![Figure 3. Case study process](image)


\(^3\) Interventions to address or bolster housing diversity, community diversity and community integration have not been included.

\(^4\) It has been assumed that, in line with best practice urban planning, these jobs and services, and the flow on jobs/ services that they induce are directed into strategic centres within the growth areas. Urban form benefits are subsequently triggered as the nodal development that occurs will enable more diverse (e.g. denser) housing forms in and around these strategic centres.
The final stage of the case study analysis was to match the nature and level of intervention with improved outcomes in the case study community. While this is not a precise process, the figures adopted are posited as reasonable targets given the context of Campbelltown.

3.2 Current state of play

Campbelltown City Council is located in Sydney’s South West and accommodates almost 150,000 residents. Campbelltown City is designated as a Major Centre in the Draft South West Subregional Strategy, which covers the region encompassing Camden, Campbelltown, Liverpool and Wollondilly. The nearest Regional Centre designated in the Strategy is Liverpool.

According to the South West Subregional Strategy, the NSW Government is planning for around 53,500 dwellings in the South West of which around 24,650 are expected to be located in Campbelltown as infill development. In addition, it is expected that the South West growth centre, which sits predominantly across Camden and Liverpool, will expand by a further 100,000 dwellings.

Currently Campbelltown is underserviced in terms of education, health and community services, and in terms of employment opportunities for its residents. A significant proportion of workers leave the municipality to work, most of them being car dependent. When compared to the metropolitan area, Campbelltown has a higher unemployment rate but falls short in terms of resident and housing diversity; white collar jobs; school completion and tertiary qualification rates; and income levels (Table 2).

<table>
<thead>
<tr>
<th>Table 2. Campbelltown – greater Sydney comparison</th>
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<tbody>
<tr>
<td>Campbelltown</td>
</tr>
<tr>
<td>Overseas born migrant population ratio</td>
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<td>Median individual weekly income</td>
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<td>Car based travel to work</td>
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</tbody>
</table>

Source: Derived from ABS Census and Journey to Work.
Notes:
* Persons employed in professional, managerial, clerical or administrative roles.
** Ratio of jobs in these sectors to residents.
*** Households in the 10th and 40th deciles of income distribution paying more than 30% of income on rent.
3.3 Identified interventions & costs

3.3.1 Capital costs

Discussions with representatives from the City and NSW Government identified the following infrastructure investments in Campbelltown, which have been included in the BAU scenario (Table 3).

Campbelltown is host to considerable public housing which has resulted in concentrated pockets of social disadvantage. This generates particular infrastructure and servicing challenges. As an example buses will reportedly not travel in some public housing districts due to concerns about safety.

Pressures on infrastructure from historic land releases in the municipality have also been identified as an issue. Whilst population growth has continued, it has done so without the matching commitment for supporting infrastructure.

The previous ‘Community Facilities Program’ has been superseded predominantly by Section 94 plans and developer agreements. Consequently, Campbelltown City Council does not have an up to date, clear guiding document for facilities planning. However, the Council is currently in the process of completing a CBD structure plan, as well as an Open Space and Community Facilities review, with the aim of identifying future needs for infrastructure and open space.

Source: City of Campbelltown

As an up to date facilities plan with quantifiable identification of facilities is currently not available, SGS has conducted an analysis of future needs based on widely accepted social infrastructure planning benchmarks. That is, the Transport Data Centre population forecasts have been applied to yield demand for different facility types. The analysis reveals that by 2031 numerous facilities will be required.

Table 3. Campbelltown – BAU infrastructure investment

<table>
<thead>
<tr>
<th>Funding source</th>
<th>Planned &amp; Committed Infrastructure Investment</th>
</tr>
</thead>
</table>
| Local government | • Raby Sports Complex upgrade  
|                  | • Blair Athol Community Centre  
|                  | • Asset Management Program.  
|                  | • Intersection upgrades.  
|                  | • Pedestrian Overbridge at Leumeah.  |
| State/ federal government | • Stage 3 redevelopment of the Campbelltown Sports Stadium  
|                          | • South West Rail Link (partially committed)  
|                          | • Rail upgrades = (increase capacity at certain stations).  
|                          | • Commuter Car Parking Program  
|                          | • Bus services (infrastructure plan for the SW Growth Centre  
|                          | • South Sydney Freight Line  
|                          | • Two new community centres (Oran Park and Leppington).  
|                          | • Minto Public Housing Renewal  
|                          | • Projects funded by Commonwealth's Community Infrastructure Program.  |
### Table 4. Campbelltown – intervention investments

<table>
<thead>
<tr>
<th>Funding source</th>
<th>Intervention Investments (over and above BAU)</th>
</tr>
</thead>
</table>
| Local government | • Open Space - neighbourhood active, passive and higher order active  
                     • Community/ civic centres - neighbourhood, local, district and regional  
                     • Central and branch libraries  
                     • Youth centre - local & district  
                     • Exhibition / convention centre  
                     • Performing arts centre  
                     • Museum  
                     • Art Gallery |
| State government | • District TAFE  
                     • Community health centre, care hub and care precinct  
                     • Aged care service/respite centre – local & district  
                     • SW Rail completion |

Sources: City of Campbelltown and SGS Economics and Planning.

Table 4 brings the benchmark based infrastructure needs together with those anecdotally expressed needs from Council. It shows that significant *capital spending* (>840 million) is required to cope with population growth and current under-provisioning between now and 2031.

#### 3.3.2 Recurrent costs

In addition to capital investment in infrastructure facilities, the *recurrent services* accommodated by these facilities need to be funded. Estimating future needs for recurrent servicing is an inherently complex process, as current services spending is not reported on a local area basis by state and federal agencies. There are also complex cross-funding agreements which further complicate the issue.

In order to quantify recurrent service funding needs, SGS has assumed that the existing number of public sector jobs in the education and training, health care and social assistance, and arts and recreation services sectors in Campbelltown are a good starting point. SGS has subsequently:

- Applied sector specific average salaries and salaries to total cost ratios to convert public sector job estimates to total recurrent spending rates;
- Estimated the differential between the recurrent spending rates assessed at the metropolitan level and in Campbelltown;
- Assessed the additional recurrent funding required to close the gap for recurrent service provision, i.e. assuming the necessary facilities are in place to accommodate these services (refer Tables 3 & 4).

The process results in an average annual estimate of $77 million for recurrent services each and every year until 2031; a very large funding requirement indeed. As a result of the enormity of this task, the modelling was scaled back so that the gap between Sydney’s and Campbelltown’s capital and recurrent funding requirements was only ‘half’ closed.

#### 3.4 Intervention outcomes and benefits

If the intervention scoped in the above section is delivered, it is expected that Campbelltown would enjoy the following outcomes:

- Education, health, workforce participation and other community enhancements;
• Local job opportunities, both directly and indirectly as a result of improved social service provision;
• Centralisation of jobs within Campbelltown, as development is channelled into strategic centres well serviced by public transport; and
• Linkages with a wider catchment of jobs and services, i.e. outside the municipality, as access to metropolitan public transit systems is afforded.

These outcomes overlap significantly and work collectively to better prepare and enable Campbelltown’s residents and workers to engage in the knowledge economy. As a result, SGS has quantified them under the discrete benefit headings of:

- **Regional productivity enhancements** – the heightened productivity of the regional workforce as agglomeration economics accrue;
- **Improved social choice** – the community’s willingness to pay for an improved choice with respect to the employment and services on offer locally;
- **Travel savings** – the savings associated with fewer travel demands, some of which will be effectively serviced by public transport following investment; and
- **Deferred fringe development costs** – non-urban land and trunk infrastructure connection savings, as some of the development pressures are redirected to the strategic centres promoted in the growth areas (i.e. as infill development).

Other benefits that remain un-quantified include the increasing amenity afforded in Campbelltown and other social benefits that relate to improved health, education, etc. not included in the higher income levels of Campbelltown residents, i.e. associated with regional productivity enhancements.

### 3.4.1 Regional productivity enhancements

Regional economic productivity will be bolstered as Campbelltown residents are more likely:

- To participate in the workforce and to gain employment, as improved skills are afforded and the physical barriers to employment are reduced;
- To work in higher value adding (knowledge based) jobs, as education/skill levels are higher and as the agglomeration economies within the broader region take effect as physical and non-physical linkages are enhanced.

In terms of the agglomeration effects, there is clear evidence linking the ‘effective density’ (time based accessibility) of economic activity with labour productivity (SGS 2009). This has been demonstrated empirically to apply in Melbourne with the relationship varying across industry types. Figure 4 shows how each industry’s labour productivity in Melbourne improves as effective density doubles.

Overall, a doubling of effective density leads to a 7% improvement in productivity, with other labour intensive industries showing much stronger relationships. This is within the range of results estimated in international studies of agglomeration (refer Graham 2007) and therefore, can safely be applied in the Sydney/Campbelltown context.

A complementary perspective of agglomeration economies as identified in the economic literature is described as Matching Theory (aka Search Theory). That is, if there is a wide range of jobs on offer, a worker can search the available jobs and best match their skills to what’s on offer and, potentially, maximise their wage. They also have the opportunity to work in a number of different jobs and hence gain a range of experiences (which can be seen as on-the-job investment in their education), which will also translate into higher wages.
Again there has been an empirical study estimating these impacts in Melbourne (SGS 2009). The results generated suggest that a doubling of the effective density of economic activity (jobs) translates to between a 6% and 15% increase in worker incomes, with more highly skilled occupations benefiting most.

In this case study, it has been assumed that the interventions half close the gap between Campbelltown and Sydney salary levels, with worker incomes increasing by less than 6%.

3.4.2 Improved choice

Improving jobs provision, social service provision, housing diversity and transport connectivity in Campbelltown will provide residents with much improved choice. This choice, regardless of whether residents actually avail themselves of such options, is in itself viewed as a social benefit and can be measured by resident ‘willingness to pay’.

To estimate this willingness to pay, SGS has regressed the premium paid on dwellings in highly accessible locations. In essence, SGS (2008) has estimated that dwelling prices are bid up by $0.40 to $0.80 for each and every job (alternatively an available service) that is brought into a 30 minute travel time, i.e. for households in the bottom three quintiles of jobs accessibility. This household premium can be applied to Campbelltown’s households with high confidence levels given the significance of the relationship found and the depth of data used in estimation.

3.4.3 Travel savings

Campbelltown and other municipalities in the SW growth centre areas will undeniably accommodate a significant proportion of Sydney’s future urban growth. Improving public transport, concentrating urban development within key nodes, and locating more local jobs and will yield travel related benefits, as trips become shorter and quicker. A greater share of trips will also be made via public transport, with reduced car dependency.

Figure 4. Elasticities of labour productivity by industry (Melbourne)

Source: SGS Economics & Planning
Savings are likely to be generated under multiple banners5:
- External congestion costs;
- Travel time;
- Vehicle operating costs;
- Road accident costs; and
- Environmental externalities.

In generating estimates for Campbelltown under these banners, some key assumptions have been made including:
- Improved public transport share of journeys to work in line with similarly serviced areas;
- Shorter vehicle trips to access train stations; and
- A reduction in worker movement to the additional jobs created in the growth areas by the interventions.

3.4.4 **Deferred fringe development costs**

Given that Campbelltown City Council and other SW Growth Centre councils have a strong desire to concentrate jobs growth and, to a lesser extent, household growth in strategic nodes, rather than allowing unfettered urban expansion, there are likely to be significant urban development savings including:
- Network infrastructure extension savings; and
- Non-urban land savings.

In short, the greater intensity of urban form induced via the interventions will have real resource savings which can be valued using market prices. In Campbelltown, SGS has applied these prices to the level of infill residential development induced by the interventions.

3.5 **Net benefit assessment**

By invoking numerous assumptions surrounding the timing and quantum of the aforementioned costs and benefits, the implications for Campbelltown have been speculatively modelled and assessed using discounted cashflow analysis. Table 5 details the results over the period to 2031.

In short, costs are considerable but the benefits outweigh the costs by a factor of 2.5, providing a sound return on community capital. The strong net benefit exhibited is a reflection of both the significant levels of current disadvantage in the area, as well as its role in servicing communities beyond its municipal boundaries.

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5 Note that these externalities relate to the wider metropolitan area and not just the case study municipality. For example congestion benefits relates to metropolitan wide congestion reduction.
Table 5. Campbelltown intervention results (2009-31)

<table>
<thead>
<tr>
<th>Present value (6% real discount rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital costs</td>
</tr>
<tr>
<td>Recurrent costs</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
</tr>
<tr>
<td>Improved workforce participation</td>
</tr>
<tr>
<td>Heightened workforce productivity</td>
</tr>
<tr>
<td>Improved choice</td>
</tr>
<tr>
<td>Travel savings</td>
</tr>
<tr>
<td>Fringe development savings</td>
</tr>
<tr>
<td><strong>Total benefits</strong></td>
</tr>
<tr>
<td><strong>Net benefit</strong></td>
</tr>
<tr>
<td><strong>Benefit cost ratio</strong></td>
</tr>
<tr>
<td><strong>Internal rate of return</strong></td>
</tr>
</tbody>
</table>

Source: SGS Economics & Planning

4 National level results

If the Campbelltown case study results, combined with an additional case study undertaken by SGS in the City of Swan (WA) (not reported here) are scaled up to reflect the nation’s overall capital city growth area intervention requirements, the investment task is very significant indeed. In fact the overall scale of investment totals to $69 billion over the 2009 to 2031, or a present value (using a 6% real discount rate) of $50 billion.

Nonetheless, these significant costs are outweighed by benefits (with a PV of $78 billion), with the following paybacks estimated:

- Net present value of investment: $28 billion
- Benefit cost ratio (BCR): 1.56
- Internal rate of return (IRR): 18%
- GDP boost (average over long term): $18 billion p.a.
- GDP boost: 1% higher permanently
- National job creation (average over long term): 230,000 p.a.

5 Conclusions

At its broadest level, this paper has demonstrated that growth areas on the fringe of Australian capital cities are significantly disadvantaged, including the compromised ability of residents and workers to engage with the knowledge economy. It has also highlighted that integrated plans for better provisioning growth areas with jobs and services, and improving their linkages with other areas of the metropolis are rare. Moreover, while these plans are elusive, their resourcing requirements are likely to be hefty indeed.

Nonetheless, the speculative modelling presented in this paper, highlights that while the cost of better equipping the growth areas may well be significant, they are likely to be outweighed by benefits, particularly benefits associated with workforce and transport productivity enhancements.

Improved government service delivery on the urban fringe, promoting vibrant town centres and improving transport links across the metropolis therefore should be a priority
for investment given the likely knowledge economy development dividends and given the scale of future growth earmarked the fringe of Australian capital cities.

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Marston, G, Morgan, L, Murphy, J, 2003, Human service gaps at the Interface between urban and rural, RMIT Centre for Applied Social Research.
A ‘capabilities’ solution to the flight of human capital from Australian regions

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Structured Abstract

Purpose - The purpose of this paper is twofold. First, to identify spatial and temporal disparities in economic growth and human capital in the Australian context; and second, to discuss the relative contribution of two theoretical approaches to address these regional disparities in relation to the university as a vehicle for community engaged knowledge creation and distribution. The two approaches are Sen’s capability approach, and ‘enterprising human capital’ and ‘sp-ethics’ originated by the author and others in earlier work. The questions reviewed in this context have implications for local strategies for economic sustainability based on endogenous knowledge accessibility and social inclusiveness, the underemployment and flight of human capital from many non-metropolitan regions, and the community engaging role universities play in these regional human capital questions. The questions are addressed from three perspectives: the normative individual seeking to enhance their human capital or realise their capability; the region as a creative and innovative milieu or place for connectivity; and the learning institution (the university in particular) and its role for these individuals and spatial societies. It is argued that these actors and agencies need to be strategically connected, or engaged, with a focus that goes beyond a concern only for production and commodities and moves towards capability-building initiatives and matters of social inclusion. The latter takes into account individual cognition and the influence of attachment to place as an exogenous environmental determinant.

Design / Methodology / Approach - The research uses econometric analysis to identify the extent of spatial disparity in economic growth and to identify its significant drivers across 94 regions in the Australian context over an 18 year period. The disparity is manifest in such labour market/ demographic characteristics as an ageing population, skills ‘brain drain’, ‘just-in-time’ vocational training, rural-urban population drift, daily out-commuting, and ‘lifestyle’ underemployment which are now familiar labour market characteristics that affect many regions outside the major metropolitan conurbations. The paper examines two approaches as mechanisms for addressing the spatial disparity, viz: Sen’s capability approach, and ‘enterprising human capital’ and ‘sp-ethics’ both originated by the author and others. A regional example from Sweden is presented which demonstrates the role of the university in building human capability within an innovation system in a region undergoing revitalisation. The paper concludes both approaches have their role and both need to be enhanced through either having stronger connection to the
Introduction

The purpose of this paper is twofold. First, it will identify spatial and temporal disparities in economic growth and human capital in the Australian context; and second, it will discuss the relative contribution of two approaches in addressing these regional disparities in the context of the role of the university.

An unproductive ageing population, ‘brain drain’, industry ‘just-in-time’ vocational training, rural-urban population drift, daily out-commuting, and ‘lifestyle’ underemployment are familiar labour market features that characterise the economy and society of many regions outside the major metropolitan conurbation. When human capital is shown to be the most significant driver of economic growth for regions in Australia (Taylor and Plummer 2003, Garlick et al 2007, Taylor et al 2008), where does this leave local strategies for sustainable economic growth? What can be done about the apparent capability-free zone that underpins underemployment and the flight of human capital from many non-metropolitan regions? And finally, what role should publicly-funded universities play in regional human capital and capability enhancement matters?
These questions are addressed in this paper through three perspectives – the normative individual seeking optimal realisation of their capability; the region as a creative and supportive milieu; and the learning institution (the university in particular) as a knowledge vehicle for these individuals and societies. It is argued that these perspectives need to be strategically connected (engaged) with a focus that goes beyond path-dependent human capital generation with concern only for commodity and production, and moves towards capability-building initiatives that include social justice and all groups in the community. It raises concerns about what role the university might play in capability realisation in these human capital deprived regional communities when government policy funding does not support such initiatives and there is a culture of public university operation that resembles private corporate practice.

In previous work we introduced the concepts of ‘enterprising human capital’ (Garlick et al 2007, Taylor et al 2008) and ‘sp-ethics’ (Garlick and Palmer 2007, 2008) as engagement mechanisms for universities to address regional human capital concerns within a moral and ethical framework that involves the enterprising individual. In the light of Sen’s (1985, 2009) capability approach, are these mechanisms enough, when taken together, to tackle problematic regional human capital trends and consequent regional economic sustainability. Or, does the human capability approach offer additional benefits to the region and its engaging university? The conclusion reached is that the capability approach of Sen may need to explicitly consider attachment to place as an exogenous mechanism for cognitive and non-cognitive advancement. The other conclusion reached is that ‘enterprising human capital’ and ‘sp-ethics’, as mechanisms for an ethical approach to learning within the region may need to consider more closely the role of cognitive enhancement embedded in spatial circumstances and connections.

2 Literature themes: People, institutions and places

The first literature theme referred to in this paper is about the normative individual seeking capability realisation and comes from the work of Sen (1985, 2009), Nussbaum (2000, 2002) and others on human capability and justice. The capability approach emphasises individual ‘ambition’, ‘opportunity’ and ‘functionality’, rather than institutionally-imposed, competency-oriented, path-dependent learning designed to meet pre-specified commodity objectives. The ‘capability approach’ favours social inclusion and social justice – a moral construct of justice based on individual choice through egalitarianism and freedom (Nussbaum 2002). Through the capabilities approach Sen does not emphasise what people have achieved or received by way of status, income or wellbeing, but rather what they could achieve or obtain given certain available liberties or ‘functionings’. The ‘state’ of individuals and their social environment, enabling or otherwise, rather than the commodities or services they produce, is therefore important in contrasting capability with the typical model of the way in which income and wealth are generated with human resources(1). Sen says: “Capability, thus, is a set of vectors of

1 The distinction is made in this paper between ‘human resources’ and ‘human capital’, where the latter refers to those with higher learning that involves technical and creative skills and their application in addressing real-world matters of concern in the long term, as opposed to the former, which can also include people who have simply been trained ‘just-in-time’ to meet an immediate workforce need.
functionings, reflecting the person’s freedom to lead one type of life or another” (Sen 1992: 40), and is distinguished from wellbeing as a concept of welfare.

In our work on regions we have likened Sen’s human capability model to what we have termed ‘enterprising human capital’, as it is about people with enterprising abilities who not only formulate ideas but can take them and turn them into real on-the-ground positive outcomes for both individuals and the wider community (Garlick et al 2007, Taylor et al 2008) within a supportive regional ‘milieu’.

The second stream of literature relating to taking a capabilities approach to achieving more effective outcomes in regions is the social construct of the region as a supportive ‘atmosphere’ or milieu of collaboration and dialogue, where knowledge spillovers and transmission effects are nurtured and promoted and can therefore generate community benefits beyond the individual outcomes that some see as implicit in the Sen model of human capability. Sen argues, however, that the capabilities approach is not about ‘methodological individualism’ (Sen 2009: 244-247). He says, for example, “It is hard, then, to envision cogently how persons in society can think or act without being influenced in one way or another by the nature and working of the world around them.” (p 244-245).

There is an enormous volume of literature in regional development theory about the notion of the so-called ‘atmospheric’ (Maillat 1995) benefit of the spatial milieu, and many instrumental institutional structures and processes and agency behavioural determinants have been argued as giving form to it. Concepts such as ‘institutional thickness’ (Amin 1999), social capital (Putnam 1993), trust (Fukuyama 1999), business clustering and networking (Porter 1998), innovation systems (Braczyk et al 1998, Lundvall 1996), learning regions (Maskell et al 1998), creative class (Florida 1995, 2002), regional leadership, and so on, are now everywhere.

We have argued elsewhere using Australian data that these apparent determinants are:- (a) built on soft analysis, (b) are not responsive to the exigencies of the real capitalist environment in which regions operate (Plummer and Taylor 2003, Garlick et al 2007, Taylor et al 2008), (c) do not take into account the way in which business partnerships are formed, and importantly (d) are not people centric. We do not see argued in the literature that the regional milieu offers the possibility of being a nurturing instrument to realise human capability in these real world situations. The result has been that after more than 20 years of institutionally-facilitated bottom-up regional development:- (a) many regionally-focused organisations have been created, (b) local social capital has been active, and (c) a plethora of sectoral, commodity and investment plans and reports have been created. Beyond this there has been little of substance that addresses long-term potential. There has been minimal realisation of the capability of the people who reside in many of these places. In short, the institutionally-supported instrumentalist approach to regions in this country has entirely missed the mark because it has focused on structures, products and the processes and forgotten about the essential first step – realising the capabilities or the human capital of the people attached to these regional communities.

The result of failing to address these human capability questions is an increasing flow in human capital away from many regional areas. Despite the copious strategic planning that has occurred in regions over many years there have been precious little that has focused on human capital, and probably none that has addressed human capability as a tool for opportunity realisation and social inclusion.

What is demonstrated in our research is that economic growth in Australian regions has, over the last two decades, become spatially divergent, with concentrations of high
and low-growth regions becoming more apparent over time. National growth in Australia has not been equally spread, and there has been no trend towards a long-run equilibrium for all regions. Key metropolitan regions have been the main beneficiaries of growth, while other regions have had declining fortunes.

What we have found, using economic growth data for 94 regions over 18 years with closed econometric modelling (Garlick, Taylor and Plummer 2007; Taylor et al 2008), is that the relative availability of a source of ‘enterprising’ human capital in a region is the most significant positive determinant of its economic future, and the disproportionate inter-regional flows of this human capital are the most significant determinant of widening regional growth disparity nationally.

The third section of literature referred to in this paper relates to the new emphasis on the role of publicly-funded higher education institutions in the development of cities and regions, the so-called ‘third mission’. Theoretically, universities play an important regional role because of their focus on human capital and the creation and dissemination of knowledge, their spatial distribution, their relative institutional freedom of thought and expression and their regional leadership role (Goddard 1997, Garlick 2000, OECD 2007).

It is argued that universities have a common good regional responsibility to reach out and with the assistance of other regional agents and agencies, ‘pull through’ the human capital pyramid capable people who are at the margins of the community. This would enhance social inclusion as well as economic sustainability in the community in which they are located (Garlick and Palmer 2008, OECD 2007, Observatory Pascal 2009). There is clearly a higher education participation implication in this. However, this university/regional community engagement highlights an ethical and moral dilemma for the modern university. How can it meaningfully respond to a regional role for capability realisation within a national funding framework that pressures it to adopt corporate processes that do not necessarily support such undertakings? Many universities with strategies that embrace the acquisition of money and prestige fail the Dewey (1956) and Boyer (1996) tests of the common good expected of the publicly-funded university (Garlick and Palmer 2008, Benson and Harkavy 2002).

What is argued here is that universities perhaps need to have a role in human capability building in their regions rather than simple human capital creation. This should occur not only through curriculum and learning pathways connected to other organisations, but in their outreach and partnerships throughout the community based on themes that have global meaning. Ethical approaches to society along these lines not only have community and global societal benefit but institutional benefit as well.

3 Analytical framework

Using a conventional gap-convergence (Barro Regression) econometric model (Plummer and Taylor 2001b), regional growth for 94 Australian regions over the period 1984 to 2002 was decomposed into three causative growth components: (a) transition dynamics – or the speed at which a region’s growth rate returns to a long-run equilibrium after some disturbance, i.e. mean reversion; (b) structural characteristics – or the extent to which there are growth differences between neighbouring regions after a shock; and (c) random shocks – or the unanticipated and unpredictable factors that can impact on the growth rate of particular regions (so-called ‘white noise’) (Martin and Sunley 1998).

It is hypothesised that, in a competitive labour market situation, there will be a convergence of unemployment rates in all regions towards a general common rate over
time(2). If this does not occur, and each labour market converges to its own long-term unemployment rate over time, then there are particular ‘structural’ factors (or drivers) at work that reflect the local capacities of each region rather than simply being reflective of national competitive trends. Long-term growth in each region is determined by the relative impact of each of the structural factors or drivers (Badderly et al 1998).

To explore the patterns of regional growth in the Australian situation over the period 1984 to 2002, three different approaches to explaining spatiality were used (Garlick et al 2007): (a) the significance of the changes in overall spatial association among all regions, using a Morans I statistic (Anselin 1996); (b) the identification of particular spatial clusters of growth among regions (spatial accumulation), using the Getis-Ord (or G) statistic (Getis and Ord 1992, 1995); and (c) the significance of specific spatial clusters to the extent that they might be classed as ‘hot spots’ of difference from neighbouring regions, using local indicators of spatial association (LISA) (Anselin 1995).

4 Analytical results

The resulting analysis shows that economic growth across the 94 Australian regions has become increasingly divergent. The computed Morans I statistic for regional growth has risen from 0.213 to 0.416 over the two years, significant at the 1 per cent level, suggesting that an increased degree of spatial growth association or clustering is occurring. In other words, as aggregate national growth has risen between 1984 and 2002 spatial divergence between regions has increased.

The scatterplot (Anselin 1996) diagram in Figure 1 shows the degree of change over the time period for each region relative to that of its contiguous neighbours. Spatial patterns of high growth (negative values) appear to be occurring around regions in quadrant I: Central Sydney (1), Gosford (2), North Sydney (3), Southern Sydney (5), Western Sydney (6), Southern Melbourne (12) and Wollongong (48) to name just a few (iii). These high growth regional agglomerations are surrounded by low growth regions. Patterns of low growth (positive values) regional agglomeration are shown in quadrant II and include: Morewell (63), Moe (62), Sale (57), Traralgon (51), Port Lincoln (84), Port Pirie (53), Southern Adelaide (21) and Inner West Melbourne (8) in particular. These low growth regional agglomerations are surrounded by high growth regions. Cairns (80) in quadrant III is also interesting, in that it stands out as an individual region, along with several other hot spot locations with relatively high growth (negative values), in a segment of the scatterplot diagram that otherwise comprises zero/low growth regions. Similarly, in this scatterplot diagram Lithgow (49) in quadrant IV stands out as a cold spot, or low growth individual region surrounded by high growth regions. This pattern of significant, increasingly distinct and disparate growth clustering of regions is supported by both the G statistic and Lisa statistic (Garlick, et al 2007)

Given that there is a divergence of regional growth away from a long-run national equilibrium towards a clustering of different growth rates across all regions, it is necessary to identify the significance of the drivers of these regional growth patterns. From six ‘institutionalist’ or ‘structuralist’ regional development theories, eight

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2 We have used relative unemployment as a proxy for regional economic growth in the modelling (Plummer and Taylor 2003, Garlick et al 2007).

iii The full listing of the 94 regions is in Garlick et al 2007.

iv Readers wishing to read more detail of the modelling results are referred to Plummer and Taylor 2001b and Garlick et al 2007.

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hypothesised drivers of this growth have been tested in the Australian situation (Plummer and Taylor 2001a). These eight hypothesised drivers include: Technological leadership at the enterprise level (HITECH); knowledge creation and access to information (INFOACC); the local integration of small firms (MLOCN); infrastructure and institutional support (PROT); local human capital base (DEGREE); the power of large corporations (TOTPOP); inter-regional trade (MKTACC); and local sectoral specialisation (SPEC).

Only four variables were found to be significant in determining the actual growth disparity between regions in the Australian situation, viz: strength in human capital (DEGREE), technological leadership (HITECH), sectoral specialisation (SPEC) and institutional support (PROT). However, only the first three were positively significant and the most significant of these was human capital accounting for most of the impact. Regions with a high degree of institutional support, without a strong concentration of human capital (i.e. low level of qualifications), technological leadership and sectoral specialisation can expect poor growth outcomes (ie quadrant II regions). On the other hand, regions that have high and growing concentrations of human capital, technological leadership and sectoral specialisation and low levels of institutional support have good growth prospects (ie quadrant I regions).

What can be concluded is that a combination of growing human capital, visionary technological leadership, sectoral specialisation and reduced institutional support appears to provide the potential to generate better growth outcomes if it can be effectively harnessed. It suggests the need for an enterprising approach to the creation of human capital in regional areas as there has clearly been a flight of human capital from groups of non-metropolitan regions to key metropolitan conurbations. This is later referred to as ‘enterprising human capital’.

5 The human capital pyramid

Figure 2 is a schematic portrayal of what might characterise underperforming regions from a human capital perspective, such as those located in quadrant II of Figure 1. Three perspectives are given. The first, on the left-hand side of Figure 2, shows the traditional development of human capital from a wide platform of basic literacy and numeracy through foundation and vocational skills to technical, creative and higher-level skills at the apex. The second perspective, on the inside of the pyramid, shows the contribution to each of these stages of various learning agencies and the impediments and regional consequences of these impediments that can occur when there is no effective progression through the pyramid.

Progression through the pyramid depends on two factors: (a) consistency in pathways across learning agencies; and (b) ‘reaching-out’ of the learning process to engage in the reality of the region. When these factors are absent, the region, and the capability of its residents, continues to revert back to a lower state of possibility. The third perspective in Figure 2 shows how these attributes can diminish the human capital capacity of a region through leakages (e.g. ‘brain drain’, out-commuting etc.) or through underutilisation (e.g. underemployment, unproductive ageing etc.). A cluster of regions with a low and declining human capital (e.g. quadrant II in Figure 1) might be expected to be characterised by unemployment, underemployment, an out-commuting workforce, ‘brain drain’, and an unproductive ageing population, as well as unclear learning pathways and limited engaged learning. These are the results of realised human capability in the
region. Those regions with high and growing human capital (e.g. quadrant I in Figure 1) would be expected to have little unemployment and underemployment, a commuting-in workforce, ‘brain gain’, and an engaged and productive older population, with human capability being realised to a greater degree.

Figure 1. Moran scatterplot of relative regional growth 1984 to 2002. Adapted from Garlick et al 2007. The numbered regions are those discussed in section 4. Analytical results

6 Enterprising human capital’ and ‘Sp-ethics’

The concept ‘enterprising human capital’ introduced in section 4 as a determinant of spatial economic growth disparity in Australia comprises ‘enterprising people’ or those individuals, or groups of individuals, that can take an idea and, using their various and complementary capabilities, realise that idea through engaging the supportive regional community (physical, social, economic and cultural). This ‘enterprising human capital’ idea comes close to the human capability enhancement thesis of Sen and others when applied on a regional scale, but is still not sufficient and needs to be augmented by notions of freedom, ethics and social justice. In an attempt to do this in other work we introduced the concept of ‘sp-ethics’ to describe the ethical relationship between the individual and the place with which there is an affiliation.

Sp-ethics refers to the combined interaction of values and principles relevant to local places, the fostering of enterprising human capital based on local needs and identity, and geographically-specific concerns. Sp-ethics evolves through the process and practices of people engaging together within the community, where learning is seen as a two-way street, and the formation of tacit knowledge is valued as equally as that of explicit knowledge... Sp-ethics embodies the sense of ‘a community woven together from sharing and mutual
care’ (Bauman 2001, p. 150). More importantly, it acknowledges that the experience of space is fundamental to our identity (Davidson 2000) (Garlick and Palmer 2008a: 76).

Figure 2. Human capital pyramid and regional progression

For Bauman (1995, 2001), Smith (2001) and Davidson (2000), context is important for learning and engagement in a fragmenting and liquid modern world. In this liquid world, to address the human capital problem of regions, attention must be directed towards fostering and anchoring human capability in ways that form and are informed by the natural, physical, economic, social and cultural distinctiveness of the spatial community. While this interpretation of enterprising human capital in the spatial and ethical context is not too far removed from Sen’s ideal human capability within a regional engagement framework the question of attachment to place as a moral contextual space (Smith 2001, Bauman 2001) might need greater consideration as a means for enhancing capability achievement in the Sen model.

7 Human capability, place and ethics

Sen (1999) clarifies the distinction between human capital and human capability by reference to the following characteristics: (a) connection to freedom and wellbeing; (b) connection to social justice; and (c) connection to influencing economic production (pp
He argues that only the third of these characteristics is relevant to human capital.

Central to a capabilities approach is valuing a person’s freedom to pursue opportunities that they otherwise might miss because of unrealised endogenous skills and cognitive functions (following Gasper 2002, so-called ‘S-caps’) and exogenous societal and other constraints (‘E-caps’) which include the effect of social norms and roles, regulations, policies, rules and so on. Together, ‘S-caps’ and ‘E-caps’ determine the options available to the individual (‘O-caps’). Finally, according to Gasper (2002) the freedom to pursue an ‘O-caps’ life path based on ‘S-caps’ and ‘E-caps’ has to be oriented to what is ‘right’. In other words, there is a moral action (‘M-caps’) based on ethical principles which can be used to weight the various life path options.

Taken together, the generalised ‘S-caps’, ‘E-caps’, ‘O-caps’ and ‘M-caps’ of Sen’s human capability approach bring us close to the ‘enterprising human capital’ and ‘sp-ethics’ concepts we developed in our earlier work (Garlick and Palmer 2008a and 2008b) which theoretically underpin the way in which higher education might engage with its regional community based on principles of the common good. In this regard it is easy to agree with Lanzi (2004) who argues that human capital both influences and is influenced by capability enhancement.

The work of Heckman is relevant to this discussion on human capability and also to the discussion on human capital stocks and flows in the spatial context. Heckman (2007) argues that epidemiological and neurological studies point to there being ‘critical and sensitive periods’ in the development of human capability “…where some skills or traits are more readily acquired at certain stages of childhood than other traits.” (p 13251) and “The capabilities produced at one stage augment the capabilities attained at later stages.” (p 13252). It makes sense that a local or regional environment that offers opportunities to stimulate capabilities (cognitive, non-cognitive, health and wellbeing, etc) at appropriate ages will have long-lasting beneficial effects.

It is likely therefore that a stimulating local environment that generates an attachment to place for normative individuals at critical and sensitive stages of their life will have long term capability benefits both for them and, as Sen (2009) notes, for groups such as entire communities (pp 246-247). In this sense there may not only be ‘critical and sensitive periods’ following Heckman, but there may be ‘critical and sensitive places of attachment’ that aid or detract from the development of human capability. This takes us beyond the influence of society (ie ‘E-caps’) that Sen envisaged and includes the transformative influence of the natural (which we might call ‘N-caps) and animal worlds (Garlick and Matthews 2009, Garlick forthcoming 2010).

8 The role of the university in engagement

Surprisingly, there has as yet been very little research on the application of the capability approach to education (Otto and Zeigler 2009).

In other work we have stated that claims that ‘universities are not public goods that require government subsidies… [and that] higher education can be financed privately’ (Schwartz 2006, p.3) risk eroding relations between universities and their local communities (Garlick and Palmer 2008a and 2008b). The more a business entity logic underpins the conditions of university funding and operation, the more the relationship between the university and its students and community takes on a utilitarian, fragmented and episodic agenda not unlike that of other business partnerships where there is funding
conditionality. There is little moral recognition of the other in these partnerships. Ordinarily this would not be a partnership difficulty, but an engagement relationship between university and region where there is an ethical obligation (Boyer 1996, Davidson 2000, Benson and Harkavy 2002) to address community and individual impediments to capabilities deserves something more.

Following Bauman’s (1995) forms of togetherness, a business entity-oriented style of university/community engagement resembles a behavioural ethic more akin to ‘being-aside’. With such an ethic, the entities partnered with, like the regional communities in which universities are located, are not recognised as being of significance. They are not characterised by the moral ideal, ‘being for’, where the full ingredients of the person (or community) are seen as precious. Elsewhere we termed the kind of engagement required in this situation, tending toward ‘being for’ in the Bauman sense, as ‘sp-ethics’ (Garlick and Palmer 2008a) where there is an intrinsic mutuality between university and place directed towards an ethical and moral purpose. For us (Garlick and Palmer 2008a) this engagement requires the intersection of three themes, viz:

In this paper we have suggested that a theory for university regional community engagement occurs at a point where there is an intersection of university action generating enterprising human capital; the context of human and non-human community diversity; and the big global public good issues of the day that have their regional presence. At the heart of this intersection is the ‘being-for’ ideal of togetherness put forward by Bauman (1995). It provides the basis for the underlying relational ethic we regard as necessary to achieving an ethics of engagement. This focus on addressing broader community concern through a relational approach suggests enterprising human capital can be an ethical rather than a neoliberal tool to generate regional community and global outcomes.(p 11).

Human capital planning and actions that take into account capability enhancement at critical and sensitive stages of life and in ‘critical and sensitive places of attachment’ appear to be useful initiatives on which universities could take the lead in their engagement with other education sectors with pathway planning and with the wider communities (social and natural) in which they are located. This would help to address the under-performance and inequities that appear to occur spatially in spite of national growth. Such planning would foster learning pathways from the youngest to the oldest community members. Figure 3 provides a schematic of the connections implicit in such a regional human capital plan. In this schematic, Priority A might, for example, be something like climate change with the first goal (A1) being to reduce the region’s greenhouse gas emissions through human capability enhancement throughout the formal education process, accessing knowledge, and through engagement with various relevant regional groups (ie.A1.1, A1.2…)

9 Region Varmland

The Swedish region Varmland is three hours by road or rail to the north west of Stockholm. The region has a population of 250,000 and capital city Karlstad a population of close to 100,000. The region is undergoing long term structural change from an old economy based on timber, steel and paper manufacturing and engineering workshops to an economy based on innovation, IT, knowledge and services. Like many other non-metropolitan regions around the world Varmland has an ageing population, ‘brain drain’ of young people, rural-urban drift, declining overall population, growing gender
imbalance, relatively low higher education participation, and a confusion of jurisdictional agency roles. The Karlstad University is a relatively new university of around 10,000 students with a large distance learning component.

Through strong community and university engagement the region has embarked on a strategy of revitalisation through regional collaboration, innovation, human capital enhancement and internationalisation based on knowledge acquisition. Triple helix clusters involving the region, business and the university as partners have been formed in steel and engineering, paper, packaging, IT, services and wellness with links forming between clusters. The University has strong connections in its research and teaching with regional innovation business clusters and which is reflected in many dual professorial appointments funded jointly by the region and the University, research funding partnerships, professional up-skilling programs, degree programs including work based learning, and close matching of university courses with regional needs. The University, in collaboration with the business clusters, has a range of initiatives to foster human capital throughout the region including a children’s university, young entrepreneurs programme, innovation incubator for young people, and regular open days for primary aged students.

The region and university are now focussing on two further strategies. The first is to more explicitly connect the regional innovation system through the business clusters to the strategies for human capital and eventually human capability enhancement. The second is to internationalise the regional system through connections with other regions and universities around the world with like interests and concerns. The Observatory Pascal (2010) project PURE is a stimulus for this.

<table>
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<tr>
<th>Regional community priority area/goals/groups</th>
<th>Higher education</th>
<th>Adult education</th>
<th>Vocational education</th>
<th>Secondary education</th>
<th>Primary education</th>
<th>Pre-school education</th>
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<td>Priority A Goal A1 Group A1.1 Group A1.2 etc. Goal A2 etc.</td>
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Figure 3. Schematic human capability plan
10 Conclusions

Economic growth in Australia is being accompanied by a widening disparity in spatial economic achievement. Underlying this is a significant under-utilisation and leakage of human capital in many non-metropolitan regions. In earlier work we argued that universities play an important role in contributing practically to the positive progress of these human capital ‘problem regions’ in ways that are consistent with the common good (economic advancement, social inclusion and environmental sustainability), as well as with individual well-being and opportunity realisation. An argument was made for the use of Sen’s capability approach as well as our ‘enterprising human capital’ and ‘sp-ethics’ concepts as ways of improving outcomes for ‘problem regions’.

The paper draws two conclusions about how to address the human capital problem in many regions. First, the capability approach may need to explicitly consider attachment to place (social and natural worlds) and the role of regional agencies associated with learning such as universities. This would involve the way in which they focus their programs on capability building by engaging with the distinctive regional community of which they are a part. In this way investment in capability building is not only a function of ‘critical and sensitive periods’ in life but a function of ‘critical and sensitive places’ of individual and community engagement. Second, ‘enterprising human capital’ and ‘sp-ethics’, as mechanisms for an ethical approach to learning through engagement within the region, may need to consider more closely all the factors involved in realising human capability rather than simply assume their presence.

References


The role of organisational capacity in the knowledge-based transformation of Brisbane, Australia

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Structured Abstract

Purpose – The cumulative impacts of the knowledge economy together with the emerging dominance of knowledge-intensive sectors, have led to an unprecedented period of socio-economic and spatial restructuring. As a result, the paradigm of knowledge-based urban development (KBUD) has emerged as a development strategy to guide knowledge-based economic transformation (Knight, 1995; Yigitcanlar, 2007). Notwithstanding widespread government commitment and financial investment, in many cases providing the enabling circumstances for KBUD has proven a complicated task as institutional barriers remain. Researchers and practitioners advocate that the way organisations work and their institutional relationships, policies and programs, will have a significant impact on a region’s capacity to achieve KBUD (Savitch, 1998; Savitch and Kantor, 2002; Keast and Mandell, 2009). In this context, building organisational capacity is critical to achieving institutional change and bring together all of the key actors and sources, for the successful development, adoption, and implementation of knowledge-based development of a city (Yigitcanlar, 2009).
Design/methodology/approach – There is a growing need to determine the complex inter-institutional arrangements and intra-organisational interactions required to advance urban development within the knowledge economy. In order to design organisational capacity-building strategies, the associated attributes of good capacity must first be identified. This paper, with its appraisal of knowledge-based urban development, scrutinises organisational capacity and institutional change in Brisbane. As part of the discussion of the case study findings, the paper describes the institutional relationships, policies, programs and funding streams, which are supporting KBUD in the region.

Originality/value – In consideration that there has been limited investigation into the institutional lineaments required to provide the enabling circumstances for KBUD, the broad aim of this paper is to discover some good organisational capacity attributes, achieved through a case study of Brisbane.

Practical implications – It is anticipated that the findings of the case study will contribute to moving the discussion on the complex inter-institutional arrangements and intra-organisational interactions required for KBUD, beyond a position of rhetoric.

Keywords – organisational capacity; institutional arrangements; knowledge-based urban development; Brisbane, Queensland

Paper type – Academic Research Paper

1 Introduction

Globalisation, rapid urbanisation, and the escalating use of advanced technologies have led to a growing dependence upon knowledge-intensive sectors, and accordingly the world has entered the ‘knowledge era’. In response to these challenges, dedicated knowledge-based urban development reform has become an important policy priority. This often occurs at the local and metropolitan levels as cities have proven to be enormously effective platforms for knowledge-based economic transformation (Florida, 2004). Across all tiers of government, from the supranational and national to the regional and local levels, the changing nature of the economy and urban development, presents significant challenges. Consequently the need for a re-evaluation of traditional approaches to urban development has been widely lamented (Baum et al., 2007; Plummer and Taylor, 2003, Yigitcanlar and Martinez-Fernandez, 2009). As knowledge, information, and innovation become critical factors in local and regional growth, knowledge-based urban development (KBUD) provides a purposefully designed and inimitable strategy for development. As a result, there has been widespread support and financial commitment to KBUD mechanisms that promise to foster the elements of the knowledge economy. However, in many cases, providing the enabling circumstances for KBUD has proven a complicated task. Research suggests that barriers to the successful implementation of KBUD, are predominantly administrative and systemic and there exist few proposed strategies to overcome them.

In addition to economic, socio-cultural, and urban development components, progress towards knowledge-based urban development requires the consideration of institutional processes. Researchers and practitioners advocate building organisational capacity as a strategy for overcoming institutional impediments and achieving sustained institutional change. Organisational capacity refers to the ability of the whole institution, from individuals through to organisations and the legislative and policy instruments used, to undertake a task, in this case, KBUD. Recently, organisational capacity has been recognised as critical to uniting the key actors and sources, for the successful
development, adoption, and implementation of knowledge-based development of a city (Yigitcanlar, 2009). In economic terms, the way organisations work and their programs and funding streams, have a significant impact on creating a supportive institutional environment for investment, innovation, and trade (Keast and Mandell, 2009). In this context, there is a need for urban development agencies to ascertain the complex inter-institutional arrangements and intra-organisational interactions that can advance urban development for the knowledge economy. In Brisbane, the capital city of the state of Queensland, Australia, fostering KBUD mechanisms has become a key strategy for metropolitan development. However, research into the institutional linements required to support the enabling circumstances for KBUD, has largely not moved from the position of rhetoric. Therefore the current challenge to the design of capacity building strategies for achieving KBUD is that the associated characteristics of good organisational capacity are yet to be identified. As part of the discussion of the case study findings, the paper describes the institutional relationships, policies, programs and funding streams, which are supporting KBUD in the region. Specifically, this paper investigates the organisational attributes contributing to Brisbane’s knowledge-based development.

2 Knowledge-based urban development mechanisms

KBUD promises a secure economy within a human setting, delivered through institutional, economic, socio-cultural, and urban development. The following knowledge-based urban development assessment framework (Figure 1), shows these four development domains in detail: economy; society; institutional; built and natural environments. For the successful knowledge-based development of a city, organisational capacity is central to these four development domains. Institutional development processes are essential to orchestrate KBUD and bring together all of the key actors and sources, in order to organize and facilitate necessary knowledge-intensive activities and plan strategically KBUD (Yigitcanlar, 2009). Economic development codifies technical knowledge for the innovation of products and services, market knowledge for understanding changes in consumer choices, financial knowledge to measure the inputs and outputs of production and development processes, and human knowledge in the form of skills and creativity, within an economic model (Lever, 2002). Socio-cultural development indicates the intention to increase the skills and knowledge of residents as a means for individual and community development (Gonzalez et. al., 2005). Urban development builds a strong spatial network relationship between urban development clusters, and in this sense, knowledge precincts play a significant role in the spatial formation and delivery of citywide KBUD strategies (Yigitcanlar et al., 2008d). This paper scrutinizes Brisbane’s transformation to KC by examining the city’s institutional strengths and weaknesses in light of this combined framework.
3 Brisbane’s organisational capacity attributes

With a reasonably strong knowledge and technological development; growth in competitive industries and efficiencies in the services sector; rapid processes of adjustment to ICT’s; and the increasing implementation potential of KBUD; Australia rates above the OECD average for most of the indicators of success for knowledge-driven economies (McKeon and Lee, 2001; Yigitcanlar 2008c). Brisbane is the capital city of the state of Queensland, in which economic growth has exceeded that for Australia over most of the last decade, and Australia itself, has been acclaimed as one of the fastest growing economies in the OECD. By standard economic measures, Brisbane is an outstanding performer, driven by strong population growth and high export performance (Andrews, 2006). The city has emerging strengths in a number of dynamic new sectors that will drive the city’s capacity to sustain and advance growth into the future. Biotechnology and biosciences, aviation and aerospace and information and communications technologies (ICT) are examples of development opportunities, which have the potential to diversify Brisbane’s economy into the higher value activities required to be competitive in the global marketplace (Andrews, 2006). The following sections investigate organisational capacity attributes and institutional change in Brisbane. The discussion focuses on the institutional relationships, policies, programs and funding streams, which are supporting KBUD in the region.

3.1 Institutional policies and programs

Rapid population growth and urban development in Brisbane over the last decade, led the state and local governments to develop KBUD strategies in order to achieve more sustainable urban and economic development of the region. In Queensland, the Smart State Council was established to remove the institutional barriers that stand in the way of knowledge-based reform in the region. Together with the Department of Infrastructure
and Planning, they formed a collaborative network of development agencies, to create the strategic synergies required to achieve KBUD. Their working relationship enables coordinated KBUD and ensures there is adequate and consistent availability of technical and financial resources. As a result of this collaboration, the ‘Smart State Strategy’ was developed and comprises a vision of knowledge-based transformation and numerous KBUD policies for the region. The strategy ensures that policy is coordinated and consistent across administrative boundaries. These policies identify investments in research, development, technology diffusion and commercialization of ideas to achieve a KBUD and an improved quality of life (Smart State Council, 2007). The political imperative of the Queensland ‘Smart State Strategy’ was developed to drive growth and economic development across the state and particularly in the Brisbane Metropolitan area (Rayner, 2006). The strategy, later implemented in 2003, attempts to reposition the economy as a knowledge economy; recognizing knowledge, science, technology, research, education, and innovation as key drivers of economic growth. The strategy outlines government’s commitment to achieving the ‘Smart State’ vision of using knowledge to drive sustainable economic growth across the region, and charter future directions and new initiatives (Queensland Government, 2004). Under the guidance of the Smart State strategy, local government policies for KBUD, are consistent across administrative boundaries. However, this policy framework enables local governments in the region, such as in Brisbane city, to adapt these policies to suit local conditions.

In line with the ‘Smart State Strategy’, Brisbane adopted a ten year ‘Smart City Strategy’ (2007) to support KBUD with an aim to transform the city into a knowledge city. The strategy focuses on the local level of KBUD activities including; economic development (economic fundamentals of; industry efficiency, capital infrastructure, fiscal environment, innovation), human and social development (education and training, knowledge society skills, culturally diversification), and sustainable urban development (formation of knowledge clusters, networked infrastructures). In contrast to a relatively mature ‘Smart State Strategy’ (1998) the ‘Smart City Strategy’ (2007) has a much more intense urban development focused knowledge-based development perspective. The ‘Smart City Strategy’ develops KBUD policies that address and promote the following: information access, lifelong learning, digital divide, social inclusion, quality of life, and economic development within the Brisbane City and its hinterland. Specifically, the strategy aims to achieve KBUD through developing capital systems by obtaining a positive value balance among all stakeholders and interest groups into the decision-making process as active actors. With regard to intra-organisational capacity attributes, Brisbane benefits from a strong history of community participation and willing engagement, which contributes to effective organisational leadership. In recent years, effective collaboration amongst stakeholders have led to a better understanding of the organisational and operational limitations of stakeholders, which has assisted in the formulation of policy initiatives and capacity building programs.

Although some economists argue that strategic planning instruments offer little guidance to the success of KBUD; the geography of knowledge producers and users has been an important factor in Brisbane’s knowledge-based development, and contributed to the city’s attraction of talent and investment. Furthermore, a Van Winden et al. (2007) suggest Brisbane’s organising capacity and good governance, at both the regional and metropolitan levels, have had a significant influence on the KBUD efforts of the city. Therefore, KBUD benefits from not just the implementation of management practices in local administrative practices, but also strategic planning and growth management at the
regional level. In this regard, good organisational capacity attributes include linking regional knowledge strategies to the development and planning priorities of local areas so that support policies can be more effectively designed and implemented. Further to this, collaborative working arrangements have ensured there is an open and transparent communication between state and local level organisations, which is essential to advancing the KBUD of Brisbane.

3.2 Institutional relationships

Brisbane’s efforts in building the organisational capacity of KBUD are based around quadruple-helix model partnerships, for the overall integration of various local and state wide KBUD initiatives (Odendaal, 2003). Research suggests that whilst participation by all sectors of society in government processes, is effective in developing new productive capacity within the knowledge economy, the formality and practice of traditional organisations restricts widespread involvement (Putnam, 1993;1995). Consequently, Putnam (1993) argues that there is a need to remove the limitations of conventional government processes, reinvent institutional structures and increase the scope of public responsibility in decision-making. In Brisbane this has been achieved through greater privatisation with more specialised, less hierarchal arrangements, such as public-private partnerships and matrix organizations. In terms of organisational attributes, both formal and informal relationships, between different types of organisations are acknowledged and actively maintained. The advantages of public–private–academic partnerships can be seen through numerous cooperation’s, for example Brisbane City Council works with: State Government in providing training in schools; with universities in providing training, and skill development; with the information technology businesses in providing infrastructure; and with knowledge-intensive industry providing services and employment. In addition Brisbane City Council networks with other state agencies such as State Education in providing various initiatives and online training, and works with Federal and State government in the development of local e-government (Odendaal, 2003).

In terms of good inter-organisational capacity attributes, there is a strong emphasis on information sharing across the local and regional government levels and collaborative inter-organisational relationships. Local Government incentives for knowledge sharing in the form of budget allocations for the creation of communities of practice (Brisbane City Council, 2009), facilitate the creation of formal and informal networks for knowledge sharing amongst various knowledge agents, specifically innovative businesses, organizations, universities and research centres. Local e-governance initiatives aim to achieve KBUD through developing capital systems to obtain a positive value balance among all stakeholders and involve interest groups in the decision-making process as active actors. As the literature suggests, communication, forms the basis for collaborative relationships, and information sharing helps create positive relationships between stakeholders (Healey,1998). Further to this, information sharing amongst development agencies is beneficial to KBUD at the local level, as it addresses knowledge gaps and promotes individual, organisational and institutional learning (Brown, 2005).

With regard to urban development processes, there has been a deliberate departure from neutral administration, to a more streamlined process in which institutions define frameworks, create policies, and transmit values through strategy implementation. The operation of ‘Smart State’ and ‘Smart City’ initiatives from one administrative centre for
each, promotes overall integration of various local and state wide initiatives, and promotes capital systems management and community engagement practices. Within the framework of a more flexible institutional structure, Brisbane’s local government is benefiting from an increased capacity to respond to the pro-active and dynamic nature of the knowledge economy for KBUD. The development of KBUD strategies in concert with the relevant authorities is important in providing for knowledge production and the augmentation of the knowledge economy; which requires relevant governing institutions capable of orchestrating KBUD and equipped to handle the planning and the creation of the necessary spatial arrangements for the development of the knowledge economy and the concomitant KBUDs. Queensland’s ‘Smart State Strategy’ and ‘South-East Queensland Regional Plan’, together with Brisbane’s ‘Cityplan’ and ‘Smart City Strategy’, are the major statutory driving forces behind the KBUD of Brisbane, and when combined the KBUD initiatives have strong pushing power in positioning Queensland’s economy as a knowledge economy. Notwithstanding, the city and the state are still lacking an institution similar to Melbourne’s ‘Office of Knowledge Capital’ or Manchester’s old ‘Manchester: Knowledge Capital’ and new ‘Manchester Innovation Group’ to bring the key actors and sources together to organize and facilitate necessary knowledge intensive activities and plan strategically for the city’s knowledge-based transformation. For example, more effort is required to support the establishment of networking, interactions and partnerships with other Knowledge cities or the continuous adaptation and integration of best practice examples for the improvement of policies, processes and services offered by Brisbane City Council.

3.3 Funding sources

In the late 1990s, Queensland started to develop extensive innovation engines; these centred on nine universities and research agencies, the majority of which are located in metropolitan Brisbane and South-East Queensland region. However, and until the release of the ‘Smart State Strategy’, there was a lack of coordination of development and insufficient recognition of these sectors’ potential to generate wealth for the region. In addition, there was an absence of an appropriate level of public leadership and investment to boost the necessary knowledge infrastructure required for the transformation to knowledge economy. Consequently the ‘Smart State Strategy’ comprises a number of initiatives to provide a stimulus for boosting industry innovation and commercial capacity for greater global export and trade gains. A mix of regulatory and incentive based approaches are used to target the mobilization of the innovation process by providing support in converting ideas into tangible results and include funding of: innovation building, research facilities, innovation skills, and innovation projects, particularly in Brisbane.

As KBUD requires an economic model to regulate the advancement of technical, market, financial and human knowledge required for knowledge city formation. In a knowledge-based economy, private and the public sectors value knowledge, spend money on supporting its discovery and dissemination, and ultimately, harness it to create goods and services (Carrillo, 2006). A strong financial support is fundamental for a successful KBUD and from various government resources Brisbane provides financial support for research, innovative business and entrepreneurship, through various programmes for the promotion of new ideas. Consequently, Brisbane has seen improvements in the city’s performance in knowledge intensive sectors; the rate of labour force employed in
knowledge intensive sectors has increased and they comprise a growing share of the city’s annual turnover (Brisbane City Council, 2009) Furthermore there are an increasing number of research centres and institutes, and companies with a research and development (R&D) component operating in Brisbane and it is expected that this will contribute to a higher quality degree of diffusion and research results, and increase in hi-tech and knowledge intensive exports, in the future.

Within Brisbane, the active involvement of the private sector in the organization of knowledge production is essential. A positive business climate is the breeding ground for the development of entrepreneurial spirit and competitiveness. Furthermore, the positive promotion of knowledge entrepreneurship is a vital aspect of successful KBUD strategies. Brisbane’s KBUD strategy is improving to be able to handle administrative environment hand-in hand with sound business environment to create an exemplary entrepreneurial climate and an open, flexible interface between government and business. For example, Brisbane’s ‘Green Heart’ program administered through Council’s website, provides a high quality of information and knowledge, in addition to a number of actions and measures to support environmental sustainability, and offers financial and venture capital for investments in Green Industry sectors. Brisbane’s KBUD strategy declares its orientation towards achieving flexibility in any sense allowing responsiveness to changing needs and demands, while providing the basic capital infrastructure and sound fiscal environment that enables future needs and demands to be accommodated. Nevertheless, in the current state of Australian cities only Sydney enjoys the proliferation of multinational regional headquarters in the city, which translates into knowledge-based employment growth (Searle and Pritchard, 2008). Brisbane is still investing on its business environment to become a globally vibrant city.

4 Conclusion

As advanced economies transition to knowledge-based economies; the benefits of strategizing new ways to foster activities in knowledge-intensive sectors has evoked much interest and investment from a broad range of urban development agencies. Notwithstanding, there is growing evidence to suggest that whilst the knowledge economy offers cities and metropolitan regions prospects for sustainable economic growth and the prevention of social exclusion; failure to appropriately shape and adapt urban development processes will ultimately preclude local administrations and regional governments from capitalising on these opportunities. In this regard, the way, urban development agencies work to create a knowledge-based economy and their programs and funding streams, have a significant impact on creating a supportive institutional environment for investment, innovation, and trade. Consequently, there a definite need to ascertain the complex institutional arrangements and inter-organisational interactions that can advance urban development for the knowledge economy.

Within the broad topic of KBUD, this paper has specifically addressed the organisational capacity attributes that are advancing Brisbane’s urban development for the knowledge economy. Overall, Brisbane’s KBUD experience is supported by a mix of regulatory and incentive based approaches to support appropriate urban development in line with strategic intent. Decision making is underpinned by stakeholder engagement, which helps to ascertain widespread support for development. With regard to strategic policy making and planning, Brisbane benefits from various collaborative relationships, across different levels of government and types of development agencies. As a result
organisations roles and responsibilities are more transparent and coordinated policy is consistent across administrative boundaries. Government’s commitments to KBUD have also resulted in an adequate and consistent availability of technical and financial resources. Overall, Brisbane’s experience promises a successful transformation to knowledge-based development. However, as in many cases some institutional barriers remain. In general, organisational attributes are inhibited by: lack of trust between organisations; a lack of empathy of the constraints, drivers and operational limitations of organisations, a lack of vision and understanding how their organisation fits into this objective. In this context, building institutional capacity as a means to overcome the systemic and administrative barriers and lack of progress in KBUD will require the identification of capacity deficits that can then be used to inform future policy and reform initiatives.

References


Structured Abstract

This paper examines the characteristics of Sydney and Melbourne IT industry companies that have a significant global market for their products. The paper examines academic literature on company-level factors favouring the export of services, and uses this to frame the analysis. The data for the analysis comes from phone interviews of a random stratified sample of IT industry companies in the two cities. The analysis identifies company correlates of significant overseas sales, including ownership, size, type of product, sources of knowledge and finance, and extent of innovation. The way in which the findings fit models of the global structure of software and other IT industry components is considered. In particular, the extent to which IT exports result from regional offices of multi-national corporations as against home-grown firms is examined. In terms of urban context issues of the KCWS conference, the role of Sydney- or Melbourne-specific factors, such as the city’s overall industry structure and industry specialisation, that have aided IT exports is a particular focus of the analysis. The findings are then used to propose IT industry policies that could increase the ability of Australian IT industry firms to compete globally.

Purpose – The purpose of the paper is to analyse factors at the firm level that are associated with IT exports from Australia.

Design/methodology/approach – We use data from a random sample of Sydney and Melbourne IT firms that is stratified by firm size to identify the level of exports according to firm characteristics that include IT sub-industry, size, level of innovation, sources of knowledge, inter-firm collaboration, and perceived problems from Australia’s location.

Originality/value – This paper discusses evidence as to what kinds of Australian information technology companies export some or most of their production, and how Australia’s global location hinders IT exports. It thus identifies some dimensions of the
policy question of how Australia’s large deficit in IT imports/exports might be better addressed.

**Practical implications** – The findings of the paper have policy implications for promoting Australia’s IT exports.

**Keywords** – IT exports; multinational companies; global periphery

**Paper type** – Academic Research Paper

1 **Introduction**

Although Australia has a significant IT industry sector, there is still a large trade deficit in IT goods and services. Information, communication and technology exports in 2008-2009 were less than exports in 1999-2000. There is a strong policy imperative to use the existing IT industry base to generate greater exports. At present, however, there is inadequate data relating to factors impeding or assisting exports on which to base such policy. In particular, the role of Australia’s position in global chains of IT production, and of Australia’s peripheral global location, is poorly understood. This paper is an initial attempt to explore firm-level factors associated with IT exports from Australia. It uses data from a random stratified sample of IT firms in Sydney and Melbourne to identify company attributes associated with differing levels of exports. It also uses data from this sample to explore factors associated with Australia’s global location that are perceived to disadvantage Australian IT producers.

2 **Service industries and exports**

One important characteristic of knowledge based urban development is the development of knowledge intensive service activities. The local impact of these activities is likely to be greater if they become export activities, just as in an earlier era manufacturing firms in metropolitan economies brought growth and wealth to urban areas by exporting to distant markets. The export of services has been a steadily expanding activity, but its association with the urban location of firms is a more complex matter. This paper attempts to explore that complexity as it is expressed in the Australian IT sector.

2.1 **Services as an export activity**

Decisions by firms to export have been understood to be part of a straightforward set of stages as reviewed by Bell (1995), deriving from some foundation research carried out on exporting firms by Johanson and Wiedersheim-Paul (1975) and expressed for multinational firms by Dunning (1993). That analysis has suggested that firms go through stages in their approach to export activity. In the beginning they develop as skill or productive capacity in a home market, which they then export directly. Here one can see the local knowledge base as the foundation for the export function. In a second stage firms invest in production facilities in selected foreign markets; here they are transferring the knowledge base from their home city to other markets. Finally, firms engage in the geographically complicated global production networks that are common in many industries. Here the home based knowledge of the firm can be expressed in the management and organisation skills to ensure the mobility and co-ordination of component movement and final production.
How might that model work for services? Zou and Stan (1998) showed that early thinking on this issue spanned a wide array of approaches. Further work has exposed two critical perspectives. The first is that the foreign direct investment and re-locations of production along with the multi-location production arrangements by manufacturers outlined above actually requires the use of services, often drawn from a home base. Daniels (2000) has highlighted this aspect in research by exploring the question whether services are exported like a commodity, or whether their real function is “servicing exports”? This distinction has important implications for the way that the knowledge base of a city, expressed though its service sector, is felt in local development. If services are exported like commodities, local firms need to create facilities in new markets which will hopefully generate income and profits that will be returned to the home base. Alternatively, a significant role for services can be the facilitation of physical exports (raw materials or manufactured goods) via finance, marketing, government liaison, transport and logistics functions for example, what Balabanis (2005) has recently labelled “export intermediaries”. In turn, the exporting firm is likely to look to its current bank, advertising agent, and transport service suppliers to support its international expansion. In this situation, the home knowledge base will be expanded and enriched via its exposure to the global activities of the manufacturers, as the service firms “service exports” (Pain and Welsun 2004). To this can be added the fact that there are often significant regulatory and cultural limits on the supply of services in foreign markets. Banking regulations for example limit overseas banks from operating without first gaining a licence; the same can be said for legal firms. For these activities it is possible to be involved in a foreign market on behalf of a client, but it may be more difficult to actually establish a presence in such a market. O’Connor and Daniels (2001) illustrated that outcome by showing that the concentration in service trade is actually between countries with highly developed service sectors. So rather than supplying a market were a product is missing, service exports are most developed in markets where service functions are already sophisticated. This paradox emerges from the way that services are linked to production and need a well developed skill base (and regulatory structures) to operate.

A second important dimension is that services can be exported yet still made within the supplying country. In research on this topic these activities have been labelled “domestically located service exports” (Roberts 1999) Education, tourism and health services provide the best examples. To obtain these exports clients need to come into a country. So the expansion of the knowledge base of a metropolitan region can be the foundation for service exports without going through the basic model of export activity outlined above. Hence knowledge based service sector development can have a strong export orientation while at the same time directly adding to the economic functions and activity within the home base city.

These general perspectives show that the rapid expansion of service exports may have unexpected associations with the local production facilities and through that the knowledge base of a city. Due to their special features, the way that service exports influence a city will be very different to what we have seen as manufacturers became exporters. This may have some special relevance in Australia where the manufacturing sector is not as large as it was in the past, (although its export exposure is still significant in some sectors). O’Connor and Daniels (2001) Australia in 1998, and the concentration on these activities were greater than in other countries. In contrast business service exports were less significant.
2.2 **IT as an export activity**

The implications of the interpretations of service activity may need to be re-interpreted for the IT industry in the rapidly changing digital world. Roberts (1999:85) identified this activity as “wired” exports, noting at the time that improvements in telecommunications will probably increase this activity especially as “ICTs become more integrated into the process of service provision” (page 81). The rapid expansion in computer based outsourced activities from countries like India and elsewhere illustrates that expectation (Javalgi et al 2004, Saxenian 2006; Parthasarathy 2004).

Significantly Roberts (1999) found computer services firms were three time more likely to use the “wired export” approach than all business service firms in her sample. Bell (1995) explored export activity by small Computer software firms. He notes entry barriers are low and the size of the enterprise is not critical. He observes “Small software developers with only a handful of staff can develop excellent packages which have great export potential. High-value, low-volume offerings make physical distribution easy (while) transmission of software via electronic means can be an added advantage. (Also) intra-industry relationships with hardware manufacturers and integrated systems developers impact on the export strategies of small software firms (Bell 1995:74).

2.3 **IT as an export activity in Australia**

Hence when we consider IT exports from Australia we have a number of dimensions to explore. First, computer services can now be moved easily across the globe. That would suggest that an advanced country like Australia could be a significant actor in this sector. Second, if the home based market is the foundation of development, and firms then reach out to the global market, might the small scale of the Australian market act as a limitation on the development of exporting forms? Alternatively are there some special features in the Australian market (such as the services supplied to the mining industry or to specialised agriculture, or maybe to some other innovative areas like solar energy and medical research) that provide a “niche” skill that can now be easily exported? Third, the IT industry is dominated by a small number of large companies. That could have two consequences for IT export firms in Australia. One, the link to the global operators could provide conduits for local firms (which may in the long run be absorbed into the large firm). Looked at in this way, the link to the larger firm can overcome the problems and difficulties of entering overseas markets for small Australian firms. However, the sheer scale of the global firm could limit the Australian firm to the Australian market alone and make it impossible to enter global markets as the local firm’s product would lack a profile overseas. Finally, there is the issue of the intensity of competition in this sector, and whether Australia provides the support and capacity for its firms to compete with nations in the Asia Pacific region such as Taiwan, Singapore, India and increasingly China.

Hence the capacity for the Australian IT sector to be involved in export activity, and through that enrich and enhance the knowledge base of Australian cities is an open question and deserves research attention to explore and address any special features that might shape the outcome, and so contribute to the understanding of the sector in general, while providing a clearer base for the articulation of policy designed to assist firms in the sector.
3 Firm sampling methodology

Data for the present analysis was obtained from a telephone questionnaire that was administered to a random stratified sample of Sydney and Melbourne IT industry firms. The sample target was 50 firms in each of software production, computer systems/services and technical support, and internet and multimedia. The target was 20 firms in each of data preparation, computer hardware, internet service providers, and computer peripherals. The sample was skewed toward large firms to ensure a more even coverage of total industry employment. Yellow Pages company listings were used in addition to Kompass listings as the latter directory gave less comprehensive coverage of the industry, especially of smaller firms. However, as no employment data was available for companies listed in the Yellow Pages, all such companies were included in the sample of firms with less than 50 employees. Where a firm in the Yellow Pages sample was found in the interview to have more than 50 employees, it was counted as one of the sample in the appropriate (larger) size category.

The number of firms actually interviewed is shown below in Table 1. The overall number of firms sampled was less than targeted, due to lower than expected response rates. The number of software production firms sampled was more than targeted, because a number of firms classified in Kompass or the Yellow Pages as computer service providers were found to be principally software producers when interviewed. Nearly all of the internet service providers listed in the two directories were found to be resellers rather than originator providers, thus accounting for the few firms interviewed in this category. The same was true to a lesser extent in the case of hardware producers.

4 IT exports and company characteristics

4.1 IT industry type

The IT industry sector contains a variety of production types. Some of these could be expected to have greater possibilities for export than others. Table 1 sets out the survey findings on the association between level of exports of each firm and their IT industry branch.

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<th>Exports as % of total sales</th>
<th>Software production</th>
<th>Internet &amp; multimedia production</th>
<th>Hardware production</th>
<th>Computer services</th>
<th>Peripherals production</th>
<th>Internet service providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5 to 49</td>
<td>21</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>0 to 4</td>
<td>36</td>
<td>30</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1 indicates that industry type influenced the level of exports. Software producers had the highest rate of exporting, with 42 per cent of sampled firms exporting 5 per cent or more of their production (measured by sales value). Computer services and ISP companies had no or virtually no firms exporting 5 per cent or more of production. Much software can be used across a range of applications, and so is not as contextually-
dependent as computer services, for example. The latter derive their main revenue from problem-solving for specific workplaces, and the resulting service is not easily sold to different firms. ISP companies are restricted to intra-national markets in part because they operate in the context of nationally-based telecommunication regulations and associated telecommunication providers. Most multimedia production is carried out on a project-by-project basis, restricting the scope for cross-firm applications, although Table 1 suggests that the skills involved can be applied to overseas clients in many cases.

4.2 Company type and size
A central issue concerning IT exports relates to the role of multinational corporations. These can be seen as the core components of the global IT sector, operating throughout the world and drawing on sub-contractors for specialist supplies and services. Around these companies a cluster of smaller IT companies operates, most of them servicing local markets, but many serving as sub-contractors to multinationals or exporting niche products themselves. IT exports are thus hypothesised to be generated by a combination of multinational production platforms and specialist small national firms. Multinationals in countries that are not production platforms would be expected to be importers rather than exporters of IT goods and services. The survey therefore obtained data on the involvement of multinationals in IT exports from Australia. It also obtained data on company size, to test (inter alia) the hypothesis that larger local companies might have sufficient levels of skills and innovation to engage in export activity. Table 2 sets out the resulting data on how multinational status and firm size are related to export levels.

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>Australian non-MNC less than 50 employees</th>
<th>Australian non-MNC 50 or more employees</th>
<th>Australian MNC less than 50 employees</th>
<th>Australian MNC 50 or more employees</th>
<th>Foreign MNC less than 50 employees</th>
<th>Foreign MNC 50 or more employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>5 to 49</td>
<td>23</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0 to 4</td>
<td>86</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

(1) Size denoted by number of employees at establishment of interviewee.

The data in Table 2 show that foreign-owned MNCs were slightly more likely than non-MNC Australian firms to export, but less likely than Australian MNCs. Exports were generally unrelated to size. Thus 6 of the 16 foreign MNCs interviewed had some – mostly minor - role as Australian export platforms. Most, however, operated just as importers of IT goods or services into Australia. Eleven of the 12 firms exporting more than 50 percent of their production were Australian firms. From this data it might be possible to draw a negative inference as to the effect of high levels of foreign ownership on IT exports from Australia, though the negative relationship is not statistically significant.

4.3 Level of innovation
A high level of innovation might be expected to be associated with a greater propensity to export. Greater innovation levels increase the likelihood that new products
capable of being exported will be produced. Table 3 sets out survey data on levels of innovation, measured by new products or routines/processes introduced in the last 3 years, and their relationship with export levels. While the table shows there is a positive relationship between the introduction of new products and whether firms export more than 5 per cent of their production, it is not statistically significant ($\chi^2$ two-tailed $P$ value = 0.18). It is possible that a more exact measure of innovation would produce a more significant relationship. There is no relationship between the introduction of new routines or processes and the level of exports.

### Table 3. Level of exports by level of innovation in last 3 years

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>None</th>
<th>New products</th>
<th>New routines/processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>5 to 49</td>
<td>12</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>0 to 4</td>
<td>41</td>
<td>38</td>
<td>10</td>
</tr>
</tbody>
</table>

### 4.4 Sources of knowledge

The type and extent of knowledge accessed by firms can be hypothesised to influence levels of exports. In this regard, there is an extensive debate about the relative roles in IT production of tacit knowledge based on face-to-face communication, and ‘global pipeline’ knowledge gained by linking into global production chains. The survey asked respondents to list their various sources of knowledge. The results are shown in relation to levels of exports in Table 4.

### Table 4. Level of exports by sources of knowledge (1)

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>Suppliers</th>
<th>Customers</th>
<th>Similar firms &amp; peers</th>
<th>Professional forums, conferences, fairs</th>
<th>Books, journals</th>
<th>Own R&amp;D</th>
<th>Consultants</th>
<th>New employees</th>
<th>Ex employees</th>
<th>Internet</th>
<th>Universities, research agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>5 to 49</td>
<td>24</td>
<td>34</td>
<td>15</td>
<td>29</td>
<td>19</td>
<td>27</td>
<td>12</td>
<td>12</td>
<td>2</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>0 to 4</td>
<td>64</td>
<td>82</td>
<td>30</td>
<td>56</td>
<td>46</td>
<td>68</td>
<td>29</td>
<td>32</td>
<td>13</td>
<td>51</td>
<td>19</td>
</tr>
</tbody>
</table>

(1) Totals include every source listed for each firm

Overall there is little correlation with the different types of knowledge and the level of exports. Some types of knowledge have a more positive association with exports than others, however. The most significant of these are universities and research agencies (in nearly all cases universities were the knowledge source in this category). This accords with conventional wisdom about the relationship between university research and strong high tech clusters. By contrast, neither consultant knowledge nor ‘own R&D’ had a particularly positive association with exports. Knowledge from similar firms and peers also had a moderately positive association with exports. This tends to validate the hypothesised role of tacit knowledge, though other strong potential sources of tacit knowledge such as suppliers and customers did not show a distinctive influence on
exports. Most firms drew on a number of sources of knowledge, suggesting that richness of knowledge was seen as vital to staying competitive.

4.5 Type of sales

The hypothesised role of global chains of production in the IT sector suggests that MNC contracts will be vital for firms to participate in exporting along these chains. More generally, sales via contracts might decrease the risks of exporting, as opposed to sales on open export markets. Table 5 shows data from the survey on the main types of sales of respondent firms, and compares this with export levels. The importance of MNC contracts for exports is clearly shown. Of the 9 respondent firms with such contracts, all but one exported 5 per cent or more of their total production. The eight such firms could thus be considered as part of global production chains. Nevertheless, these firms were a clear minority of all respondent firms with exports above 5 per cent. Global production chains thus explain only a small part of Australian IT exports. Table 5 indicates that other categories of sales are not particularly associated with export activity.

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>Open market/distributors</th>
<th>MNC contracts</th>
<th>Non-MNC contracts/government contracts</th>
<th>Unspecified type of contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>5 to 49</td>
<td>15</td>
<td>6</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>0 to 4</td>
<td>35</td>
<td>1</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

(1) Includes all types mentioned where main type not identified

4.6 Inter-firm collaboration

Different forms of inter-firm collaboration could be expected to assist firms in exporting their production. Participation in global production chains, for example, requires collaboration of various kinds. Table 6 shows the main type of inter-firm collaboration used by each respondent firm, and compares this with export levels. Firms with no collaboration are seen to be much less likely to export more than 5 per cent than firms engaged in some type of collaboration. Firms engaged in reseller/vendor agreements are the most likely to be exporting. Such agreements greatly reduce the risks of exporting. Partnerships and alliances also produce an increased likelihood of exporting. These both generate either more assured export markets to partners, or else enable firms to join with partners to engage in more complex forms of production or draw on specialist knowledge that make exports more competitive.

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>Zero collaboration</th>
<th>Reseller/vendor agreement</th>
<th>Partnership</th>
<th>Sub-contracting</th>
<th>Project cooperation/collaboration</th>
<th>Alliance</th>
<th>Joint venture</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>5 to 49</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>15</td>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>0 to 4</td>
<td>36</td>
<td>3</td>
<td>4</td>
<td>39</td>
<td>12</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
4.7 Perceived disadvantages of Australia’s location

A major research issue for the analysis of Australian IT exports concerns the role of Australia’s location in relation to the global IT sector, and of disadvantages that might arise from this location. A working hypothesis might be that the peripheral position of Australia has negative effects that hinder IT exports. To explore this, the survey questioned firms about the level of disadvantage they felt arose from Australia’s location in the global IT sector (Table 7).

Table 7. Level of exports by perceived disadvantage of Australia’s location in global IT sector

<table>
<thead>
<tr>
<th>Exports as % of total sales</th>
<th>1 (no disadvantage)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (high disadvantage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 &amp; above</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>5 to 49</td>
<td>12</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>0 to 4</td>
<td>71</td>
<td>7</td>
<td>14</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Perceptions about how disadvantageous they considered Australia’s global location to be indicate that most IT-exporting firms perceive some disadvantage, although only 2 firms exporting over 5 per cent of their production saw their location as highly disadvantageous. Less obviously, a quarter of firms exporting less than 5 per cent of their production also saw Australia’s location as a disadvantage to varying extents.

Comments from exporting firms indicated that Australia’s global location was particularly disadvantageous for making sales. This involved making telephone calls outside normal Australian working hours (with one firm saying that overseas clients were a ‘communications nightmare’), or the necessity of travelling to see clients in person. The US market was especially cited as one where face to face communication with clients was necessary. This could involve a journey of 24 hours to some locations. One firm with a major overseas client said that the client needed ‘local hand holding’, while another firm said there was a stigma attached to Australian firms by overseas clients. Firms selling to APEC countries did not report similar difficulties from Australia’s location, presumably because of the closeness of their time zones.

A number of non-exporting firms also reported disadvantages associated with Australia’s location. Phone calls outside normal hours could also be necessary for software or hardware support, particularly to US multinational offices. One firm reported time problems in getting current hardware from overseas. Similarly, firms drawing on overseas supplies or sub-contractors outside the Asia-Pacific area reported disadvantages associated with the need to make phone calls well into the night. Conversely, a foreign multinational said that software developers in India were willing to get up in the middle of the night to discuss work issues. An animation firm saw Australia’s location as an advantage, because time differences meant they could work on projects while their North American partners were resting, and vice versa, using internet file exchanges.

5 Sydney versus Melbourne

The paper now briefly explores the possible influence of the different economic bases of Sydney and Melbourne on IT exports. Of the eleven sample IT firms exporting 50 per
cent or more of their production, eight are located in Sydney and three in Melbourne. Three of the Sydney firms listed banking and finance as a main client industry, while none of the Melbourne firms did. This suggests that Sydney’s role as Australia’s main financial centre has produced specialised skills and/or a specialised client base that has aided IT exports. Four of the Sydney firms, but no Melbourne firms, listed mining/oil and gas as a main client industry. This is at odds with Melbourne’s more dominant role as a location for major mining companies, but it does reflect a legacy of medium-sized mining production and exploration companies in Sydney (c.f. Daly, 1984). It also accords with one study that noted Perth has been losing mining industry services to better networked and resourced firms in both Sydney and Melbourne (Spiller Gibbons Swan Pty Ltd and National Institute for Economic and Industry Research, 2000). Two of the three Melbourne firms had major client industries that were connected to specialised aspects of Melbourne’s economy. One animation firm listed gaming publishers as the main client industry, corresponding to Melbourne’s bigger animated games industry that has been a policy priority of the state government. Another produced road-related hardware and software for governments and consultants, which perhaps reflects the concentration of road research expertise in Melbourne, especially in the Australian Road Research Bureau. Thus the economic base of the respective cities can be seen as having some influence on the type of IT exports from each city.

6 Conclusion

The research reported above has established a profile of the export activity in the Australian IT industry. It shows that the small local firm is strongly represented. These results confirm that the current context reflects local firms that have developed a product in response to local demand, and then taken it to an export market, rather than an alternative where major international corporations utilise a national base for production and subsequently export. The latter has been an important stage in the evolution in the fortunes of the IT industry in some nations. One question created by the research is why Australia has not attracted this form of major corporation sponsorship and development.

A second question is what have been the characteristics of the Australian market that have stimulated the IT product development for export. An answer to this question will require understanding of the circumstances of each firm It would be interesting to know whether the IT exports are a mirror of the other major export sectors such as mining, agriculture, education and tourism. With a global role and global scale in these activities, it is possible the IT needs have created special requirements which have been addressed by local firms and have then been developed for use in these sectors on the global market. Alternatively, the exports could be part of part of new and different industries that have emerged from innovative thinking in activities that are not exported, perhaps in an activity like health services.

Recognising the differences that would be exposed by exploring these questions will create some clarity for policy. Should we be providing more support for small forms to export services developed to serve our leading industries, or should we be encouraging more innovation in all activity? Secondly, should be we be looking at ways to attract major corporations to develop IT products in Australia and so export, or should we be assisting the small home based firms? Articulating answers to these questions will depend on extensions to the work outlined in the current paper.
References


Measuring the concentration of the knowledge-based economy in central Sydney in 1996 - 2006

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Structured Abstract

Purpose – The purpose of this paper is to measure to what extent the knowledge-based economy is concentrated in Central Sydney and how this concentration has changed.

Design/methodology/approach – I use the Location Quotient (LQ) tool to analyse the Australian census employment data by place of work in Central Sydney compared to Metropolitan Sydney in 1996-2006 to find the industries which are concentrated in Central Sydney and categorise which industries fall in the knowledge-based economy.

Originality/value – This paper provides an empirical study which systematically examines the knowledge-based economy concentrated in Central Sydney by analysing the employment data by place of work. The findings testify and support related theories and researches which address the same issue from other approaches.

Practical Implications – The data results and findings can be easily translated into future urban strategy and policy on how to better position Central Sydney’s competitive position in regional, national and international contexts as a knowledge-based economy hub.

Keywords – knowledge-based economy, concentration, Central Sydney

Paper type – Academic Research Paper

1 Introduction

Sydney is Australia’s top global city positioned in a global urban hierarchy as measured and ranked in an increasing number of global city literatures from the 1990s until now (Beaverstock, Taylor, & Smith, 1999; Friedmann, 1986, 1995; GaWC, 1998, 2009; Godfrey & Zhou, 1999; MasterCard Worldwide, 2008). Saskia Sassen, the author of the term ‘global city’ defines a global city’s status as its capacity to provide ‘producer services’ of financing, banking, accounting, advertising, marketing and management consultancy and argues that these complexes of knowledge-based economy activities are usually located in CBDs of a few global cities (Sassen, 1995, 2001). This theorisation of global city and its knowledge-based economy concentrated in central city area applies to Sydney too. Some researchers have tried to verify Sydney’s status as a global city and the concentration of producer services and ‘financialisation’ of employment in Central Sydney (Baum, 1997; Daly & Pritchard, 2000; O’Connor & Stimson, 1995; O’Neill & McGuirk, 2003; Searle, 1996, 1998b, 2008). However, it is important to empirically examine how the knowledge-based economy has been concentrated in Central Sydney compared to Metropolitan Sydney in a comprehensive and systematic manner.
This paper seeks to address such an issue. In order to measure to what extent the knowledge-based economy is concentrated in Central Sydney and how this concentration has changed, I use the Location Quotient (LQ) tool to analyse the Australian census employment data by place of work in Central Sydney compared to Metropolitan Sydney in 1996-2006 to find the industries which are concentrated in Central Sydney and categorise which industries fall in the knowledge-based economy. This paper provides an empirical study which systematically examines the knowledge-based economy concentrated in Central Sydney by analysing the employment data by place of work. The findings testify and support related theories and researches which address the same issue from other approaches. The data results and findings can be easily translated into future urban strategy and policy on how to better position Central Sydney’s competitive position in regional, national and international contexts as a knowledge-based economy hub.

2 Method

I used the Location Quotient (LQ) analysis to measure the employment concentration in Central Sydney in relation to Metropolitan Sydney in 1996-2006. LQ analysis is widely used ‘to identify the concentration of an industrial sector in a local economy relative to a larger reference economy’ (Edward Blakely & Bradshaw, 2002, p. 122). Employment is the most used variable in LQ analysis which defines a ratio of employment shares: the local industry’s share of total local employment compared with the industry’s employment share in a wider reference region (regional, national, or even international) (Klosterman, 1990). An LQ > 1 indicates a higher than average degree of specialisation in that sector locally compared with the reference region, and is interpreted as an indicator of concentration and competitive advantage (Spencer, Vinodrai, Gertler, & Wolfe, 2010).

Geographically Central Sydney and Metropolitan Sydney are respectively represented by Sydney Local Government Area (LGA) and Sydney Statistical Division (SD) defined by the Australian Bureau of Statistics (ABS) for statistical data purposes. The locations and comparisons of Sydney LGA and Sydney SD are as follows:

![Maps of Sydney LGA and Sydney SD](Source: ABS)
Table 1. Specifications of Sydney LGA and Sydney SD

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney LGA</td>
<td>29 Km²</td>
<td>180,474</td>
<td>357,767</td>
</tr>
<tr>
<td>Sydney SD</td>
<td>12,428 Km²</td>
<td>4,148,570</td>
<td>1,736,824</td>
</tr>
<tr>
<td>LGA’s Share in SD</td>
<td>0.23%</td>
<td>4.35%</td>
<td>20.6%</td>
</tr>
</tbody>
</table>

Source: ABS

The implementation steps of the research include:
1. I collected the 1996 and 2006 census data on industry of employment for Sydney LGA and Sydney SD obtained from the ABS. The census data is based on place of work and collected by two digit industry subdivisions in the Australian and New Zealand Standard Industrial Classification (ANZSIC) 1993.
2. I calculated the LQs for all the industry subdivisions in Sydney LGA in 1996 and 2006 by the equation:

\[ LQ_t = \frac{a_t}{E_t} + \frac{E_t}{E_T} \]

where \( a_t \) = employment in industry subdivision \( i \) in Sydney LGA, \( E_t \) = total employment in Sydney LGA, \( E_t \) = employment in industry subdivision \( i \) in Sydney SD, \( E_T \) = total employment in Sydney SD.
3. I selected the industry subdivisions with LQ>1 in 2006, and respectively calculated the selected industry subdivisions’ employment changes and LQ changes in 1996-2006.
4. I displayed the results in three modes to interpret to what extent knowledge-based economy was concentrated in Central Sydney:
   - Mode 1: All concentrated employments of industries are listed according to their LQs in 2006 as in any normal LQ analysis (displayed in Table 2);
   - Mode 2: All concentrated employments of industries are plotted in a diagram measuring employment shares, LQs and employment changes developed by Information Design Associates with ICF Kaiser International (1997) and ICF Consulting (2000). This diagram simultaneously conveys information about the sizes of employments of industries, the employment changes, and the LQs for industries in Central Sydney by aligning employment changes along the horizontal axis, aligning LQs along the vertical axis, and plotting individual industries with ‘bubbles’ proportional to the numbers of their employments (displayed in Figure 1);
   - Mode 3: All concentrated employments of industries are plotted in a diagram measuring employment shares, LQs and LQ changes developed by Hu (2009). The Relative Share Matrix diagram simultaneously conveys information about the sizes of employments of industries, the LQ changes, and the LQs for industries in Central Sydney by aligning LQ changes along the horizontal axis, aligning LQs along the vertical axis, and plotting individual industries with ‘bubbles’ proportional to the numbers of their employments (displayed in Figure 2).
5. I interpreted the displayed data results to find to what extent knowledge-based economy is concentrated in Central Sydney and what the practical implications can be drawn.

3 Results

Of the total 69 industry subdivisions by the ANZSIC 1993, 16 industry subdivisions had LQs more than 1 and employment share more than 1 per cent in 2006 in Sydney LGA. That is to say, these 16 industries are concentrated in Central Sydney compared to Metropolitan Sydney measured by employment. The analysis is focused on these 16 industry subdivisions.
The 16 subdivided industries are mostly services industries and are categorised into three broad groups depending on the nature of the services: commercial services; public and infrastructure services; and cultural and media services (see Table 2). The commercial services refer to the highly specialised services for business activities (finance, insurance, business, and property services). The cultural and media services are those services which are informing, educating and entertaining people. The public and infrastructure services refer to the government administration and urban supporting services such as transport, communication and amenities (accommodation, cafes and restaurants). The commercial services group, the cultural and media services group, and the public and infrastructure services group respectively account for 42 per cent, 7 per cent, and 22 per cent of total employment in Central Sydney in 2006. In total the three concentrated industry groups account for around 71 per cent of Central Sydney’s total employment. Table 2 sequences the concentrated industry subdivisions according to their LQs in 2006 from the highest to the lowest. The commercial services are the most concentrated in Central Sydney, especially in finance and insurance services. The other two groups of services do not indicate very impressive degrees of concentration over other services.

Figure 2 and Figure 3 visually display the results in Table one. Both Figure 2 and Figure 3 provide information of the LQs, employment shares of the concentrated industry subdivisions, but respectively display their employment changes or LQ changes in 1996-2006. They better illustrate how these industries are compared with each other and had changed over the one decade period. Measured by sheer employment shares, top industries in Central Sydney are business services (21 per cent), finance (8 per cent), services to finance and insurance (7 per cent), and accommodation, cafes and restaurants (6 per cent) as contrast to the top industries measured by LQs, which are services to finance and insurance (3.11), insurance (2.80), finance (2.59), and libraries, museums and the arts (2.21). Figure 2 indicates that the majority of the concentrated industries in Central Sydney had employment growth in 1996 and 2006 except for two industries which lost employment numbers modestly. Figure 3 indicates that half of the 16 concentrate industries in Central Sydney increased their degree of concentration by positive LQ changes while the other half industries decreased their degree of concentration by negative LQ changes in 1996-2006. The different patterns of employment changes and LQ changes of the concentrated industries occur because the LQ changes depend on the employment numbers of the industries in Metropolitan Sydney region too. Figure 3 also indicates that industries with higher LQs tend to have positive LQ changes in 1996-2006, denoting that industries in Central Sydney tend to be more and more concentrated on few numbers of industries.
### Table 2. Measuring employments of industry subdivisions and their LQs in 1996 and 2006

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>75 Services to Finance &amp; Insurance</td>
<td>12,453</td>
<td>19,429</td>
<td>4.06%</td>
<td>3.22</td>
<td>24,528</td>
<td>6.86%</td>
<td>3.11</td>
<td>-3%</td>
<td>97%</td>
</tr>
<tr>
<td>74 Insurance</td>
<td>10,120</td>
<td>20,304</td>
<td>3.30%</td>
<td>2.50</td>
<td>13,070</td>
<td>3.65%</td>
<td>2.80</td>
<td>12%</td>
<td>29%</td>
</tr>
<tr>
<td>73 Finance</td>
<td>29,675</td>
<td>58,508</td>
<td>9.68%</td>
<td>2.55</td>
<td>29,815</td>
<td>8.33%</td>
<td>2.59</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>92 Libraries, Museums &amp; the Arts</td>
<td>4,818</td>
<td>11,472</td>
<td>1.57%</td>
<td>2.11</td>
<td>4,711</td>
<td>1.32%</td>
<td>2.21</td>
<td>5%</td>
<td>-2%</td>
</tr>
<tr>
<td>62 Rail Transport</td>
<td>2,996</td>
<td>8,547</td>
<td>0.98%</td>
<td>1.76</td>
<td>4,966</td>
<td>1.39%</td>
<td>2.18</td>
<td>24%</td>
<td>66%</td>
</tr>
<tr>
<td>91 Motion Picture, Radio &amp; Television Services</td>
<td>3,319</td>
<td>12,652</td>
<td>1.08%</td>
<td>1.32</td>
<td>5,635</td>
<td>1.58%</td>
<td>1.96</td>
<td>49%</td>
<td>70%</td>
</tr>
<tr>
<td>82 Defence</td>
<td>3,186</td>
<td>11,961</td>
<td>1.04%</td>
<td>1.34</td>
<td>4,447</td>
<td>1.24%</td>
<td>1.92</td>
<td>43%</td>
<td>40%</td>
</tr>
<tr>
<td>78 Business Services</td>
<td>53,668</td>
<td>174,253</td>
<td>17.51%</td>
<td>1.55</td>
<td>74,085</td>
<td>20.71%</td>
<td>1.70</td>
<td>10%</td>
<td>38%</td>
</tr>
<tr>
<td>66 Services to Transport</td>
<td>7,472</td>
<td>18,986</td>
<td>2.44%</td>
<td>1.98</td>
<td>7,184</td>
<td>2.01%</td>
<td>1.66</td>
<td>-16%</td>
<td>-4%</td>
</tr>
<tr>
<td>24 Printing, Publishing &amp; Recorded Media</td>
<td>9,006</td>
<td>32,284</td>
<td>2.94%</td>
<td>1.40</td>
<td>10,022</td>
<td>30,526</td>
<td>2.80%</td>
<td>1.59</td>
<td>14%</td>
</tr>
<tr>
<td>81 Government Administration</td>
<td>19,590</td>
<td>49,435</td>
<td>6.39%</td>
<td>1.99</td>
<td>21,011</td>
<td>6.63%</td>
<td>1.54</td>
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<td>7%</td>
</tr>
<tr>
<td>71 Communication Services</td>
<td>11,145</td>
<td>36,849</td>
<td>3.64%</td>
<td>1.52</td>
<td>9,355</td>
<td>3.32%</td>
<td>1.45</td>
<td>-4%</td>
<td>-11%</td>
</tr>
<tr>
<td>57 Accommodation, Cafes &amp; Restaurants</td>
<td>18,580</td>
<td>71,304</td>
<td>6.06%</td>
<td>1.31</td>
<td>21,377</td>
<td>81,233</td>
<td>5.98%</td>
<td>1.28</td>
<td>-2%</td>
</tr>
<tr>
<td>96 Other Services</td>
<td>9,831</td>
<td>30,302</td>
<td>3.21%</td>
<td>1.63</td>
<td>8,083</td>
<td>2.62%</td>
<td>1.12</td>
<td>-31%</td>
<td>-18%</td>
</tr>
<tr>
<td>93 Sport &amp; Recreation</td>
<td>3,826</td>
<td>16,813</td>
<td>1.25%</td>
<td>1.14</td>
<td>4,368</td>
<td>1.22%</td>
<td>1.05</td>
<td>-9%</td>
<td>-4%</td>
</tr>
<tr>
<td>77 Property Services</td>
<td>5,511</td>
<td>24,610</td>
<td>1.80%</td>
<td>1.12</td>
<td>6,597</td>
<td>1.84%</td>
<td>1.02</td>
<td>-9%</td>
<td>20%</td>
</tr>
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<td>…</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>306,469</td>
<td>1,539,593</td>
<td>100.00%</td>
<td>1.00</td>
<td>357,767</td>
<td>100.00%</td>
<td>1.00</td>
<td>0%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Note: Commercial services ■; Cultural & media services ●; Public & infrastructure services ◆.
Source: Calculated from ABS census data in 1996 and 2006
Figure 2. Measuring employment shares of industry subdivisions, LQs and employment changes

Source: Calculated from ABS census data in 1996 and 2006
Figure 3. Measuring employment shares of industry subdivisions, LQs and LQ changes

Source: Calculated from ABS census data in 1996 and 2006
4 Discussion

The results of this research show that the knowledge-based economy was further concentrated in Central Sydney in 1996-2006 in two broad categories of industry subdivisions: commercial services; cultural and media services.

Sydney has been a top leader in commercial services in Australia’s urban hierarchy since the 1980s. Sydney was the main urban beneficiary of Australia’s increasingly globalised commodity and financial markets (Searle, 2008) as the central locus of international corporate headquarters and financial offices. By 1988, Sydney had 150 head offices of international institutions (43 in Melbourne) and 155 of the 185 Australian head offices of foreign banks (Daly & Stimson, 1992). In 1997 and 1998, some 61 multinational corporations set up Asia Pacific regional headquarters in Sydney, more than four times the total for any other Australian or New Zealand city (Daly & Pritchard, 2000). Comparing Sydney’s employment structure with overseas cities indicates that Sydney’s performance in finance and business services in the mid 1990s was approaching that of New York and London in the mid 1980s (Searle, 1996). A study done by the accountancy firm Price Waterhouse Coopers in 1998 compares Sydney with seven international cities (New York, London, Frankfurt, Singapore, Atlanta, Vancouver, and Kuala Lumpur) and concludes that Sydney is performing reasonably well across a wide range of measures (Price Waterhouse Coopers, 1998). Hall places Sydney in the ranking of sub-global cities then (Hall, 1995), but other scholars including Searle (1996), O’Connor and Stimson (1995), Lepani (1995), Newton (1995) and Baum (1997) argue that Sydney’s economic characteristics of finance and producer services were indicative of its emergence as Australia’s global city in the late 1980s and early 1990s.

Sydney’s status as a financial centre on the Pacific Rim was established in the 1980s. Saskia Sassen defines a global city’s status as its capacity to provide ‘producer services’ such as financing, banking, accounting, advertising, marketing and management consultancy and argues that these complexes of activities are usually located in CBDs of a few global cities (Sassen, 1995, 2001). The results of this research indicating increasing concentration and importance of finance and insurance, and professional and business services in Central Sydney fits into Saskia Sassen’s argument and testifies Sydney’s status as a global city of growing influence. Searle (1998a) investigates changes in producer services location in Sydney based on analysis of four industries of management consultancy, insurance, graphic design and data processing and concludes that ‘globalisation appears to have reinforced the traditional central city focus of Sydney’s producer services sector’ (Searle, 1998a, p. 237). Forrest (1996) examines the spatial clustering of the journey to work in Sydney and points out a decreasing dependence on the central city as a focus of employment other than those employed in the business, finance and information service sector. These researches draw similar conclusion to this research of centralised advanced producer services in central Sydney out of different analytical approaches. It is even argued that the surge of finance-based economic activities in Central Sydney helped sustain Australian economic prosperity in the late 1990s (O’Neill & McGuirk, 2002).

Central Sydney’s growing role as a knowledge economy centre, on the other hand, is seen in its increasing concentration of cultural and media industries in 1996-2006. This is indicative of very significant transformative urban functions in Central Sydney. Other scholars also observe similar patterns in different approaches. Searle and Valence (2005) find an emerging inner Sydney multimedia cluster including graphic design, advertising
and related media. They base their study on an empirical analysis of the multimedia firms’ geographical locations in metropolitan Sydney area and observe the high concentration of the new information industry in central Sydney as part of a shift towards an information economy (Searle & Valence, 2005). These researches highlight Sydney’s concentration of new information economy on a regional base, however, Sydney’s performance deserves an international credit. In the index ranking global cities’ capacity in providing producer services released by the Globalisation and World Cities (GaWC) program at the Loughborough University, Sydney ranked the fifth in advertising performance of major global cities (Taylor, 2008, p. 56). Sydney’s performances in other producer service categories were much less impressive on a global base, including accountancy, banking and financing, insurance, law and management consultancy. Few empirical studies have been made to provide plausible explanation for central Sydney’s rapid and high concentration of new information economy in cultural and media industries. Florida’s (2002, 2005) theory of creative class appears to provide an explanatory framework. The creative workers required by the new information economy are urban lifestyle class (Florida, 2002) and are globally mobile as electronic migrants (E. Blakely, 2001; Florida, 2005). It seems that Sydney’s cityscapes – built, natural, social and cultural cityscapes – are assets of the city’s competitiveness for a creative economy and creative city (Gibson, 2006; Throsby, 2006). But the validity of this causal relationship – simplistic as it is – needs to be verified by very plausible empirical study

5 Conclusion

In this paper I used the LQ tool to measure to what extent the knowledge-based economy was concentrated in Central Sydney with reference to Metropolitan Sydney and how the concentration of the knowledge-based economy changed in 1996-2006 by using the ABS census data of employment by industry based on place of work. By presenting the results on the LQs, employment shares, employment changes and LQ changes of industry subdivisions (two digit subdivisions by ANZSIC 1993) in Central Sydney, it is found that 1) the majority of the concentrated industries in Central Sydney are knowledge-based services; 2) apart from the public and infrastructure services which support local as well as regional/national economy, the concentrated knowledge-based economy in Central Sydney basically fall into two categories – commercial services, and cultural and media services; 3) the overall degree of the concentration of the commercial services and cultural and media services in Central Sydney has been growing as indicated in the trend in 1996-2006. The findings out of measuring the concentration of the knowledge-based economy in Central Sydney are explained and supported by related theories and researches. The contribution of this research is that it provides an empirical case with systematic statistical examination to illustrate the concentration of the knowledge-based economy in Central Sydney and its longitudinal trend.

References


Leveraging the benefits of knowledge assets for members – how CPA Australia is managing its knowledge offer

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Structured Abstract

Purpose – The purpose of the paper is to outline the approach that CPA Australia has developed to manage its knowledge offer for members. This relates to the storage and use of assets as well as the different channels being used to deliver the offer to the membership.

Design/methodology/approach – We propose an approach that is practical in nature and one that imposes limited changes to the way staff at CPA Australia create, use and store knowledge assets. The emphasis has been on greater use of existing systems and the enhanced processes and procedures for ensuring currency of knowledge assets.

Originality/value – This methodology puts in evidence the value that CPA Australia places on its knowledge offer to members and the value of multiple delivery channels in delivering the global offer to members in a timely and effective manner.

Practical implications – The outcomes of the application are enhanced use of existing systems, improved processes and procedures for storage, re-use and management of knowledge assets and greater visibility of the knowledge offer across CPA Australia which translates into reduced duplication of knowledge assets.

Keywords – classification; content management; delivery channels; (max 5 words)

Paper type – Practical Paper

Glossary of Terms

- ACCA – Association of Chartered Certified Accountants (UK)
- CIMA – Chartered Institute of Management Accountants
- DMS – Document Management System
- ECS – Enterprise Classification Scheme
- ICAA – Institute of Chartered Accountants in Australia
- IFRS – International Financial Reporting Standards
- CPA – Certified Practising Accountant
1 Introduction

CPA Australia is one of three professional accounting bodies in Australia, the others being the National Institute of Accountants and the Institute of Chartered Accountants of Australia.

It is one of the largest global accounting bodies with 129,000 accounting, finance and business professionals in some 100 countries.

The core services of CPA Australia to members include education, training, technical support and advocacy. Staff and members work together with local and international bodies to represent the views and concerns of the profession to governments, regulators, industries, academia and the general public.

In view of the fact that education is a core service of CPA Australia it is of utmost importance that the management of these knowledge assets is done in the most efficient and effective manner to ensure the right information is made available to members when they want it and where they want it. To deliver on this expectation, CPA Australia developed the 2009 -2011 Corporate Plan in which one of the strategic themes was

*Provide members with ready access to knowledge that enhances their career*

This paper will outline the initiatives that have been undertaken or are planned that will deliver against this strategic theme.

2 Background

As a significant global professional accounting body, CPA Australia is operating in an increasingly competitive market both nationally and internationally.

In the Australian market, CPA Australia’s main competitor, ICAA, is actively targeting the industry and public sector space. ICAA also have a close association with the Big 4 accounting firms which helps bolster their membership. Overseas accounting bodies namely ACCA and CIMA are becoming more active in the Australian Market with ACCA opening an office in Sydney and CIMA developing partnerships with local universities.

ACCA and CIMA are CPA Australia’s major competitors in overseas markets for potential international designation prospects. Both bodies have strong global brands and provide entry pathways that enable non-degree holders to obtain a qualification awarded by an education provider as well as membership.

In addition to this competition there is also the need to understand why people join a professional body and what they expect for their membership. Anecdotal evidence suggests that members want their membership of CPA Australia to provide them with assistance around employability (develop their career/improve job prospects) and knowledge (provide access to knowledge assets to support their development).

In light of this information and the fact that more organisations are recognising that their competitive advantage is their knowledge assets and that knowledge is the differentiator in the knowledge economy (Nonaka and Takeuchi, 1995), CPA Australia has embarked on a number of strategic projects to deliver against its corporate plan “*To position itself as a stronger competitor with a distinctive brand valued by employers and members, a compelling CPA Program with flexible learning modes for global career advantage and ready access to high quality relevant knowledge*”.
3 Knowledge initiatives

3.1 Classification of content

To enable easy access to knowledge assets it is important to have a clear way of classifying these assets. It is also important to have an organisation wide classification scheme which can be used across multiple content repositories offering a consistent experience to CPA Australia staff.

A project was undertaken to develop a classification scheme that would reflect the content needs of CPA Australia. The result of the project was an enterprise classification scheme or ECS that was:

**Organisationally agnostic** – the ECS is independent of CPA Australia’s organisational structures. This means that it will not be impacted by organisational restructures.

**Scalable** – the ECS can be used to classify the member content but can also be applied to the wider organisational content as required.

**Collectively exhaustive** – the ECS should support all critical elements of CPA Australia business model and direction. If the business model changes the ECS will need to be modified to reflect that change

**Owned** – ideally the ECS will be managed by one area of the organisation but the elements in the ECS have to be owned by the relevant business area. The ECS should highlight those areas that are not owned, so that the impact on the business can be highlighted to management.

**Business Relevant** – the ECS has to be relevant to CPA Australia and the way the organisation operates. The ECS defines the first two levels of the classification structure, however in some areas this may need to be more granular.

The ECS was initially used to sort the knowledge assets that were of relevance to members but going forward the relevant categories are being applied to assets that are for internal consumption within CPA Australia.

The ECS has a limited number of level 1 categories with varying numbers of level 2 and level 3 categories (see Figure 1 for an example).

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
</tr>
<tr>
<td>Products &amp; Services</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Information Services &amp; Systems</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
The ECS will always be a “work in progress” as it has to evolve as both CPA Australia and the external environment change and evolve. Changes to level 1 are less likely, as it has been built on the industry standard and is not organisationally aligned. The possibility of changes at the second and lower levels due to legislative requirements and other influences will be more likely.

3.2 Review of the content repositories

Once the ECS was agreed and signed off in principle the next step in the content strategy was to review the content repositories and get an understanding of the size of the pool of knowledge assets.

CPA Australia has a document management system (DMS) for internal use and a digital content repository associated with its Learning Management System (LMS). The governance around the uses of these systems was not clear and content of relevance to members was found in the DMS which meant members were not able to access the assets.

A review of the digital content repository revealed a system, with robust security, version control and workflow routing – functionality that would be of great benefit to the organisation in managing its knowledge assets for members. The outcome of the review was the recommendation that the digital repository would hold all content of relevance to members and be classified according to the Products & Services category of the ECS.

Another recommendation of the review was that content for the various programs conducted by CPA Australia be stored in the same location to allow re-use of the materials. This re-use may involve taking a small amount of text from one program/product and re-purposing for delivery through an alternate channel as part of another product. The intention with housing all content together is to provide transparency to all internal staff as to what content is available. This will stop the redevelopment of the same or similar content by different areas of the organisation.

As a result of the review, a project has been initiated to rework the digital content management system and store all the knowledge assets according to the ECS. During the course of this project it became apparent that some changes to the ECS at Level 2 and Level 3 of the Products & Services category were required. These changes included the addition of some new categories at Level 3 and the renaming and realignment of one of the Level 2 categories. These changes were not unexpected as the ECS until that point had not been used in an actual situation.

Another activity that has been initiated during this project has been the development of metadata templates in the digital content repository and the assignment of metadata to the knowledge assets as they are loaded into the system. Having the metadata templates has been useful given the number of assets that needed to be loaded into the system. Using the metadata templates ensures consistent terminology and labelling of assets. The management of the metadata templates has and will continue to be created and managed centrally to again ensure consistency of terminology and application of the metadata.

3.3 Consistent use of content repositories

With the review of the content repositories, it became evident that CPA Australia, like so many other organisations, had no clear policy around the use of these repositories. As mentioned in Section 3.2 the review recommended that all content of relevance to members be held in the one digital content repository.
As well as offering a single location for staff to find content it will also simplify the long term goal of CPA Australia – the implementation of a Federated Search. Federated Searches solutions provide access to large amounts of data without indexing the data as is the case with Enterprise Search solutions (as detailed in Figure 1). Rather than building a master index, federated search engines send the user’s query to multiple repositories and through adapters is able aggregate the results into a single page. By using one content repository for storing content for members, less effort will be required in deploying the Federated Search engine.

The use of a single system for the management of content for members is also an advantage from an auditing perspective. It provides a clear picture of what is available and the currency of the content on offer. The intention is to undertake an annual audit of the knowledge assets in the repository and this will be done by a knowledge advisor in association with the content expert. This will ensure consistent management and currency of the knowledge assets. The content has been arranged in such a manner that a user can ascertain whether the materials they are looking at relate to current products or are reference materials only.

The use of a single repository is a significant change for a number of staff and training sessions have and will continue to be conducted to assist in this activity. The main issue is that most staff members use the digital content repository on an infrequent basis and the comfort with the system that comes with regular use is therefore difficult to attain. This lack of use means that users will need to refer to instructions to ensure they are doing things correctly. To this end, key staff have been identified and they are loading many of the knowledge assets into the system to guarantee the loading of metadata with the knowledge assets. Again the audit activities will provide the opportunity to review the knowledge assets for currency and details.

**End user will be able to access all content held in various repositories from their desktop.**

![Collaboration - CoPs, Wikis, Blogs, Face Books, etc.](image)

**Content Alliances.**

**Access to the learning portal and toolkits.**

**Corporate Repositories.**

**Online repository**

**Online repository**

**Online repository**

**Digital content repository**

**CPA library**

**Will contain CPA Program, PD, Publications, ITB, Submissions.**

![Federated Search](image)

**Provides members access to online materials.**

**Figure 1. Federated search**

### 3.4 Delivery of knowledge to members

One of the strategic initiatives of CPA Australia’s Corporate Plan is to:
Provide members with ready access to knowledge that enhances their career

As a global accounting body, CPA Australia must provide members with access to the knowledge offer through a variety of channels. Having the knowledge assets that make up the knowledge offer in the one repository has assisted in delivering the multi channel strategy.

As mentioned in Section 3.2, CPA Australia has an LMS and it is through this application that members are able to access materials for both the CPA Program (CPA Australia’s flagship accounting designation) and for products that contribute to a member’s ongoing Professional Development – a member must undertake 120 hours Professional Development in a 3 year period. The CPA Program and the Professional Development products can be hard copy, face 2 face or increasingly online in the form of e-documents, webinars and virtual events.

The webinars have had a very positive uptake as they allow members to access materials in their own environment. This is especially important for members who are located in country places and cannot get to face 2 face meetings which are held in capital cities. This is evidenced by this quote from a member “I live in a rural remote town in NSW, and it is the first time I have been able to access any learning apart from reading. Thank you, I hope this is the first of many, many more. It was nice to feel part of a group.” The other advantage of webinars is that they can be made available through the LMS and members can access the learning materials at their convenience or on multiple occasions. Additionally, webinars can be scheduled to run at times that take into consideration the various time zones where members are located rather than at a single time which is convenient to only a small section of the membership, thus creating a positive member experience. Another advantage of the webinars is that they are live and interactive with the presenter able to take questions via the whiteboard in the webinar tool or over the phone connection. The webinars like all other knowledge assets of benefit to the members are stored in the Digital content repository for future use or reference.

There are a number of initiatives under way to deliver knowledge via mobile applications such as Blackberrys and iPhones so that members can access knowledge even when they are offline. The first application will be venue and session details at the upcoming CPA Australia conference - CPA Congress to be held in a number of global locations from September to November 2010.

Another way members can engage with CPA Congress is via Second Life the free 3D virtual world where users can socialize, connect and create using free voice and text chat. Using Second Life a CPA Virtual Congress was launched with the 2009 CPA Congress (Figure 2) and the uptake and feedback was very positive.

![Figure 2. View of the CPA virtual congress 2009](image)
CPA Australia is committed to providing a rich and engaging experience for members and to that end has recently implemented a social media platform where Communities of Practice (CoPs) can be established to allow members to connect and share their knowledge and experiences.

Whilst the Communities are a new initiative, there are already around a dozen communities and some 400 members and there has been no active marketing of the application. This suggests that there is a need amongst the membership to have the ability to share knowledge and experiences. The CoP approach has been adopted by a number of committees and council groups as a member networking and discussion forum to keep members abreast of the latest news and events as well as member specific groups.

The online communities cover three types of interactions:
- Member to Member;
- CPA Australia to Member;
- Member to CPA Australia

The online communities have a number of tools in them which can be used by the community members.

- **Blog:** Information sharing, news updates, thought/opinion pieces, event summaries
- **Forum:** Information seeking, asking and answering questions
- **Files:** Sharing files – documents and articles with others
- **Wiki:** Collaborate on document writing

The content on these Communities is not housed in the digital content repository as the social media platform is externally hosted at present. Obviously any content of relevance will be copied into the digital content repository for future use.

### 3.5 Content life cycle management

Up until this point in the paper, we have concentrated on the creation and delivery of content to the membership. However, the currency of the content is an extremely important but an often forgotten aspect of Content Management. CPA Australia has developed a content lifecycle process to cover the management process. The lifecycle is a 7 stage process covering:

1. **Organisation** stage where the content strategy and ECS belong as well as the metadata schema and the content types
2. The next stage is called the **Business Rules** and defines the workflow rules, the roles and responsibilities as well as the policies and procedures
3. The third stage is the **Create** stage and this involves the authoring process and metadata tagging
4. The fourth stage is the **Store** stage and this is where the repositories and the file formats are defined
5. The fifth stage is called **Versioning** and elates to the version control and templates that are used
6. The sixth phase is the **Publish** stage and defines the channels and delivery mechanisms as well as the strategy for personalisation and syndication
7. The final stage of the Life Cycle is the **Archive** phase and in this stage the retention policy is defined as well as the review cycle and the archive and destroy policy

Some areas of this lifecycle such as the ECS, metadata schema and the use of the various content repositories are more developed than others like the Archive policy and the strategy for personalisation of content. That said the foundations for the management of content for members and also for internal consumption have now been laid which will
allow CPA Australia to move along the path to effective Content Lifecycle Management. This is a journey that will take a number of years to fully implement given the activities to be undertaken. After that there will be the ongoing maintenance and auditing of the repositories in accordance with policy.

4 Conclusion

CPA Australia as one of the large global accounting bodies has a key interest in managing and effectively utilising its knowledge assets which are provided to members as the knowledge offer in the form of face to face and online courses, webinars, communities of practice and various social media tools.

The management of these assets is of the utmost importance and CPA Australia is undertaking a program of work to put in place the policies and processes to manage these assets. This paper highlights some of the initiatives that have been commenced and outlines some of the projects that still need to be undertaken. The paper emphasises the importance that CPA Australia places on its knowledge assets and the competitive advantage that the good management of these assets will confer on the organisation.

The paper discussed some of key initiatives including the development of an Enterprise Classification Scheme (ECS) which can be used for all content repositories within the organisation. It also touched on the review of the content repositories and the recommendation that all content of benefit to members be stored in the one location. Mention was also made that a reduction in the number of repositories would simplify the implementation of Federated Search engine which is the long term goal for CPA Australia.

CPA Australia like so many knowledge asset rich organisations is committed to managing these assets effectively and to that end has committed the resources and time to implement the processes and systems to achieve that end.

References

Nurturing small firms in the knowledge-based economy: program and challenges

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Structured Abstract
This paper aims at providing some insights into how the knowledge-based economy trend has been embraced by Australia’s Queensland State Government, through its signature policy known as the Smart State Strategy. Through significant investments in building new research institutes, upgrading the skills of locals to attracting and retaining knowledge workers and providing support to businesses, the Smart State Strategy has helped position Queensland as an important player in the global knowledge-based economy.
A key initiative of the Smart State Strategy involves providing support to small and medium-sized enterprises (SMEs), which are now widely recognised as playing a vital role in economic activities in most countries. Despite their economic significance, SMEs are often poorly understood by policy makers and as a result some government-led programs and initiatives designed to nurture and support them may not achieve their intended goals. Using past literature a conceptual framework is developed for understanding the key challenges being faced by SMEs in participating in the current knowledge-based economy. This framework is then applied to the Smart State Strategy to assess its initiatives for supporting the small business sector. The paper argues that the Smart State Strategy has achieved some success in relation to its implementation, however, in terms of nurturing and supporting new and existing small businesses, barriers do exist that may hold up the progress of these policy initiatives.

**Purpose** - The purpose of this paper is to provide an overview of and insights into how Australia’s Queensland State Government’s has embraced the knowledge-based economy through its signature policy known as the Smart State Strategy. Specifically, the paper assesses the services/programs being provided to the small business sector under the Smart State Strategy.

**Design / Methodology / Approach** - A conceptual framework detailing the key challenges being faced by small and medium-sized enterprises is developed using past literature. This is then applied to the Queensland Government’s Smart State Strategy to assess its initiatives for supporting the small business sector. The Smart State Strategy is briefly explained, highlighting some achievements to date and the challenges that policy makers may face in providing adequate support to the small business sector.

**Originality / Value** - This paper would be beneficial to all stakeholders involved in providing support to the small business sector as well as those interested in understanding how the small business sector operates given the changing world economy.

**Practical Implications** - Provides policy makers with an understanding of the development path taken by small businesses and the specific problems they face at each stage of the growth cycle. This is important for designing appropriate support programs to enhance the small business sector.

**Keywords** - small and medium-sized enterprises, small business sector, policy initiatives, knowledge-based economy

**Paper type** – Academic Research Paper

1 **Introduction**

In most advanced and in some developing nations it has become widely acknowledged that the success and prosperity of economies and firms largely depends on the acquisition and use of knowledge in all its forms. Wealth creation is no longer determined by availability of land, labour and capital but by how well knowledge is acquired, distributed and used in economic processes. For countries to benefit from this trend they ought to re-orient themselves as ‘knowledge-based economies’. Although a small but significant amount of research has been done on the concept of the knowledge-based economy, the concept is still difficult to pin-point because there is not one universally accepted definition. In recent years, research has focused on understanding the drivers and features of the knowledge-based economy (Gera, Lee-Sing, & Newton, 2001) and what countries and regions should do or are doing to succeed in this new global economy (OECD, 2005). Numerous studies have highlighted some policy initiatives and
programs designed to help improve the competitiveness of countries/regions and cities in the new economy. While these studies have helped shed light on this emerging phenomenon, there seems to be little attention paid to understanding how the growth and development of small and medium-sized enterprises (SMEs) is being affected by the shift towards the knowledge-based economy. SMEs form the vast majority of private sector entities in most countries including Australia and play a central role in the economy. This paper attempts to address this gap by analysing some of Australia’s Queensland State Government-led knowledge-based initiatives/programs designed to support SMEs. The objectives are as follows:

- Briefly discuss the concept of the knowledge-based economy and Queensland’s Smart State Strategy
- Provide a conceptual framework for understanding the challenges faced by small firms in the current knowledge-based economy using past literature
- Analyse the Smart State Strategy using the conceptual framework and provide suggestions for designing effective programs for the small business sector.

2 The Knowledge-Based Economy Trend and the Smart State Strategy

For the past two decades, there has been an increasing interest amongst governments in both the advanced and developing nations to incorporate knowledge into economic processes as it is being recognised as playing a critical role in generating wealth. While land, labour and capital have always been the key factors of production, knowledge in all its forms seems to be taking centre stage in economic processes in today’s current global economy. Economies and firms are increasingly depending on the acquisition of knowledge to remain competitive in the changing global economic environment (Gera et al., 2001). The terms ‘knowledge-based economy’, ‘new economy’, knowledge-driven economy’, ‘new networked economy are often used interchangeably to refer to this global phenomenon that has been embraced in most parts of the world. According to the Organisation for Economic Co-operation and Development (OECD), a knowledge-based economy is ‘an economy in which the production, distribution and use of knowledge is the main driver of growth, wealth creation and employment across all industries’ (OECD, 1996).

Australia like other OECD nations has been captivated by the knowledge-based economy trend. Its well developed knowledge infrastructure, comprehensive educational system, and an open and democratic political system (Langdale & Thorburn, 2004), coupled with the commitment by the Federal and State Governments to transform the economy into a knowledge-based one, make Australia an important player in the global economy. At the State level, Australia’s Queensland Government appears to stand out in terms of how it has embraced the concept of the knowledge-based economy (DEEDI, 2008). In 1988 the Queensland Government launched the Smart State Strategy as part of the broader vision of transforming Queensland into a knowledge-based economy. Its vision is: ‘To develop a state where knowledge, creativity, and innovation drive economic growth to improve prosperity and quality of life for all Queenslanders (DEEDI, 2008). The Smart State Strategy aims at:

- creating new industries such as nanotechnology, biotechnology, ICT and creative industries
- expanding Queensland’s export performance
- reforming the education system

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• building on Queensland’s R&D capacity

With significant investments of $3.6 billion into various projects and initiatives, the Smart State Strategy has achieved some success since its inception:

• Business investment in R&D increased from $437 million to $1.6 billion between 1998 and 2006-07
• Increase in knowledge-based exports from $1.8 billion in 1988-1999 to $6.1 billion in 2008-09
• Approximately 59,000 new knowledge-based jobs have been created in the science, technology, engineering and health sectors
• Growth in Queensland’s biotechnology industry – currently has 90 companies, 66 research organisations, and a workforce of 7630 people.
• Investment of $4.4 million into the creative industry which now has 26,000 businesses across the state
• Increase in the number of businesses in the ICT industry to 5,740 with total sales increasing from $10.1 billion in 1999-2000 to $29 billion in 2006-07

Source: (DEEDI, 2008)

The purpose of this paper is not to evaluate the entire Smart State Strategy but rather to discuss some of its programs and initiatives specifically designed to support the small business sector as will be demonstrated in the following section.

3 The Small Business Sector in the Knowledge-based economy

Over the years small businesses have dominated the Australian economy in terms of the number of businesses, share of employment and GDP (Landstrom, 2005). According to the Australian Bureau of Statistics (ABS) there were just over 1.9 million SMEs operating in Australia as of June 2007 (ABS, 2008b), making them the vast majority (96%) of private sector entities in the country, employing 47% of the non-agricultural workforce. Small firms in Australia commonly operate in industries such as construction (20%), professional, scientific and technical services (11%) and agriculture, forestry and fishing (11%) (ABS, 2008a). In the last 20 years the Australian small business sector has remained steady and official data indicates that the majority of firms remain in business longer than 5 years. The distribution of SME operators generally matches the population distribution across the states with New South Wales (31.7%), Victoria (24.4%) and Queensland (21.5%) accounting for the largest proportion of the population (ABS, 2008a). In 2007, Queensland (3.7%) and Western Australia (4.7%) registered the highest net growth in the number of businesses as well as the highest business entry rates (19.0% and 19.3%) respectively (ABS, 2008b).

The shift from an industrial and natural resources-based economy to a knowledge-based economy has given rise to different ways of thinking amongst policy-makers and businesses. To maintain a competitive edge in the changing global environment, businesses will have to think and operate innovatively, particularly the small business operators if they are to play a role in the knowledge-based economy (Paige, 2002). Historically, small businesses in most countries including Australia have often been ignored in policy circles because attention was mainly devoted to large enterprises which were largely perceived as being more central to economic activities (Curran & Blackburn, 2001). However, in recent years policy-makers as well as economists and management theorists have recognised the essential role that small businesses play in job creation,
technological innovation and in the overall health of the economy (Khan & Manopichetwattana, 1989). Despite this recognition, it is argued that most policy-makers typically have a poor understanding of how the small business sector operates. This lack of understanding may impede the effectiveness of policies targeted at fostering their development and growth.

The Queensland Government has demonstrated that it recognises that the small business sector can be an important player in transforming Queensland into a knowledge-based economy as evidenced by some of the support programs and initiatives it has introduced under its Smart State Strategy as shown below:

**Table 1. Smart state strategy programs/initiatives to support small businesses**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Australian Institute for Commercialisation (AIC) established in 2002 by the Queensland Government</td>
<td>• to provide innovation and commercialisation advice, skills development and linkages to small and medium-sized firms (DEEDI, 2007)</td>
</tr>
<tr>
<td>TeQstart Pty Ltd</td>
<td>• provides financial support to technology start-up companies (DEEDI, 2007)</td>
</tr>
<tr>
<td>The i.lab Technology Incubator, established in 2000</td>
<td>• to accelerate the growth of high technology start-up businesses by linking member companies to venture capital financing, export and other business networks to assist with the commercialisation of innovative products and services (DEEDI, 2007)</td>
</tr>
<tr>
<td>The Queensland Industry Development Scheme</td>
<td>• aims at assisting knowledge-intensive small to medium-sized businesses to maximise their growth (DEEDI, 2007)</td>
</tr>
</tbody>
</table>

Through policies, governments can have considerable influence on the level of business activity in the economy because they can create either a constraining or conducive environment for businesses to operate in. While policy makers have a key role to play in creating an enabling environment where businesses, particularly early-stage and small businesses can develop and grow, some policy initiatives can actually work against the success of these firms. Clydesdale (2010) argues that when governments intervene to assist entrepreneurs, they often do a poor job which sometimes contributes to the failure rates of new businesses, excessive market entry and over investment. For policies aimed at nurturing small businesses to be effective, policy makers need to have a deeper understanding of how small businesses operate, what development path they take and what the triggers and barriers are to their success. A number of factors have been
identified in the research literature as being the reasons why small businesses may face difficulties in succeeding in today’s knowledge-based economy.

Using the Five Stages of Small Business Growth Model by Churchill and Lewis (1983) as well as reviews from a broad body of literature (Leonidou, 2004; Madrid-Guijarro, Garcia, & Van Auken, 2009; Smallbone, 1990), the key problems affecting small businesses can be condensed into four major categories: resource constraints, technical expertise, commercialisation and internationalisation. Churchill and Lewis (1983) suggest that small businesses go through a sequence of five stages of development, namely, existence, survival, success, take-off and resource maturity with each stage presenting a unique set of challenges which require different solutions. The model was adopted for this study because it clearly demonstrates the development path that small firms take and highlights the key issues/concerns found at each stage as shown below:

**Table 2.** A conceptual framework for understanding key challenges facing small firms in the knowledge-based economy

<table>
<thead>
<tr>
<th>SME stage of development</th>
<th>Key issues/concerns</th>
<th>Implications for SME support programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence</td>
<td>• Customer base and product delivery</td>
<td>• Provide more training in developing new products and markets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide more start-up capital to encourage early stage businesses</td>
</tr>
<tr>
<td>Survival</td>
<td>• Cash flow</td>
<td>• Increase access to risk capital to finance growth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provision of financial management skills training</td>
</tr>
<tr>
<td>Success</td>
<td>• Growth decisions</td>
<td>• Provide entrepreneurial and business skills training</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide incentives to encourage successful entrepreneurs</td>
</tr>
<tr>
<td>Take-Off</td>
<td>• Financing growth</td>
<td>• Provide financial assistance to support growth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Encourage competition among financial institutions</td>
</tr>
<tr>
<td>Resource maturity</td>
<td>• Maintaining control of financial gains, flexibility and entrepreneurial spirit</td>
<td>• Encourage networking, regional and international linkages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide more information on international trends</td>
</tr>
</tbody>
</table>
4 Assessing the Smart State Strategy’s support for small businesses

4.1 Early start-ups: existence and survival stages

According to Churchill and Lewis (Churchill & Lewis, 1983) small firms operating at the existence stage of the development cycle typically have fewer resources for their start-up, do not have a sufficient customer base and are unsure about the product their delivering to their customers. As firms progress to the survival stage, their concerns are mainly about generating enough cash flow to stay afloat. Under the Smart State Strategy are programs such as the i.lab incubator, Innovation Centre Sunshine Coast, Gold Coast Innovation Centre and Creative Enterprise Australia to assist early stage ventures by providing skills development, mentoring, networking opportunities, office space etc. These programs have assisted 236 client companies, created over 1000 high-tech jobs and have attracted $107 million investments into these companies.

4.2 Established small firms: success, take-off and resource maturity stages

When firms get to the success stage, their concerns shift to decisions about expanding the business or continuing operations at the same level. At the take-off stage their focus changes to how they can grow rapidly and finance that growth while those at the resource maturity stage are mostly burdened with issues of maintaining control, flexibility and the entrepreneurial spirit (Churchill & Lewis, 1983). The Innovation Centre Sunshine Coast, an of the initiatives of the Smart State Strategy, currently housing 30 businesses has what is called the business accelerator package to assist established firms by providing them with an array of services such as serviced office spaces, access to high speed internet, consulting support, investment readiness and networking for growth businesses (Graham, 2010).

Based on the Queensland Smart State Strategy Reports, it appears that some impressive results have been achieved both in relation to how this vision has been implemented and in the outcomes of its programs and initiatives. However, the following potential barriers exist that may hold up the programs from moving forward:

- **Knowledge industry sector is wide**: Small firms operate in virtually all sectors of the economy, therefore deliberate efforts to provide assistance to only high-tech businesses or smart businesses will limit the potential of the knowledge industry sector. When the concept of the knowledge industry was first introduced by Machlup (1962), the major sectors identified were education, information services, information technology, mass media and research and development. Nowadays other creative and cultural industries such as advertising, design, crafts, real estate, insurance, arts, media, business services, publishing etc are also being included. In light of this, policy makers are then faced with the challenge of identifying which sectors to target for assistance, what the specific needs are for the small firms in these sectors and in designing appropriate programs to them.

- **Access to knowledge workers**: Small firms are generally disadvantaged when it comes to accessing knowledge workers, that is, workers who “have high degrees of expertise, education, or experience, and the primary purpose of their jobs involves the creation, distribution or application of knowledge” (Davenport, 2005). Knowledge workers spark innovation and growth in the organisation, invent new products and services, design marketing products and create...
strategies (Davenport, 2005). Such workers tend to cluster around specific regions that can support and nurture their creativity; therefore proximity to knowledge assets is important. For small firms located in peripheral regions, the pressure is even more intense as these areas typically have difficulty in retaining knowledge workers. The issue for support programs is how to ensure that small firms regardless of their location can benefit from a pool of talented individuals.

- **Access to risk capital:** One of the problems that small firms in the knowledge-intensive sector face, particularly the high-tech businesses is limited access to risk capital. Most financial institutions are reluctant to fund their ventures (Colombo & Delmastro, 2002) given their risky nature (Oakey, 1995; Storey, 1994). While public support programs are making efforts in providing financial assistance to small firms in the high-tech sector, alternative funding sources such as angel investors and venture capitalists are insufficient in most places.

- **Technical expertise:** the increased importance of knowledge in today’s global economy puts firms under pressure to acquire new knowledge, particularly small firms if they are to have a competitive edge. Managers of small businesses typically have limited training in technical and managerial skills which can hinder them from thinking innovatively and strategically and can also prevent them from competing effectively in a global technology-based knowledge economy. Public support programs have the challenge of providing appropriate training that can help small firms compete favourably.

- **Internationalisation:** vast opportunities exist for small businesses in the international arena, given the changing nature of the global economy. However, small firms may face both internal barriers (resource constraints, organisational capabilities and approach to exporting) and external barriers (tariff barriers, different customer habits, and foreign rules,) which may hinder them from exploiting these opportunities (Leonidou, 2004). How can policy makers ensure that the right information on international trends and markets is provided to small businesses to help them compete favourably in the international arena?

5 **Summary and future research**

Australia’s Queensland State Government has arguably been successful in the implementation of its signature policy (the Smart State Strategy) to transform the economy into a knowledge-based economy. The commitment from both the Queensland State and Local Governments coupled with Queensland’s endowment advantages have undoubtedly contributed to the success of the Smart State Strategy. Although notable investments have been injected into various projects ranging from linking research to industry to supporting small businesses achieve their economic potential, there is more that can be done to nurture the development of a knowledge-based economy, particularly in the area of providing appropriate assistance to small firms. Small firms have always been and will continue to be an important element of the Australian economy. Although many studies have been done on small businesses in the knowledge-intensive sectors, there is more that needs to be uncovered in relation to the issues that affect their growth and development. This paper is the first step towards highlighting some of the general
issues that may hinder the success of government-led programs designed to assist small businesses participate fully in the current knowledge-based economy and realise their innovative and growth potential. Further research in this area will provide a deeper understanding of how programs and initiatives can be shaped to enhance their impact on the small business sector. Issues that need to be considered for future research are:

- The impact of government-assisted programs on the decision to establish new firms. Has the Smart State Strategy encouraged individuals to start new firms? Where are these new start-ups mostly located in Queensland? This is important for planning future programs.
- The differences between small firms in knowledge-intensive sectors and those in other sectors. Do they face similar challenges? Do they take a similar development path?
- Differences between small firms in peripheral regions and those in urban centres. Do they receive the same public sector support? If so how do they rate in terms of support?
- The specific contributions that small firms in the creative industries are making to the economy in terms of job creation, innovation and creativity.
- Knowledge sharing amongst small firms. Are small firms really co-operating and collaborating with one another?

References


Learning from the history of Dubrovnik (Ragusa) to enhance our future: the humanism of city government

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Structured Abstract

Purpose - The purpose of this work is to present the knowledge received from the history of Ragusa (Dubrovnik), a city that managed to stay free for four centuries without an army, even though it was surrounded by the great forces of the time: Austria, Venice and the Ottoman Empire. This is the city that created great structural capital for the development of citizens, and for the development of relations with other countries through diplomacy. This paper focuses on quarantine, an innovation of Ragusa created in 1377 on the initiative of its citizens. Quarantine was established at the time of great movements in the history of Europe, during the época of humanism. Humanism was the period when man started to become curious, when he started to learn about culture, history, technology, and when cities started to communicate and share knowledge. Is it any coincidence that quarantine was created during that great time? What can we learn from that example? How can we “humanise” the citizens of Dubrovnik to be creative once again by using new technologies? Is there structural capital to support new technologies? Is there a willingness to start a new humanism for the city of Dubrovnik, and how can we reach such a tipping point?

Design/methodology/approach/practical implication - The paper is based on primary and secondary sources. The primary source of data was collected by conducting interviews with citizens of Dubrovnik (some of the interviews are available at http://www.youtube.com/watch?v=-0M9cUBgMV1), Dubrovnik historians, Dubrovnik tourist guides and from interviewing professors at the “IC Future Seminar”. Secondary sources of information were books and websites listed in the references. The paper was designed to explain the process of innovation in old Ragusa, and to apply that knowledge to enhancing the future of Dubrovnik. The article presents not only the theory of creating an innovation, but it also tries to find out how to transform that theory into practice, to create a new innovation in Dubrovnik to reach a tipping point for it to became one of the knowledge cities of the 21st century.

Keywords - Ragusa, humanism, quarantine, citizen, Idea Factory

Paper type – Academic Research Paper

1 Introduction

Ragusa was a small city state on the coast of the Adriatic Sea. In the period from 1272 (the first urban planning system) until the fall of this city state in 1808, Ragusa enjoyed good living conditions and was able to innovate. It started to provide medical services in
1301, opened the second oldest pharmacy in Europe (1317), built the first quarantine (1377), and so on (Harris, 2006). But it was also the first to abolish the slave trade (1416), and the citizens of Ragusa were the first to give diplomatic recognition to the USA (1783). They created great conditions for human development. Ragusa was a city state without an army, and it was able to keep its independence for more than five centuries although it was surrounded by the Ottoman Empire, Venice and Austria. But what is the main difference between Ragusa and other potential cities of knowledge like Alexandria, Baghdad or perhaps Rome? The main difference is that Ragusa was created with the power of knowledge and was able to stay free for five centuries, applying that knowledge in diplomacy. It adapted to new conditions with the information gained from the first ever organised system of intelligence. With more than 80 ambassadors, it was always informed of the situation in the world and often used this information to keep its freedom.

1.1. Structure of the city administration

It is very important to mention the structure of the city administration:
- The Grand Council (supreme governing body) consisted of nobles that took their seats in the Council at the age of 18.
- The Small Council (executive power) was elected by the Knez or Rector.
- The Senate worked as a consultative body. It consisted of 45 invited members (over 40 years of age).

The city was ruled by the nobles, the class below them consisted of citizens (mostly merchants) and the lowest class was constituted of servants.

![Diagram of the city administration structure](image)

**Figure 1.** The hierarchy in old Ragusa

Ragusa prospered in freedom in the world in which it lived because its ruling families and governing doctrines were based on its unique culture. The rules below were typical:
- It is better for a republic to be governed by laws than by men.
- A prince by election is better than one by succession.

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- Citizens of moderate means better love their princes and country than the rich, who refuse to have anyone above them.
- To govern a republic, it is best to imitate the great god of nature, who does everything little by little, almost unobserved.²

With this unique way of thinking, Ragusa was able to be innovative and creative, and was always open to new ideas. The product was one of the most important innovations of Ragusa: quarantine.

2 Quarantine

The Ragusa quarantine is a unique historical example not only because it was the first quarantine ever created, but also because it was established on the initiative of citizens, to be accurate, by the merchants. But what was the story behind this innovation? The fourteenth century was a period when the plague struck the population of Ragusa. In the chronicle of Dinko Ranjina, we can see that 170 members of the Ragusa nobility, more than 300 wealthy citizens and more than 1,000 citizens died of the Black Death. It was very important to find a solution since Ragusa needed to continue with its maritime and other trade. Other countries like Venice decided to forbid the entry of all ships to their port. Ragusa wanted to stop the plague but they did not want to halt trade. The government made a decision in 1377 that every ship with a crew that came from infected lands needed to spend a month on the islands near Ragusa.³ The decision was made based on the experience of Ragusa traders. Academician M.D. Grmek wrote: “...the Dubrovnik (Ragusa) administration came to the idea of quarantine thanks to experience with isolating those who were sick with leprosy”. So what path led to this innovation?

Figure 2. The path to the new innovation: quarantine

What are the main conclusions to be drawn from this example? Again, we see an innovative way of thinking. The greatest part of the Ragusa economy was trade, and the

³ Searcher, A. (1968.): Medicinska enciklopedija, Karantena (pp. 591-597), Jugoslovenski leksikogravski zavod, Zagreb.
plague was a serious threat. It was very important to find a new way to adapt to this new situation. What were the two main reasons for successfully adapting? Organised intelligence (merchants as one part of the intelligence), and an openness to new ideas. The city government used the experience of their citizens and created an innovation that saved their economy and made them even richer.

3 The humanism of the city government

What have we learned from this example and how can we apply such knowledge using new technologies like web 2.0, or web 3.0? First of all, how can we support the citizens proactively? How can we use web 2.0 to create a city filled with ideas that will improve living conditions? How can we use the citizens’ brainpower?

One possible answer is the “Idea Factory”, a collaborative and co-creative platform for starting new initiatives, or for finding possible solutions for existing problems. This platform could be part of an existing official city website, or a separate platform. How would that work? Every citizen would be able to connect to the platform. They would be obliged to create a profile, and then they would be able to start an initiative, to provide solutions to existing situations, or to vote for the best initiative or solution. Voting and commenting would start once ideas were uploaded. There would be some rules. Ideas would be welcome from anybody, but only the citizens of the city would be able to vote. Anyone who uploads an idea would lose the right to vote. After a period of time (for example one month), the voting would end and the city government would gain market research about the preferences of the citizens and it would use the given information to start a project. Before starting a project, the city mayor would create a virtual round table with other mayors to share knowledge about the possible project. In this way, organised intelligence would be created, similar to that enjoyed by the old Ragusans.

3.1 The process of an idea community:
- Registration on the platform – on registration, citizens can start an initiative, post a solution, or just vote for an interesting idea
- Creating a profile – basic information on the user
- Starting an initiative or giving ideas for existing situations by the community
- Voting by the community for initiatives, or thumbs up for solutions
- The city government considers the best initiative and solution
- Virtual round table with the other cities with similar experiences
- Starting the project
3.2 From theory to practice

How would that work in practice? Let us take Dubrovnik and building a new interactive museum for our case study. How can we start an initiative if we are not a part of the city government? With an “Idea Factory”, this is pretty simple. We create a profile on the community platform. We would have limited time to write an abstract, for example, until 1st February. Until 1st March the community would be able to make comments and give a thumbs up or thumbs down for the project. If the community supports the idea of a museum, the government would take it under consideration. Before starting the project, the mayor would create a virtual round table with, for example, the mayors of Bilbao, Shenzhen and London. With their experiences in building an interactive museum, the project could be started.
4 Target market

We need to ask some questions vital for the project. Is there demand for something like the “Idea Factory”? Is there a target group that has the ambition, proactive drive and know-how to use web 2.0? Is there even infrastructure to support this process?

4.1 Structural capital

The answer to the question about structural capital in Croatia can be found at the Croatian Central Bureau of Statistics (www.dzs.hr). From their database we can find information on households equipped with information and communication technologies. 55% of households have a personal computer, which is 2% more than in 2008 and 6% more than in 2007. Another important question is how many have internet access. Only 50% of households have internet access, which is 5% more than in 2008, and 9% more than in 2007. 82% of people use a mobile phone, which is an increase compared with 2008 (81%) and 2007 (77%).

4.2 Human capital

But is there proactivity and a willingness even to be proactive and use the “Idea Factory”? This was one of the key questions in this study. Primary research conducted on the streets of Dubrovnik showed that there is considerable ignorance among the citizens of Dubrovnik about their own history, and that the government has no long-term vision for the future of Dubrovnik. The best response to that ignorance is an interactive museum that would be started as an initiative of the community, in this case, by eSTUDENTS. The Idea Factory makes it possible for everyone to start an initiative, and provides every citizen with the opportunity to support that idea. The main question is whether the museum can be the tipping point to start the new humanism of Dubrovnik?

5 Conclusion

Why humanism? Humanism was the period of late medieval history, where the main carriers of change were the Italian cities of the 14th century. The period was characterised
by ancient philosophy and its integration in medieval Christianity and faith in the ability of man. The ideal of humanism was the Renaissance man (l’uomo universale), developing the mind and the free spirit to question existing paradigms. The aim was also to learn about the social and natural sciences. Humanists were a special class, a class of scientists and artists. Humanism was focused on man and on his needs. Cities started to communicate and the product of that new trend was a great period of human history, the Renaissance. Accidentally or not, quarantine was created in the period of humanism, and, let us remember, it was built on the initiative of citizens.

There is an array of connections between humanism and the period we live in. First, we are living in the period of Knowledge Cities, and formerly the main carriers of humanism were cities. The Renaissance man was educated and curious. Today, we have knowledge workers who are also educated and curious. Humanism was oriented on Ancient Rome and Ancient Greece, while today we are exploring the history of Ragusa as the first Knowledge City. The product of that exploration is the “Idea Factory”. This is a process that is based on man, on the community and the ability of people to create value for their city and to achieve economic prosperity. Are we entering a new Renaissance, and can we make an “Idea Factory” part of every Knowledge City in the modern world?

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Abstract

In this presentation Yossi and Edna will focus on their long experience of working with cities on urban renewal issues.

Specific focus on two stories: Yossi will tell the story of the Jerusalem Y – the largest community center in Israel located on the border between a wealthy and a poor neighborhood and how a very dynamic outreach program of services for the very young all the way to the very old helped integrate these two communities around the community center.

Edna will tell the story of a strategic process in Tel-Aviv focused on making Tel-Aviv attractive for young families through special programs designed by the municipality. The challenge was to cope with the problem of Tel-Aviv being attractive to young people only till they start building their own families to then move out into the suburbs. The process engaged all stakeholders - parents, teachers, managers, academia and industry - in a learning process out of which emerged the strategy for unique municipal programs to make the young families stay in the city to ensure a healthy age mix which is a key success factor for sustainability of cities.

Keywords – knowledge city, young, knowledge cafe, community centres’.

Paper type – Practical Paper

1 The story of the Jerusalem Y

The Hebrew youth center started to function in 1950, since then its activities have expended. After the Six Day war in 1967, the Jewish Welfare Board (JWB) felt the need to help rehabilitate Jerusalem. The JWB collected donations and in 1968 the new building for the Young Men and Women's Hebrew Association (YMWHHA) was ready for use. The YMWHHA is the first and the largest community center in Israel and it is inspired by the
Jewish community centers system in the U.S. and Canada and the Jewish settlement houses system. It is a symbol for the contact and involvement of the U.S.A Jewish community centers (today it is called that JCC- Jewish Community Centers Association of North America). The center’s first professional director Dr. Florence Metvch brought to Israel the term “group community work” includes using public management and community volunteers’ in a multi age community institution. The center served and is still serving much of the residents of Jerusalem in all ages: children, teenagers, adults and retirees. One of its advantages is that the center hosts a variety of activities, sports and health, leisure, education, culture, art and activities for new immigrants (http://www.betanoar.org.il).

Yossi was the Executive director of the YMWHA. The time was 1974, few months after the Yom Kippur war in Israel, the polarization between poor and wealthy people, and between the oriental ethnic groups and the Ashkenazic ethnic groups, in Israel in general and in Jerusalem in particular was at its peak. In Jerusalem most of the people were poor, some were academic people and some were government officials. The deprived levels of the society in Jerusalem were oriental ethnic groups; they were gathered in a few neighborhoods, the main one is called Katamon 1. The Unemployment in Katamon was very high. On the other hand a small number of wealthy neighborhoods rose: Gevaat Mordechay, Nayut and Rechavia. Against this background the Neighborhood rehabilitation project begun.

Naturally the YMWHA became the place where all the programs became alive. The center was located on the border between a wealthy and a poor neighborhood and could host all the variety of programs in its different facilities: kinder garden, Olpan for New Immigrants to study Hebrew, elderly club and Sports facilities for classes.

The problems in the YMWHA started when contrasting groups of people interfaced each other in the sport and cultural activities. The source of the fermentation is the polarization between religious and non religious and between oriental ethnic groups and the Ashkenazic ethnic groups. The residents of the Katamon neighborhood headed by Charley Beton (the leader of the black panthers) claimed that the center is theirs. The fermentation became to its peck when it was decided to start collecting an entrance fee according to the person’s financial capability, so that there will be money to rehabilitate the neglected building.

Here rises the question how to consolidate the parties using the strong will and the exciting building?

A meeting with Graynom Berger one of the YMWHA leaders raised the idea of creating a group of lay leaders. This group of people was opinion makers who do not have a formal position in the community. The extremists were silenced by collecting names for the lay leaders from the local leaders. The group included 26 chosen people from the different communities surrounding the center, who over went a leadership course of six months. Part of the people who took the course was chosen to be members of the center’s management. They also formed the sub-management teams for each activity that took place in the center. The demonstrations gradually decreased and people got used to pay the symbolic entrance fee.

The center planned a very dynamic outreach program of services for the very young all the way to the very old what helped integrate these communities around the community center. Examples for activities that was regulated during that time in the program: A separated time for the Neturei Karta community; Camps for youngsters during the summer and holiday vacations.

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The Hebrew youth center had a significant contribution to the cultural order and discussion. The center became byword and people came to visit it from all the U.S.A.

2 The story of a strategic process in Tel-Aviv focused on making Tel-Aviv attractive for young families

A healthy city is a city that combines people from all ages. The challenge was to cope with the problem of Tel-Aviv being attractive to young people only till they start building their own families to then move out into the suburbs. The master plan was to develop and improve the early childhood services that would attract the young parents to stay in Tel-Aviv. This could only be done by strengthening the cooperation between the various stakeholders. Development and implementation of the plan was accompanied by the consultant team from Edna Pasher PhD & Associates.

One of the main problems cities around the world including Tel-Aviv, face is stagnation. Some cities have reached the point where they no longer renew their services, implement their infrastructures or invest in human capital. Hence, they are losing their overall appeal to citizens in general and specifically to the younger educated group (Levin-Sagi, Pasher & Hertzman, 2006).

Knowledge cities aim at stopping this stagnation. Among the different definitions one finds for a knowledge city there lies a generic definition of the concept, which focuses on the strategic objective of a knowledge based development of a city “by encouraging the continuous creation, sharing, evaluation, renewal and update of knowledge... achieved through the continuous interaction between its citizens and simultaneously their interaction with citizens of other cities. The citizens’ knowledge sharing culture as well as the city’s appropriate design, IT networks and infrastructures support these interactions” (Ergazakis, Metaxiotis & Psarras, 2004). At the core of knowledge cities is the capability to generate and apply knowledge onto the creation of new ideas and innovations, which stimulate the making of competitive products, services and procedures for the advancement of the city (Amidon, 1993).

The key source for competitive advantage among cities, as well as any other organization, is the knowledge rooted in people, its intellectual capital (Kotkin & Devol, 2001).

A town that wants to evolve into a knowledge city must, in many cases, empower its residents into knowledge citizens. Such change should focus on citizens’ perceptions regarding the level of involvement and influence they have on the city’s life, as well as the extent to which they are willing to contribute to the shaping of the environment in which they live (Goldberg, Pasher & Levin-Sagi, 2006).

Those elements of knowledge cities are suitable for the process described below.

2.1 The process

The preliminary mapping stage: The first stage of the project was initiated in 2000. Four people were members of the premier team they were representatives of four different departments at City Hall. They collected information about the target population and preschools, so that they would have a full view of the current situation. The forum decided to summon a steering team for the project that would consist of officials who have authority and influence, are creative, service providers and consumers. They were representatives of organizations such as: Ministry of Social Affairs and Labor; officials from the Municipality- education, planning, psychological service, social services;
ministry of education and culture – supervisor; parents; kindergarten teachers; voluntary organizations, as well as experts from the academia and industry.
The first complicated step was gathering all the stakeholders in one place to encourage human conversation and collective learning of the issue. The idea was to use the methodology of Knowledge Café. The knowledge café is a distinct method that enables conducting effective brainstorming sessions with a large group of people. From the working assumption that involvement generates commitment, came to life the idea of the knowledge café sessions that are discussion forums to discuss issues of strategy and management. The meeting takes place over a cup of coffee, in little groups around small tables that allow intimate knowledge sharing. The participants in the meeting suggest ideas and thus become committed to later implement them. The basic principles of the ‘knowledge café’ are: open rather than judicial discussions; listening rather than arguing; creativeness and “outside of the box” thinking; focusing on solutions rather than problems; involving all the members in the discussion (http://www.theworldcafe.com).
The advantages of the knowledge café in this case was that the municipally could get a wide range of creative ideas from experts who have different perspectives and hopefully become committed to implement the ideas.

Conversations are seen by some scholars as a ‘‘unifying principle’’ for the generation of innovation in corporate, as well as urban, environments (Stewart, 2001; Dvir and Pasher, 2004). Knowledge cafés encourage a culture of conversing. A culture of conversing promotes what is required in order to adapt successfully to change and the unknown (Stewart, 2001). Tresman, Pasher & Molinari (2007) add that the benefits of a tolerant and conversing culture, created through continuous interaction between regions, are acceptance and respect, trust, co-operation between and within groups, creativity, inclusion, participation and ethical behavior. In this process people feel and become part of the decision-making process and community building, generating new ideas, participation, knowledge, issues to be dealt with, and ways of dealing with them.

In a culture where dialogue, communication and conversing are common, people feel confident to express their thoughts and ideas in regard to questions that matter. A culture of trust enables the creation of ‘‘new knowledge which is created from questions that arise in conversation’’ (Stewart, 2001).

In the Tel-Aviv knowledge café two questions were raised. The first was – what are the issues that we need to pay attention in the strategic planning, so that we could provide a quality and comprehensive response for all the infants and their family needs? On the second round the groups were asked to choose one issue and suggest how can the municipally handle it.

Examples of ideas that were raised in the knowledge café: Long learning day (till 4pm); adding green areas in a walking distance; establishing an information center for parents that will bring together all the information.

Diagnostic stage: In this stage an organizational diagnosis was performed. The diagnosis included personal interviews with a variety of officials in the municipally, three focus groups and the conclusions from the previous stage. The purpose of this stage was: lessons learned from the first stage of the process; mapping the organization's expectations from the strategic process; mapping the current situation in the area of early childhood and needs; identifying potential concerns; setting key success factors; and raising strategic dilemmas.

Planning stage: Formation of a general strategy that included: municipal vision for early childhood field, guiding values for developing the services in the field and a charter for collaboration between all the factors that are involved in the city. Those were decided upon a wide consensus of the extended steering committee.

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In addition, a workshop for writing an operational action plan was held. The workshop focused on discussion of a limited number of issues. These issues arose from dilemmas that were mentioned in the diagnosis. Each issue was discussed by a small work team that suggested a clear vision of the issue in question, courses of action and a first pilot for immediate implementation. From the workshop products the next steps for implementation were determined.

In the end, the process engaged all stakeholders in a learning process out of which emerged the strategy for unique municipal programs to make the young families stay in the city to ensure a healthy age mix which is a key success factor for sustainability of cities. Exposure and involvement of the entire city including the mayor in this process was the most important factor for the program’s success.

Stewart (2001) says: “Creating a positive future begins with human conversation. The simplest and most powerful investment a member of a community or an organization may make in renewal is to begin talking with other people as though the answers mattered.”

As Tresman, Pasher & Molinari (2007) claim, the ability to create a connected and conversing network of key players (industry, academia, schools, health, government), as happened in this case, reflects on the city’s ability as a system to adapt to internal and external changes and utilize the value of a heterogenic society, not only in the way of tolerance but in the creation of value and knowledge from this diversity. In many ways, knowledge cities derive their beauty from their openness to varied voices inside them, and their ability not only to tolerate diversity but also to use it as a source for knowledge and development. There is no doubt that the city’s biggest knowledge pool lies nowhere else but in the minds of its citizens, workers and managers. The Tel Aviv municipality succeeded to exploit it in a well designed process.

References
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Structured Abstract
Holon is adopting an approach promoting ongoing renewal, innovation and the pursuit of knowledge and information within the organization and from the organization outward. Over the last 17 years, the City of Holon underwent a process of branding and positioning as the “City of Children”. This process is the result of the urban vision whereby Holon would be a leading city in the lives of its children, enabling them to become familiar with, be exposed to and learn through a wide range of activities geared for children. This process is reflected on various municipal levels. One of them is the establishment of a broad range of facilities providing children-oriented services. For example, Holon is home to the Save a Child's Heart (SACH) Association; The Israel Children's Museum featuring various exhibitions, such as "Dialogue in the Dark" led by blind guides and "Invitation to Silence" led by deaf guides.

Alongside these facilities, Holon also promotes the nurturing and enrichment of children in open urban spaces through the original Story Gardens Project, held in public gardens. Another aspect of children's cultural life is the diversity of special events and festivals such as Holon's Adloyada (Purim parade), the International Puppet theatre Festival; the Sounds of Childhood Festival, and many more. Alongside all of the above, there are numerous year-round activities which are of ongoing interest to both children and teenagers. Such are the diverse "Community & Leisure” activities offered in the
municipal library network, sports centres, entertainment and recreation centres etc. Another dimension in Holon's branding process as a "City of Children" relates to the activity of the municipality's children-oriented units. Within the scope of the annual work plans each unit must accomplish something incrementally new that is children oriented. By so doing, the Municipality ensures that its vision is indeed becoming reality.

**Purpose** - The purpose of this paper is to demonstrate a transformation of a city. This is a story of the renewal of the City of Holon which over the past seventeen years, has succeeded in changing its image, positioning it in public awareness as a city with a positive image, a lively and well-kept city, offering a good quality of life for its residents and an abundance of leisure and cultural activities for everyone, with special focus on the needs of the family and the younger generation.

Over the last 17 years, the City of Holon underwent a process of branding and positioning as the "City of Children". Today, Holon boasts the unique identity of the "City of Children". This process is the result of the urban vision whereby Holon would be a leading city in the lives of its children, enabling them to become familiar with, be exposed to and learn through a wide range of activities geared for children. Holon's transformation into a City of and for Children began with the election of Motti Sasson as the City's mayor and Hana Hertsman as the Director General of the Municipality of Holon in 1993.

This paper will unfold the story of Holon's transformation from three perspectives: management, knowledge based development and organizational. This paper aims to share with others the experience and know-how that the senior management of the municipality of Holon has gained.

**Approach** - In this paper we propose an approach that combines three major perspectives: (1) management, (2) knowledge based development and (3) organizational which are all intertwined yet differentiated. Each perspective, will contribute an additional facet to the story of a city that has not only transformed itself, but has also become a role model and a case study for many other municipalities.

The perspective of "management" is basically the lens through which this story is told and what made it possible. The transformation of the city of Holon wouldn't have been possible if it weren't for the change in management and the nature of the new management.

From an organizational perspective the city of Holon had to undergo tremendous changes in order to transform itself.

Creating a vision and a strategy, assuring that each major decision is taken on the basis of data and knowledge accumulated by the senior management of the municipality and by its employees is a fundamental issue which enabled the transformation of Holon, and thus is the final perspective we offer in this paper.

**Originality/value** - Our approach enables readers, both practitioners and academia, to connect and learn from the story of the transformation of the city of Holon from a dormant suburb to a thriving center of culture, leisure, and education. Since we bring different perspectives we believe that different readers which exhibit different needs may find and learn from Holon's experience.

**Practical implications** - This paper describes a story of transformation which has many relevant implications both to practitioners who wish to learn from our experience and for academia professors who research the subject. Throughout the paper the reader may find useful tips, information and conclusions that may assist him/her in promoting similar changes in his/hers municipality or research field.
Introduction

Holon is a young city. It was founded in June 1940 with the merger of five Jewish neighborhoods to the south of Tel Aviv – the Greene neighborhood (1929), Moledet (1934), Agrobank (1935), Kiryat Avoda (1936) and the Am neighborhood (1937) – following a decree issued by the British Governor. This year Holon is celebrating her 70th anniversary. Since the city was founded on sand (Hol in Hebrew) dunes, the inhabitants of Kiryat Avoda naturally named their settlement "Holon".

Holon is situated on the central coastal strip, adjacent to the Mediterranean, in the southern part of Gush Dan. To the north, it borders on Tel Aviv, Azor and the Mikveh Israel Agricultural School; to the east and the south, on Rishon LeZion and to the west, on Bat Yam. The main interurban roads leading to the city are: the Ayalon Highway (highway no. 20), the Tel Aviv-Ashdod Highway (highway no. 4), the Tel Aviv-Jerusalem Highway (highway no. 1) and HaShiv'a interchange, the Jaffa-Ramla Highway (highway no. 44).

Motti Sasson was elected Mayor of Holon in the elections that took place in October 1993. Two months later, Hana Hertsman took on the job of Director General of the Municipality. The two took over a city that was suffering from a negative image among the Israeli public, which didn’t necessarily match the satisfaction Holonites themselves felt for their city. This image was very hurtful, not only to the residents, but also to the attractiveness of the city.

A survey carried out by the Geocartography company, which was commissioned by Motti Sasson and Hana Hertsman when they took up their positions, confirmed what they already knew and felt very well: while the people of Holon felt satisfied with their city, in the eyes of the residents of the other cities in the Tel Aviv Metro area, Holon was considered an unattractive city. Most of the residents of The Tel Aviv Metro area admitted that they had never visited Holon, but this didn’t prevent them from holding a negative opinion of the city. Those who had visited Holon had a good impression of it, or at least their opinion was more positive than those who had never set foot in it. Change was, therefore, necessary, and a strategy was required to implement it.

In order to define exactly what was needed to achieve, a vision for the city had to be formulated – a vision that would come to serve as a founding document and road map from which the organizational structure of the municipality, and later on the actions required in each and every one of the municipality departments, would be derived. On this basis the budget would build and allocated, while recruiting the most appropriate people from within the organization or from outside. During the vision formulation stages, the city’s management was assisted by a number of think tanks, with the participation of well-known experts (people from academia, writers, experts on cultural matters, etc.) and through public participation the city’s residents were asked to discuss various issues connected to the development and future of the city.

Among the points of strength that were suggested was the family atmosphere of the city of Holon. Its small area and building density created tremendous intimacy among the residents of Holon. The close acquaintance and mutual assistance that resulted from this led to a warmth that was noted as characteristic of the city and one of its advantages – and one of the reasons why families enjoyed living in Holon. Another advantage was the
city’s good quality educational system. But in order to exploit these points of strength to attract young and established families, which are needed for the future development of the city, Holon’s educational system had to be treated in a way that would create a renewed, unique and significant momentum.

For the first time in a local authority, seven deputy director general were appointed, all subordinate to the Director General, and each responsible for coordinating one part of the vision. A special deputy director general was appointed to deal with industry and commerce. The creation of this unique role served to highlight the importance that the city management gave to the promotion of the issue – and to the need to provide a proper response to the surrounding cities, which had taken serious bites out of a field where Holon was formerly the leader, with an industrial zone that was the second largest in Israel. This organizational reform was necessary in order to best achieve the goals and targets set by the city's vision.

In a long and fascinating process, in which Mayor Motti Sasson took a very active part, emphasizing the centrality of education in the city’s vision, the final text of the vision was completed. It was not very different from the draft version composed by Hana Hertsman, but a few points of emphasis were added in line with the ‘individual visions’ of the deputy directors general. The final, expanded vision referred to the various aspects of life in the city, while emphasizing its uniqueness. This vision was improved and enhanced over the years, but always included the most important elements for the development of the city (EPA Group, 2010).

2 Making the change

The transformation process of Holon is reflected on various municipal levels. One of them is the establishment of a broad range of facilities providing children-oriented services. The following are among the facilities established over the years:

- The "Begova Haenayim" Gallery provides artistic and cultural enrichment for young children and offers activities designed to familiarize children with topics such as: mathematics, electricity, the eye, the law of connected vessels, brain games, etc.
- The Havayeda is an interactive science center that introduces children to the world of science.
- The Mediatheque boasts an innovative library, a special section designed especially for children and a unique theater geared for young people with original productions, activities, workshops as well as a behind-the-scenes look at the theater world.
- The Israel Puppet Center incorporating: The School for the Art of Puppetry; The Israel Museum For the Art Of Puppetry, which offers puppet workshops for children as well as puppet theater.
- The Israeli Center for Digital Art is dedicated to introducing the world of video art to children and young people.
- The Israeli Museum of Caricature and Comics runs workshops for children.
- The Israel Children's Museum attracts visitors from all over Israel for a fascinating experiential tour and unique revolving exhibitions, with an emphasis on tolerance for differences between people. The museum features various exhibitions, such as "Dialogue in the Dark" led by blind guides and "Invitation to Silence" led by deaf guides.
Alongside these facilities, Holon also promotes the nurturing and enrichment of children in open urban spaces through the original Story Gardens Project, held in public gardens. The Story Gardens feature environmental sculptures created by well-known artists and inspired by famous children’s stories and fairytales. Even the street furniture has donned a character all its own – as such, throughout the city, one can find public benches designed with children in mind, in the spirit of the "City of Children". Eighty such benches have been strategically placed in public gardens. These colorful, child size benches are unique to Holon.

Another aspect of children's cultural life is the diversity of special events and festivals such as Holon's Adloyada (Purim parade), the country's biggest Purim carnival in recent years; the International Puppet theatre Festival; the Sounds of Childhood Festival, which introduces children to the performing arts in general and to music and dance in particular; and the Israel Festival in conjunction with the Mediatheque's youth theater offering both original and global performances as part of the National Festival events, thereby creating a new niche – namely the Israel Festival for Children in Holon.

Alongside all of the above, there are numerous year-round activities which are of ongoing interest to both children and teenagers. Such are the diverse "Community & Leisure" activities offered in the municipal library network, sports centers, entertainment and recreation centers such as the "Spark Yamit 2000" Water Park with its state-of-the-art water slides and spa facilities and other unique centers. Young children's needs are extensively met in after-school care programs, daycare centers, afternoon childcare settings and enrichment programs, while the needs of older children and teenagers are catered to through clubs and activities tailored to age requirements and changing trends.

Another dimension in Holon's branding process as a "City of Children" relates to the activity of the municipality's children-oriented units. Within the scope of the annual work plans of the municipality's units, the advancement of Holon as the City of Children is presented as a municipal priority (a topic that the municipality's management wishes to promote). Accordingly, every year, each unit must accomplish something incrementally new that is children oriented. By so doing, the Municipality ensures that its vision is indeed becoming reality. The following are examples of municipal, child-oriented endeavors: The Education Administration handles all matters pertaining to elementary and post-elementary education, person-centered care, psychological service, educational welfare, and so forth. The Engineering Administration plans child-oriented signposts, bicycle paths, new educational and cultural facilities, etc.

The Infrastructure Administration oversees the construction of educational facilities, upgrades the educational environment, builds public gardens tailored to children's needs with children oriented playgrounds and furniture and of course, story gardens exposing the children to children's literature, the art of sculpting and leisure and entertainment activities in an enriching and educational environment. The aim of this project is to enhance awareness of, and love for, children's literature and to tell the younger generation and recent new immigrants all about the heroes of children's literature in Israel. The "Story Gardens" project was conceived as part of the "green lungs" of Holon, which is one of the greenest cities in Israel. Holon's green areas are currently spread over 300 acres (an area which will double over the next few years), about 6500 trees adorn the city and its avenues and 150 thousand flowers are planted throughout the city every year. The 30 Story Gardens are spread across the city's various neighborhoods. The Municipality of Holon invested a great deal in developing each of the sculpture sites, surrounded them with greenery and supplied them with benches and playground equipment for children. A
great many visitors from Holon and elsewhere grace the City of Children and enjoy the privilege of sharing a chapter from the history of art and culture and of reacquainting themselves with several of the most prominent works in classic and contemporary children's literature.

The Trade and Industry Administration is in charge of environmental education. Similarly, the municipal subsidiaries (including the Leisure and Community Network, the sports and recreation centers, the Children's Museum, the Mediatheque and the Holon Theater) strive to promote the vision of the City of Children on an annual basis. Some of the municipal subsidiaries, such as the Israel Children's Museum – unique in its kind in Israel – or the Mediatheque are child and youth-oriented.

Since 1997 Holon has a 'Municipal Service Treaty'. The treaty is a commitment document specifying the services provided by Holon Municipality to the customers it serves. The treaty is external and internal, whereas: The External Treaty specifies the services provided to residents, business owners and property owners in Holon. The Internal Treaty specifies the services provided by the municipality to its employees and various departments. Holon's Municipal Service Treaty is based on a specification of a "range of services", which includes the main services provided by each department. A quantitative level of service is set per each service, as well as tools for control and evaluation.

The Holon's Municipal Call Center deals with Holon residents' calls in case of emergency and different issues requiring immediate attention. Active 24/7, the call center forwards the call to the relevant municipal departments. The issues are handled according to the timetables set as part of the "Municipal Service Treaty" and their urgency. In addition to urgent problems, the call center can be contacted regarding any questions or inquiries about the city of Holon in general, including information not directly related to the municipality, e.g. pharmacies opened during the night, movies screened in the city, bus lines around the city etc. The call center is not limited to incoming calls made by residents, but rather operates a fleet of patrol cars of which purpose is to patrol the city, learn from residents about hazards, locate problems and forward them to the relevant municipal departments. In some cases, the patrol car team carries out the repairs. In addition to these, the call center management holds regular surveys regarding resident satisfaction with the way their complaints are handled. Among the topics surveyed are representative's attentiveness, quality and time of service etc.

The Municipality of Holon conducts periodic surveys, which have revealed that Holon is branded as The City of Children, not just among its inhabitants, but also among the Israeli public as a whole. A survey conducted in March 2009 showed that 62% of the City's inhabitants pointed out that the nickname of "The City of Children" very accurately describes Holon, 32% indicated that it describes Holon to a certain extent and only 6% stated that it is a poor description of Holon. For the sake of comparison, in 2006, 55% of the City's inhabitants pointed out that the nickname of "The City of Children" very accurately describes Holon, 36% indicated that it describes Holon to a certain extent and 9% stated that it is a poor description of Holon.

In a survey conducted in 2006 among the Israeli public at large, 43% pointed out that the nickname very accurately describes Holon, 35% indicated that it describes Holon to a certain extent and 21% stated that it is a poor description of Holon. In other words, the image of Holon as the City of Children is also well anchored among the public at large.
Holon is the recipient of multiple prizes and prestigious titles awarded to the city by various objective entities in all areas: economy, education, environmental quality and green areas, quality of service and more.

Based on the aforementioned, the city's uniqueness as the City of Children is evident in the daily municipal efforts, the city's large number of child-oriented institutions and organizations, the volume of activities and courses geared for children, the work plan, the rise in the city's population of parents and children, the loyalty of its inhabitants, their lack of desire or intention to leave the city and its image in the eyes of the Israeli public.

Throughout this process we have learned that the process of urban change is a lengthy and long-term process. One must start actions that will bear fruit in the long term together with short term steps and celebrate ‘small successes’. Emphasizing the small but significant details, such as landscaping, gardening and signage is very important while transforming a city – all these attributes contribute much to the feeling, among residents and visitors, that the city is well-managed.

Another element which is extremely important in the transformation is defining a joint vision which resonates with all the municipal managers, so that they will cooperate and strengthen team work within the organization. When deciding to initiate change, one has to define the specific goals to be highlighted. In the case of Holon, these included an emphasis on cleanliness and the appearance of the city, and promoting the subject of children and education in the city. After defining the vision and the goals, there is a need to define a clear strategy for action that is closely connected to the goals.

The definition of Holon as “The Children’s City” was important in that it gave the city a definition along the lines of “Holon is...” – a way of identifying and differentiating it from the other Tel Aviv Metro area cities. In the same manner that Holon used what exists while intelligently adapting it to create new value so can other municipalities.

Leaning on professional experts (such as landscape architects, educational philosophers, and academics) from various fields into the renewal process, and encouraging the involvement of residents through public participation, emphasize that the process is genuine and not just a trumpet ‘on behalf of’ someone or a tool for the promotion of political objectives (EPA Group, 2010).

3 Knowledge based development in Holon

Holon's municipal strategy is inspired by the city's vision. At the start of each year, the Municipality's CEO forwards a list of municipal priorities which each manager must take into account in his work agenda for the upcoming year. Each unit in the municipality is required to ascertain what its contribution will be to the municipal priorities by setting objectives furthering these priorities. The municipal priorities are the outcome of the municipal vision and of preliminary strategic thinking based on knowledge, information and data collected on a routine basis by the municipality's strategic planning department.

The Municipality of Holon has a strategic planning, information, research and assessment department. The department is a staff unit, which is in charge of information and knowledge in the municipality as well as conferences for the purpose of policy setting and long-term (multidisciplinary) planning. The department helps municipality leaders and managers with decision-making based on data and research. One of the main goals of the strategic planning department is to collect information and turn it into knowledge. The information and knowledge are released and presented to the municipality's senior
officials and serve as a decision-making tool for the Municipality's management. The department is active on several levels.

**Statistical data compilation and publication** – The strategic planning department collects and processes data pertaining to the City of Holon and its inhabitants from internal and external sources. The data and information are published in the statistical yearbook published every two years. The statistical yearbook includes a broad range of statistical data covering a period of several years at the municipal level, at the service region (neighborhood) level and at the statistical region level, on diverse topics such as: the area's attributes and climate, the municipal infrastructures, the construction and housing, demographic characteristics, the inhabitants' standard of living, employment and welfare characteristics, business and industry, transport and traffic aspects, education, culture, sports and leisure, health and environmental quality. A special chapter dedicated to the "City of Children" includes demographic data, children's activities, social services, health and education. The annual statistical reports are based on a broad range of sources of information, such as external sources (the Central Bureau of Statistics, the Ministry of the Interior, the Ministry of Education, the National Insurance Institute, The National Council for the Child, etc.) and intra-organizational sources (municipality units and subsidiaries). The municipal collection system (the property tax file) and the municipal education system data are among the major sources of information. These systems' data are individual records which are mapped out and assessed at various geographical levels. This information provides up-to-date data in real time, which makes it possible to support informed decision making processes. The yearbook is an important source of data, which makes it possible to identify trends while they are in progress. The information presented in the yearbook is meant to serve as a tool for municipal decision makers and to enhance service. It is important to point out that although the yearbook is published once every two years, the data reach and are processed in the department and then conveyed to the Municipality management all the time, regardless of the timing of the yearbook's publication.

**Conducting periodical position surveys** – The department is in charge of conducting various specialized studies and surveys according to changing needs. These surveys and studies provide feedback from the city's inhabitants as well as from other populations regarding their level of satisfaction, needs, expectations and positions regarding topics within the Municipality's realm of responsibility. Since 1994, a survey assessing the City of Holon's position is held among its inhabitants about once in two years. The findings make it possible to learn about the inhabitants' positions and the extent of their satisfaction with the city and the municipal services. This results in an up-to-date, comparative database reflecting trends and changes in the inhabitants' frame of mind.

**Monitoring of the municipal work plans** – the department coordinates and follows up on the preparation of the municipal units' annual work plans stemming from the vision and municipal priorities each year. The programs are drafted in a consistent language featuring a definition of objects, goals and success indices. The programs' implementation is monitored throughout the year. The work plans are available to all and available in the drive shared by all municipal employees, thereby enabling them to review the work plans of each and every municipal unit as well as share knowledge and information. Inhabitants and others who are interested in consulting the municipal work plans are welcome to do so. Once a year, the work plans are presented to an extensive forum (about 400 people) including the Mayor, the municipal management, managers and employees from the rank of section manager and above and subsidiary representatives. During the encounter, each
deputy CEO presents the highlights of his administration's work plans. The work plans are presented to the forum and shared on the municipal network with the belief that the accumulated knowledge and the municipal endeavor should be transparent and should readily flow between the various municipal units.

**Long-term planning and policy setting** – The strategic planning department analyzes municipal processes, reviews demographic forecasts and assesses demographic trends. The department initiates and oversees the drafting of master plans, defines plans of action while implementing the concept of the service (neighborhood) areas. Each year, the department prepares an urban profile, which is the result of data analysis and processing, research and the surveys and information accumulated during the past year. The City of Holon's profile is a document designed to review the status and position of the City of Holon. The document's main goal is to identify strong points, sensitivities, opportunities and threats and to analyze the City's status and position in order for it to serve as a basis for the municipality's managers when making their decisions and drafting the annual work plans. The aim is to identify topics warranting future research and analysis and to shed light upon issues that need to be addressed by means of a change in policy and which the strategic planning department and the municipality's management need to focus on. The “City Profile” constitutes an identity card of sorts as well as a magnifying glass for the city's goings-on, trends, benefits and areas in need of improvement. The document surveys data from various sources: the Central Bureau of Statistics, the National Insurance Institute, the municipal collection system data, the municipal education system data, etc.

The strategic planning department coordinates the municipal master plans in various areas – a master plan for transportation that takes into consideration the forecasted number of private vehicles and future means of transportation such as the light rail, cars running on electricity or gas, bicycles, etc; a master plan for green areas, a master plan for multi-story buildings, a master plan for education, culture and social affairs, etc. The master plans collect the information existing in the various databases – both internal, municipal ones and external ones at the State level – which serve as the foundation for future forecasts for 2015-2020.

The city's development strategy is based on its location in the Tel Aviv metropolis, with the aim of identifying its advantages over other cities in the surrounding area and setting it apart from other authorities in the urban expanse. Holon has 176.3 thousand residents, and is one of Israel's largest cities. It borders Tel Aviv (402.6 thousand inhabitants), Rishon Le'Zion (226.8 thousand inhabitants) and Bat Yam (130.3 thousand inhabitants). As previously indicated, the municipal strategy strives to implement the urban vision while continuously assessing the actual state of affairs as reflected in the cumulative data, information and research in the strategic planning department and other municipality units.

The following are the city's prominent strategic objectives:

1. To make the **educational system** a leader in its pedagogical approach, the satisfaction of its customers, the interrelation between the educational institutions and the community, the physical infrastructure and the teaching environment of its institutions.

2. To offer a full range of high quality, well developed convenient and affordable **community services**.

3. To ensure that Holon enhances the **quality of life of its children**
4. To create one of Israel's leading "green" cities both in its existing and new appearance and in the quality of its infrastructures.

5. To create a unique and esthetic urban environment, with high quality residential and housing options.

6. To achieve service excellence and foster and deliver quality service tailored to customer requirements.

Another aspect of strategic development is reflected in the city's industrial area. In an effort to create economic development options, there has been a thinking and strategic planning process in the last few months in order to consolidate a vision, a purpose and an action plan for Holon's industrial area with the aim of outlining the area's future and ensuring its optimal growth by fulfilling its latent potential for the benefit of the city and its inhabitants. A task force undertook the challenge, in collaboration with the Mayor and the Municipality CEO, Deputy CEO of Industry and Trade, position holders in the Administration, the City Engineer, the Municipality's Treasurer, the strategic planning personnel and others.

In the wake of meetings with industrialists, real estate personnel and various consultants, and following internal discussions, a vision was defined for the industrial area: "The Holon community industrial and business area will boast innovative economic and organizational approaches, attract business and industry, catapult the City of Holon forward and be a leader in the fields of education, technology, sustainability and design at the national and international level". This vision will be the foundation for progress, whereby it is anticipated that both the designation of the area and the action plan leading to the vision's realization. The new strategic plan for the city's industry and business area is the outcome of the desire to differentiate the industry and business area from similar areas in other cities in Israel. The idea is that this area won't be just another industrial area (one of many). The strategic guidelines governing the development of the area are: community advocacy, a connection to the city, leadership, internationalism, the promotion of technology education, sustainability and design, interconnected uses and uniqueness.

In addition to the aforementioned, the strategic planning department's cumulative data, information and knowledge are processed and presented by the department's team in conferences, meetings and seminars attended by Municipality employees and those of the subsidiaries, and also appear in current reports. The data make up an effective and significant basis for setting a policy and following up on its implementation.

4 Conclusion

17 years after the vision was formulated Holon has created a positive image for itself as national high quality and value-based cultural center that emphasizes activities for children, but also provides a range of cultural offerings for the entire family: performance arts, plastic arts, outdoor sculpture, digital arts, puppet theater, science and more – through unique activity centers such as At Eye Level, story gardens, HavaYeda, the Children’s Museum, the Mediateque and more. The education system in the city has been upgraded and its performance proves it: The number of those matriculating rose from some 46% to 68% (according to Ministry of Education data). It has helped the Municipality to focus on the fields of children, education and culture, and made it easier to send out important messages to change the image of the city.
Even after 17 years, the Municipality of Holon continues to initiate new festivals and cultural events that enrich the cultural life of the city and attract many interested visitors. The long list of well-known festivals: The Women’s Festival, Days of Song, the International Puppet Theater Festival, the Israel Festival in Holon, the Sound Festival, the Digital Art Biennale, the Beetles Festival, and International Dance Festival, and others, was expanded to include a new attraction: The Caricatures and Comics Museum, which is also – like Holon always wants to be – different, unique, and offering what no museum in Israel has offered until now. Its establishment meets a need for both the community of caricaturists and comic artists in Israel, and for the tens of thousands of fans of the medium. The museum hosts a wide range of activities in the field, and it exposes its visitors to the art of caricature in all its forms, with the aim of promoting an understanding of the necessity of caricature in society.

In 2010, yet another museum was opened in the city: The Holon Design Museum "D.M.H.", the first and only one in Israel, an exceptional and unique project in both its external appearance and its content, which was designed by the architect Ron Arad as a municipal initiative and with municipal investment. The museum is located in the new city center of Holon, near the Mediateque and the Holon Mall, in the heart of the new residential area of Kiryat Aylon. It is an exceptional building, a work of art in its own right, combining unique design with exacting execution, and advanced technology with art that is almost hand-made.

A process that started in 1994 began to bear fruit in the mid-2000s. Conducting such a long-term process, demands patience and forbearance, and a professional management staff that look forward beyond one term of office of the elected Mayor. We must be careful to maintain and strengthen this situation with frequent publicity efforts. In order to remain on the marketing map, Holon must refresh and renew its vision. There is a new, young population. The city must be attentive to it and adjust to the new and renewing needs of the 21st century. We must insist on motivating employees through the service treaty, and it is important to refresh work procedures as needed. There must be three levels of management: on-going maintenance of what has been achieved, devoting resources and time to developing and expanding municipal services with reference to the vision and periodically refreshing the vision, and continuing to build an innovative strategic plan every 4-8 years.

References

Forensic science: a field of integration and knowledge clusters

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Abstract
The purpose of the paper is to investigate forensic science as one of the new developing fields of knowledge. Forensic science integrates various sciences, science applications, techniques and art to serve the judicial system and to pertain to law. This paper aims to investigate the nature of such an integration and possible implications and ramifications emerging as a result.

In order to achieve our aim, we adopted a qualitative research methodology to examine the perceptions and informed opinions held about forensic science knowledge. We undertook semi-structured interviews with 14 participants about their perceptions of forensic science as a pluri-disciplinary field of knowledge and developing field of practice.

This paper generates implications into a developing field of knowledge and practice. Such implications have double significance. First, this paper will benefit various agencies, centres, laboratories, higher education institutes, and government departments which are associated with or related to forensic science. Second, the implications of this paper may be considered as a case study for similar emerging pluri-disciplinary fields which require the integration of various disciplines and specialisations.

This paper finds that forensic science is a field under which different clusters of knowledge are formed and applied to serve criminal and civil laws. These clusters do not emerge from vacuum. They are the result of socialisations which exist between different social groups of different agencies, centres, institutes, and departments through partnerships, agreements, and/or protocols. Such socialisation requires five levels of communication. This communication is natural and spontaneous in some instances, and complex and challenging in others. For instance, complex communication occurs when the involved parties are from very different backgrounds. This paper also notes that the more technological advancements take place, the more knowledge will move towards what has been assumed to be simple restricted police procedures in crime and crime scene investigation. Such invitation of new fields of knowledge into forensic practice and applications will result in the accumulation of new knowledge clusters to the already existing ones.

Keywords – forensic science, knowledge integration, knowledge clusters,

Paper type – Academic Research Paper
1 Introduction

There might be no one field of knowledge as diversified and integrated as forensic science. Forensic science invites: mother sciences (e.g. biology and chemistry), applied sciences (e.g. engineering, medicine, computer science, etc), social sciences (e.g. psychology, linguistics, etc), legal knowledge, crafts and other forms of inquiry which are uniquely forensic (e.g. fingerprinting, hand written examination, etc) (Houck & Siege 2006; Bell, 2004; Camenson, 2001). Forensic science is a very broad field because ‘any profession, discipline, craft, or art may potentially be invited into the legal arena’ (Inman and Rudin, 2001:1). Unlike what some may perceive, forensic science is not restricted to criminal law matters and criminal cases. Its landscape expands to cover civil laws and cases (Bell, 2004). For example, forensic science deals with family litigations (e.g. cases of paternity proof), environmental issues (e.g. suspected source of pollution or contamination) and other security legislations (e.g. custom check).

Forensic science is a field which has always incorporated complexities and controversies in human history from Napoleon’s poisoning (1821) to O.J. Simpson’s case (1994), passing by ‘Australia’s forensic nightmare’, Lindy Chamberlain case (1980s), and many other cases (Evans, 2003:172). ‘The evolution of forensic science has been a long, complex, and fascinating journey’ which has incorporated not only stories of triumph, but also stories of failure in the ‘never-ending battle to close the loopholes through which criminals slip’ (Evans, 2003:1).

Forensic science is a ‘critical and integral part’ of the judicial system, because forensic science is one of the primary means through which ‘democratic governments fulfil one of the most fundamental obligations to their citizens: public safety insurance in a just manner’ (Houck, 2006:5). Forensic science requires very high professionalism within minute margins of error, if any. The evidence collected from a crime scene might be the only clue that was mistakenly left over by a predator and that might have survived contamination or harsh environmental conditions. Such evidence may have the potential to change juries’ deliberations and judges’ sentences from guilt to innocence or vice versa. In this respect one study revealed that ‘about one quarter of the citizens who had served on juries which were presented with scientific evidence believed that had such evidence been absent, they would have changed their verdicts- from guilty to not guilty’ (Peterson, 1987:1748). Therefore, one piece of evidence might require the contribution of various agencies, institutes, and departments where experts of different fields contribute in the assessment of such evidence.

2 Forensic science and governmental focus

Since the start of the third millennium, forensic science has experienced an increased pressure from governments as a result of the emergence of terrorist activities in addition to everyday homicides and criminal offences. This increase in pressure on forensic science is often experienced consequent to events as large and shocking as the recent terrorist acts (London Bombings in July 2005, Assassination of Former Lebanese Prime Minister Rafic Hariri in February 2005, Madrid Bombings in March 2004, and World Trade Centre Bombing in September 2001), or as personal, yet shocking, as The Wee Waa Case, the sexual assault of an old woman in her 90’s in one of New South Wales towns in Australia. In such cases, forensic practitioners, through seemingly unending work hours, have worked not only with victims, casualties, corpses, and human remains to identify the manner and cause of deaths, assault, and/or offence, but also with the
community, including victim’s families and friends, who attach great significance to human life and wellbeing and to social justice as well (James & Nordby, 2005).

3 Forensic science: a complex field

Forensic science has a dual role. The first role, which is the immediate one, is identifying, examining, analysing, and presenting evidence to a court of law. The second role, which is an ultimate one, is contributing in the maintenance of social justice and the relief of victim’s families, friends, community, and ultimately the whole society. Along the way exist complex processes and phases of knowledge integration. Garrison (1991:1) asserts that forensic science is complex because it is the ‘product of an uneasy and unholy mating of science, the objective seeker of truth and knowledge, and forensics, the argumentative persuader of courtroom advocacy’. Similarly Inman and Rudin (2000) argue that forensic science remains complex and can be partly approached from society’s perceptions.

4 Research methodology

4.1 The qualitative nature of the study

The nature of this research demands a qualitative approach because it requires the researchers to:

a) investigate an area which does not possess firm guidelines or specific procedures and is constantly evolving and changing (Creswell, 1998: 17),
b) understand an area where little is known or previously offered understanding appears inadequate,
c) make sense of complex situations and changing/ shifting phenomena,
d) learn from the participants in a setting or a process the way they experience it, the meanings they put on it, and how they interpret what they experience,
e) construct a theory or a theoretical framework that reflects reality rather than the researcher’s own perspective, and
f) discover central themes and analyse core concerns relating to a particular phenomenon (Richards and Morse, 2007: 30).

4.2 Semi-structured interviews

Interviewing is a common method to elicit information about people’s opinions, attitudes, values, perceptions, beliefs, and behaviours (Kumar, 2005; Sproull, 1995) about issues, topics, and experiences of relevance and significance to the research (Mason, 2002). Interviews involve some form of ‘conversation with a purpose’ (Burgess, 1984:102). There are many different types of interviews, ranging from structured (e.g. surveys), semi-structured, to unstructured interviews (Campbell, McNamara, and Gilroy, 2004).

In order to approach the complexity of forensic science and the complexity of the knowledge clusters embedded within the field, we adopted the methodology of semi-structured interviews. Semi-structured interviewing has been favoured in the methodology over unstructured and structured interviewing, because this approach: a) offers a guide that can be given to the interviewees so that the content of the interview focuses on the crucial issues of the study (Burns, 2000), b) avoids ‘fixed wording or
ordering of questions’ as is the case in structured interviews (Burns 2000: 424), and c) keeps away from ‘open ended breadth of data’ as is the case in unstructured interviews (Denzin & Lincoln 2000:652). Semi-structured interviews is one of the powerful tools of qualitative research methodology in examining and studying people’s perceptions and interpretations of the complexities of their world (Burns, 2000). This method contributes in the investigation of view points and informed opinions about processes and events associated with these complexities (Denzin & Lincoln, 2000).

4.3 Participants

The participants in the semi-structured interviews are Australian participants, as the research is conducted in Australia, and represent three categories:

- The first category of interviewees comprises 4 forensic science educators who possess experience in teaching forensic science or forensic-related subject(s) and are likely to have informed forensic science knowledge. The participants in this category were selected with respect to their experience, publications and contributions in forensic science education.

- The second category of interviewees includes 6 forensic science practitioners who work in various areas within the forensic field. In order to cover various forensic specializations the interviewees were selected to comprise:
  - 3 field practitioners (a crime scene investigator, a vehicle examination expert, and a firearm expert).
  - 3 laboratory practitioners who are experienced in the adoption of various chemical and biological analytical techniques to study and analyse forensic evidence.

- The third category of interviewees comprises 4 members of professions associated with forensic science: a barrister (prosecutor), a barrister (defence), a forensic psychologist, and a senior detective (police officer). The inclusion of barristers is necessary due to the direct interaction between these personnel and forensic practitioners during trials, when forensic experts present their evidence in a court of law. The inclusion of a detective and a forensic psychologist is justified by the direct interaction between these personnel and forensic practitioners on the crime scene and during the investigation process.

Interviewees were selected and contacted through professional networking: Victorian Forensic Science Centre, National Institute of Forensic Science (NIFS), The Australian and New Zealand Forensic Science Society (ANZFSS), Victoria Barristers (Vic Bar), and Victoria Police.

The inclusion of three groups of participants initiates the practice of triangulation which has been emphasized by many researchers and educators (Chenail 1997; Mathison 1988). In this respect, Wolcott (1988, p. 192) asserts that a researcher should never rely solely on a single observation or a single source, for ‘the strength of field work lies in its “triangulation” obtaining information in many ways rather than relying on one’.

These interviews examined the interviewees’ perceptions and conceptualisations about the complex nature of forensic science and the complex integration of various knowledge disciplines within this field.

4.4 Data collection and analysis

Interviews were conducted and data was collected via tape-recording. Both field notes (descriptive details about the interview) and reflective notes (personal insights, thoughts,
feelings, and impressions) were also recorded. These notes assisted the researcher in keeping the interviews appropriately ‘focused’ and were also invaluable in the later analytical phase of the study. Collected data from interviews has then been transcribed using Microsoft Word. Transcribed data was organized into three categories: data collected from a) educators, b) practitioners, and c) members of associated professions.

Transcribed data was coded (Microsoft Excel) into qualitative conceptual categories which were identified by the researcher as being major descriptive conceptions of forensic science knowledge and complexity of such knowledge. The connotations of each category were addressed with representative quotations from the interview data to convey the nuances of meaning as is customary in data coding and analysis in a qualitative research (Creswell, 1998; Sproull, 1995). Inter-categorical analysis was then conducted to summarise the overall position of the three groups of participants from each identified category of description. Finally, cross-comparison synthesis was conducted amongst the identified categories of description generating implications into forensic science knowledge. Coding started as descriptive, progressed by topic, and ended up as analytic (Miles and Huberman 1994; Richards and Morse, 2007).

5 Findings

The data collected from semi-structured interviews with forensic science educators, forensic science practitioners, and members of associated professions generated findings about:

- The nature of knowledge used, integrated, and applied to assist in the forensic science practice, particularly crime scene processing, and
- The different levels of communication required to exchange and apply this knowledge.

Data analysis revealed that the knowledge used and applied in forensic science, particularly on the crime scene, is a combination of theoretical and experiential forms of knowledge. Theoretical knowledge comprises all the scientific theories and fundamentals which underpin the work conducted on a crime scene. Experiential knowledge comprises all the vocational and technical competencies and skills applied to process a crime scene and evidence found on such a scene. These two forms of knowledge, theoretical and experiential, require cooperation between various government departments and private institutes/organisations. Cooperation occurs between:
  - Forensic science centres/agencies,
  - Forensic science laboratories (public and private),
  - Police departments, where police remain the major stakeholders in forensic science, despite whether or not forensic science centres and laboratories run, independently from police departments, semi-independently from these departments, or dependently within these departments,
  - Health institutes (private and public),
  - Higher education institutes,
  - A variety of professional communities of practice (engineers, chemists, medical practitioners, etc), and
  - A number of governmental departments (e.g. customs and immigration).

The cooperation between these department, organisations, and institutes results in the formation of clusters. These clusters of knowledge are formed when practitioners representing these departments and institutes work together to assist in evidence examination and analysis in a forensic science case (Figure-a). Such clusters comprise
both theoretical knowledge (scientific) and experiential knowledge (technical and vocational).

These clusters of knowledge are the result of socialisations which exist between different social groups of different agencies, centres, institutes, and departments through partnerships, agreements, and/or protocols. Such socialisation requires communication between personnel of these agencies, institutes, and departments. This communication is natural and spontaneous in some instance, and complex and challenging in others. Forensic science practice requires 5 different levels of communication (Figure A):

a) **Communication between practitioners/experts of the same institute/department**
   Communication is a natural component of practice which exists between colleagues of the same institute/department. For example, communication naturally occurs between forensic chemists themselves in a forensic chemistry laboratory.

b) **Communication between practitioners/experts of different institutes/departments who share similar backgrounds**
   Communication spontaneously occurs between practitioners/experts of different
institutes/department but who share similar backgrounds. For instance, communication spontaneously occur between forensic chemists, forensic biologists, and forensic pathologists who all share similar scientific backgrounds.

c) Communication between practitioners/experts of different institutes/departments who are of different backgrounds

Complex and challenging communication occurs between practitioners/experts of different institutes/departments who are of different backgrounds. For instance, a shooting crime scene sometimes requires the cooperation and communication between a firearms and ballistics officer, who might only possess secondary school education but lot of experience, and a forensic pathologist, who has done nearly twelve years of tertiary studies.

d) Communication between practitioners/experts and the judicial system

The ultimate aim of forensic science is to serve the justice system. Therefore, presentation of evidence to a court of law comprises a very important phase of the forensic work, if not the most important at all. Forensic practitioners and scientists are required to communicate scientific/technical observations, analyses, and/or opinions in a clear, simple, and straightforward manner to a non-scientific and non-technical audience: judge, jury, defence, and prosecution. The value of any evidence/opinion may be lost if such communication is not professionally and promptly conducted.

e) Communication between practitioners/experts and the general public

Communication between forensic practitioners/scientists and the general public is restricted in some areas of confidential nature but open in other areas which include civil cases (e.g. paternity testing, liability, etc) and cases which include identification of human remains in mass murders or disasters. This communication is very important and significant, because it contributes in maintaining social justice and reflects the value the general public holds towards human life.

![Figure 2](image-url)
These different levels of communication require the development of a framework of common language which integrates the different voices of different social groups (professions, institutes, and organisations) incorporated such communication. Such common language will facilitate the formation and development of knowledge clusters which emerge as a result of the integration of various fields, professions, and disciplines within the forensic science practice. This is done through facilitating various levels of communication—specifically complex ones—between various social groups representing these fields, professions, and disciplines.

Data analysis also suggests that the more technological advancements take place, the more knowledge will move towards what has been assumed to be simple restricted police procedures in crime and crime scene investigation. Such invitation of new fields of knowledge into forensic practice and applications will result in the accumulation of new clusters to the already existing ones. This will probably invite new organisations, institutes, and departments to contribute into the formation of these new clusters of knowledge. This will also contribute in the decentralisation of forensic practice from the military police restricted nature to a more civilianised nature. Decentralisation will also result in more contribution of the private sector into a field which has been conventionally assumed to be an implicit public sector.

6 Conclusion

Forensic science is a very diversified and integrated field of knowledge and practice. Forensic science requires the integration of knowledge base, expertise, and specialisations from different social groups representing different institutes, departments, and organisations. Such integration results in the formation of various clusters of knowledge between social groups of similar and different backgrounds. The formation of these knowledge clusters requires different levels of communication. Therefore, it is very important for all stakeholders of forensic science to work on the development of a common language for facilitating these different levels of communication. The advancements taking place in technology and science will result in new forensic knowledge clusters to be formed and accumulated to the already existing clusters. This will lead to more decentralisation of forensic science from being an implicit military public sector to an explicit partnership between public and private sectors and between police and civilians.

This research paper relied on the analysis of data collected from only Australian participants. The findings of this paper may not be generalised unless further research is conducted with participants from all over the world, as forensic science is a field of international dimensions, implications, and applications.

References


Cultivating existing and nascent clusters of the visual entertainment industries

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Structured Abstract

Purpose – The purpose of the paper is to explore how government and particularly local government can facilitate the visual entertainment industries via appropriate policy settings and management.

Design/methodology/approach - The approach is based on reading and appreciation of a variety of sources from overseas and within Australia, which have informed the chosen program of empirical research. The recently conducted program (comprising interviews of visual entertainment production industries, associated businesses; government agencies; NGOs and other stakeholders; academics and experts in this field) provides a valid contemporary basis for assessing the effectiveness of existing policy and the desirability of alternative policy settings.

Originality/value – The chosen methodology puts into evidence new information about the visual entertainment industries, including their commercial characteristics, their relationship to other like businesses and key factors in their spatial location and propensity to cluster. Similarly, the responses to interviews in Government and other agencies and individuals, having knowledge and experience of this industry, provide a valuable insight into the level of existing support, and a greater understanding of which shortcomings or deficiencies merit attention and action.

Practical implications – The outcomes of the research program will assist the formulation of new methods of facilitating the visual entertainment industries, particularly at the local government level, via place management theory and the use of the relatively new Business Improvement District (“BID”) form of urban management. Some insights are also provided by a short case study focussed on the potential for a BID in the St Leonards Centre of NSW.

Keywords – visual entertainment industries; screen industries; clusters; creative quarters; creative industries; facilitation policies; BIDs.

Paper type – Academic Research Paper

1 Introduction

For the visual entertainment industries place can be demonstrated to be an important factor in terms of business sustainability. There are many examples from overseas centres to demonstrate the tendency for firms to cluster in particular areas including
London’s Soho and Camden areas (Gornostaeva 2009), Vancouver’s central area (Coe 2001) and Los Angeles’ concentration of the world’s major studios in Hollywood (Scott 2005). Research conducted by the author in the two principal clusters of visual entertainment industries in Sydney demonstrates a similar pattern in which firms agglomerate for a complex set of reasons, including land value, infrastructure availability - particularly transport, support services and environmental quality and “buzz”. (Jensen 2010 A).

Responses from the sample of visual entertainment production companies, and stakeholder groups in Sydney has revealed, on the demand side, that facilitation of the industry should address a variety of broad creative city policies and more targeted strategies connected with spatial factors and locality. On the supply side, a wide variety of Government Departments is involved in efforts to stimulate the growth of the industry – although there is a singular lack of coordination, connection and resourcing leading to a bewildering array of programs and a lack of clear strategic planning for particular outcomes.

Despite holding the majority of businesses in the visual entertainment industries, the State of NSW is handicapped by a spatial planning system which is ill-equipped to realise superior outcomes, particularly economic and cultural outcomes, in the context of inner city cultural re-vitalisation and enrichment. There is a wide literature supporting the reforms necessary to achieve such improvements (see for example the conditions which underpin a cultural quarter, and the twelve strategic actions that collectively define the menu for effective policy management of the system-wide cultural district (Montgomery 2008 ; Sacco, Blessi et al. 2009).

This paper reviews sources which have examined the cultural and economic benefits of spatial agglomeration or clustering before describing the outcomes of a series of interviews of visual entertainment industries and government stakeholders. The current government focus is largely on financial assistance to production companies for specific projects or slates of projects by larger organisations. There has been an insufficient recognition of the importance of physical infrastructure and environmental characteristics of areas in which the visual entertainment industries are clustered.

The potential for a reformed local government system is also considered in further detail, having regard to the growing interest in place management and other small scale local area improvement strategies such as Business Improvement Districts or “BIDs”.

2 Current status of the visual entertainment industries in Australia

2.1 A national perspective

The visual entertainment industries (defined for the purpose of this paper as the film and television industries) are one of the most significant categories of the creative industries. Beyond a strong justification for supporting the industry on the basis of economics, the visual entertainment are notable for a number of cultural, social and environmental benefits. For example:

- they have as their main output our most popular and pervasive form of entertainment and information;
- local production in particular contributes to our national identity and sense of place;

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the industrial production processes associated with visual entertainment have significant economic multiplier effects involving a complex network of associated services;

on-location filming, while regarded by some citizens in negative terms or as “a nuisance” adds to our urban experience and reinforces the significance of Australian places, and puts us on a world stage with “free advertising”;

the impact of studios – particularly the major studios (such as Fox at Moore Park) have major urban infrastructure implications; and,

similarly, visual entertainment clusters elsewhere with or without studios as an industry focus have the capacity to enrich the urban environment.

In Australia, the creative/cultural industries, in common with other major Western economies, typically contribute around 3% overall to the economy in terms of GDP/GVA – see Table 1.

Table 1. International comparison of contribution by creative/cultural industries to GDP/GVA

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference Year</th>
<th>Aggregate Measured</th>
<th>Percentage of GDP/GVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1998-99</td>
<td>GDP</td>
<td>3.1</td>
</tr>
<tr>
<td>Canada</td>
<td>2002</td>
<td>GDP</td>
<td>3.5</td>
</tr>
<tr>
<td>France</td>
<td>2003</td>
<td>GVA</td>
<td>2.8</td>
</tr>
<tr>
<td>UK</td>
<td>2003</td>
<td>GVA</td>
<td>5.8</td>
</tr>
<tr>
<td>US</td>
<td>2002</td>
<td>GVA</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Source Department of State and Regional Development (NSW); NSW Creative Industry Economic Fundamentals; 2009 (based on data collated up to 20 June 2008) from Gordon and Beilby-Orrin (2007) International Measurement of the Economic and Social Importance of Culture, OECD, p 54

The visual entertainment industries are generally included on the lists of creative industries in recognition of the fact that they require a creative workforce, and make a substantial contribution to the cultural and creative economy. As shown in Table 2, the visual entertainment industries contribute close to 2500 businesses and $2 billion to the Australian economy with a total employment of around 14,000 persons.

Table 2. Television, film, video and postproduction services in Australia June 2007

<table>
<thead>
<tr>
<th></th>
<th>Number of business</th>
<th>Total employed</th>
<th>Income generated</th>
<th>Expenses incurred</th>
<th>Profit before tax</th>
<th>Operating profit margin</th>
<th>Total Industry value added</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2492</td>
<td>13844 persons</td>
<td>$2028.1 million</td>
<td>$1857.4 million</td>
<td>$173.9 million</td>
<td>8.8%</td>
<td>$886 million</td>
</tr>
</tbody>
</table>

Source ABS “Television, Film and Video Production and Post Production Services” Cat 8679.0 2006-07
2.2 Distribution of visual entertainment production in Australia

Recent ABS Census Data shows that NSW contains the majority of businesses as compared with all other States. NSW is the home of close to 50% of all businesses, Victoria and Queensland have more modest shares, while other States and Territories are less significant. The tabulated data below identifies the number of businesses in the main film and television industry occupations. Since NSW and Sydney play such a significant part overall in terms of gross numbers of businesses, for the remainder of this paper, my analysis mostly concentrates on the characteristics of that State, in terms both of the industry characteristics, and the nature of government support.

**Table 3.** Comparison of film and television production and exhibition throughout Australia by industry class by number of businesses as at June 2006

<table>
<thead>
<tr>
<th>CODE</th>
<th>NSW %</th>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
<th>SA</th>
<th>WA</th>
<th>TAS</th>
<th>NT</th>
<th>ACT</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>9111</td>
<td>50.4</td>
<td>2550</td>
<td>1308</td>
<td>576</td>
<td>231</td>
<td>282</td>
<td>45</td>
<td>15</td>
<td>51</td>
<td>5058</td>
</tr>
<tr>
<td>9112</td>
<td>49.3</td>
<td>204</td>
<td>105</td>
<td>45</td>
<td>15</td>
<td>30</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>414</td>
</tr>
<tr>
<td>9113</td>
<td>36.1</td>
<td>132</td>
<td>96</td>
<td>54</td>
<td>33</td>
<td>39</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td>366</td>
</tr>
<tr>
<td>9122</td>
<td>46.9</td>
<td>480</td>
<td>255</td>
<td>129</td>
<td>45</td>
<td>78</td>
<td>15</td>
<td>6</td>
<td>15</td>
<td>1023</td>
</tr>
<tr>
<td></td>
<td>45.7</td>
<td>3366</td>
<td>1764</td>
<td>804</td>
<td>324</td>
<td>429</td>
<td>72</td>
<td>27</td>
<td>75</td>
<td>6861</td>
</tr>
</tbody>
</table>

ABS Codes: 9111: film and video production; 9112: film and video distribution; 9113: motion picture exhibition; 9122: television services. Source: ABS Cat 8165.0 June 2003 to June 2006 figures extracted from Table 1.11 businesses by industry class by main state.

2.3 The significance of spatial clustering to the visual entertainment industries in Sydney

Since the seminal writings of Alfred Marshall, it has been recognised that the spatial clustering of like businesses is generally the outcome of a deliberate locational intent to achieve economic benefits from spatial proximity (Marshall 1890, current edition 2009; Howkins 2007). The most notable global example of film clustering is to be found in Hollywood, where a dense concentration of film studios and related businesses has become the most successful centre of film production in the world. Here, major film studios are concentrated in the national context, and over time have developed significant clustering benefits from pooled labour and production services.

The industry has become vertically disintegrated such that many jobs are no longer kept under one roof, creating an employment environment where as Scott has observed: “The picture that emerges reveals a labour market that is highly flexible and that generates much insecurity, but that is at the same time regulated in ways that mitigate the uncertainties with which it is associated, and that on balance yields significant pecuniary returns to those who participate in it” (Scott 2005: 137).

Canada has been the greatest recipient of Hollywood runaway\(^1\) production, and the Vancouver film cluster (with its relative geographic proximity to Hollywood) is unique in that 80% of its production revenue is attributable to runaway production and contains a range of production studios including the Crown Corporation Bridge Studios with 6 sound stages and a very large special effects stage, and the North Shore Studios and 6

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\(^1\) Runaway production refers to segments of feature films (such as post-production) which are out-sourced by Hollywood to other countries for a variety of reasons including financial savings.
large stages stated to be the largest studio complex in Canada as at 2001 (Coe 2001: 1761). With the exception of some larger companies which may be externally owned, the majority of film production companies are small local businesses which have grown to meet the increasing demand for on-location shooting (Coe 2001: 1767).

The situation is no different in Australia, where the visual entertainment industry is sustained by a large mass of contractors performing roles as diverse as food styling, audio recording and processing, and film-location selection. Such entities are typically small, mostly individuals, who work on a job-to-job basis rather than a conventional 5 day week. Analysis of the employment structure of visual entertainment industries in NSW shows that 51% comprise “non employing businesses”; 44% having less than 20 employee and only 1% having more than 200 employees (Department of State and Regional Development (DSRD) 2008; ABS Data Cat No. 8165.0).

With reference to the concentration of ITT industries in Sydney, Searle and Pritchard distinguish “generalised clusters”, and “specialised clusters”. Generalised clusters derive benefits on a basis of region-wide factors including: physical and human capital, many firms and strong demand, while specialised clusters benefit from reduced interaction costs, opportunities for face to face exchange of information and other sociological factors (Searle and Pritchard 2005: 146). The clustering of visual entertainment industries in Sydney exhibits both regional and local agglomeration forces. For example, for the film industries, the chosen location typically lies on the fringe of central to inner ring, rather than central city locations because of lower land values. On the other hand, they need to locate close enough to the urban centre to enjoy specialised cluster benefits including sharing of knowledge and skills, sharing a skilled labour force, sharing studio facilities and sharing particular services essential to production such as sound editing, film and video editing and computer graphics.

Howkins draws another important distinction between spatial clustering and electronic networking – the latter having gained prominence particularly since the widespread adoption of the internet from the mid-1990s. Networking in virtual space is particularly important for people in creative industries, who are often working alone, and need to keep in touch with one another (Howkins 2007). Networks are not only important for small businesses, however, and play an indispensable part of day-to-day external transactions for visual entertainment businesses – with broadband access of particular importance. The contemporary ability of the film industry to exchange documents and film/video files via the internet, to some extent transcends the need for close physical clustering and may explain why the Sydney clusters are relatively loose in a spatial sense and quite unlike the concentrations which are found in other parts of the world such as the Soho Precinct in Central London.

Indeed, while theorists debate the underlying causes and appropriate choice of model for clustering be it spatial or networked, the empirical evidence for Sydney, which will be discussed in further detail below, suggests that the motivation to locate is strongly based on factors which are nowadays both region-wide based as well as specialised and local (to use the Searle and Pritchard’s terminology) despite the fact that historically, local clustering pressures have been the most relevant factor for location decisions.

2.4 The status of NSW visual entertainment industries – empirical evidence

In order to gain a more detailed empirical understanding of the visual entertainment industries in Sydney, a sample of 20 businesses was sourced from the 2009 Production
Book, and in-depth recorded interviews conducted by the author on a “first come first served” basis. Comprehensive documentation of the methodology and results of the survey have been reported elsewhere, and the following represents a digest of the conclusions most relevant to the issue of government policy settings (Jensen 2010 A; Jensen 2010 B).

Spatially, the most significant contribution of mainstream film making and television production to the geography of inner urban Sydney is connected with the growth of industry clusters and related infrastructure. In this regard, the early establishment of television stations at Artarmon and Epping, and a much later decision to redevelop the Sydney Moore Park Showgrounds for a new film studio complex were key factors in the continuing supremacy of NSW in terms of industry numbers and economic strength. Thus, the early construction of television studios at Gore Hill and Artarmon in the mid-1950s for broadcast television (Inglis 1983) was the catalyst for many support services and related businesses that have survived and adapted to the present in the Artarmon, St Leonards, and Crows Nest locality of the Lower North Shore. Similarly, the establishment of the major new Fox studio complex in Moore Park, some 10 years ago, has had much to do with Sydney’s pre-eminence in large budget feature productions (Goldsmith and O’Regan 2003; Goldsmith and O’Regan 2005). But from the empirical evidence, it has also strongly affected the balance of spatial clusters, from the lower north shore to south of the Harbour (Jensen 2010).

The sample of production companies which were selected for interview was evenly divided geographically between the Lower North Shore and the Eastern Suburbs sub-regions. Topics of interest covered the main reasons underlying location choice and awareness of the ‘environmental character’ as well as collating commercial data on matters such as employment, services provided by staff or contractors, and annual turnover. Within this sample, the majority of businesses were found to be small establishments, typically comprising one or at most half a dozen individuals, while large industrial entities were the exception. With regard to the main question regarding reasons for location, some primary factors emerge as relevant to both the sub-regions on either side of the Sydney Harbour. From the analysis of responses, the most important location motivating factors are the availability of relevant industrial infrastructure; land value/rental costs; and, accessibility to road and public transport systems. Beyond these primary determinants lies a range of environmental and social factors which were noted by many of the respondents.
Consciousness of a broader environmental attractiveness associated with their locality was mentioned by those businesses particularly located in Crows Nest and Surry Hills. One located in Crows Nest said that the area’s main claim to fame was: “lots of restaurants and great places to eat” (RESPONDENT 08 2010). A Surry Hills based respondent mentioned “a sense of village atmosphere” (RESPONDENT 12 2010), and another in Surry Hills said: “The location is great for us - Surry Hills is a bit of a hub with Fox and all that stuff. I suppose that it’s still a fairly creative area, this is a creative building we want to be seen as something a little bit different not just a business but you
know a place that is a business and is a creative group at the same time. That's why we're here. And it gives us enough space without cramming it out with people. It's a good place to work in” (RESPONDENT 16 2010). A small minority of respondents were either less aware of such attributes – one in Crows Nest saying: “Basically it’s just a place to work” (RESPONDENT 09 2010), or quite negative about their environment with one respondent located in Artarmon stating that their locality resembled “A JG Ballard playground” (RESPONDENT 02 2010).

A question, which produced a revealing series of responses, was “where do you see yourselves in the next 10 years”. The answers brought to light different intentions, in terms of individual business planning, as well as awareness of the factors affecting the future trajectory of the visual entertainment industries. Some of the respondents indicated that they would already be in retirement by that time, while many others saw the need for significant changes in their business approach.

In this regard, although the sample surveyed is relatively small, some differences between the sub-regional clusters of the Lower North Shore and East Sydney were noted. In the former area, many of the businesses surveyed are at a mature point in their business cycle. The Principal interviewed, would frequently be working by him/herself. Similarly, there is evidence in Crows Nest of a significant turnover of visual entertainment industries, including some which have been drawn to places south of the Harbour.

As regard the future trajectory of the industry, the impact of the internet and technological change was raised by many of the respondents. The representative of a small to medium sized business located in Artarmon noted that “we are increasingly being asked to do more online” (RESPONDENT 02 2010). A similar scaled business in Chatswood referred to a process of convergence which is happening between the previously separate film, television and web based industries (RESPONDENT 03 2010); the Principal of small business in Surry Hills mentioned that the internet was creating an ever increasing demand for websites etc. (RESPONDENT 18 2010). A large businesses, located in Artarmon indicated that their business planning involved a strategy of diversification to reduce the risk they had already encountered from one part of the market collapsing, as a result of confining their business to only two basic strands (RESPONDENT 11 2010).

Relatively few of the Respondents had developed a clear future location strategy, although respondent R 11, as referred to above, said that, longer term, with a diversified re-structure, there would be a need to find alternative premises. A medium sized business with branch offices in the UK and the US, located in Surry Hills, said the future was in Los Angeles “where I see the real growth”, while at the same time “…having a good strong Sydney office. I see it as being in this area” (RESPONDENT 13 2010). This same respondent also said: “…there is a compelling reason to move in with another client or if it was a fantastic studio complex setup, with lots of like minded companies all those things will appeal to me”. Similarly another medium sized business in Surry Hills saw the need to establish a small studio of their own because of the frustration of not having anything suitable close by. “We looked at Fox studios at one point and they are somewhat limited in terms of the spaces that are available. Access is always difficult because of the security access to clients. It's manageable but it's not ideal. It's a bit sterile, it doesn't necessarily have the “vibe” that this area has as well, so there is a balance of that and that's probably the primary difference I think. There's nothing wrong with Fox studios but ... On the other and they do have access to public car parking…” (RESPONDENT 19 2010).
3 Current government policy settings

From the evidence gained from interviews, the propensity to cluster in specific areas in Sydney relates partly to regional push factors, but also to locality-specific attractions. Clustering takes place on the open market to a great extent to take advantages of these forces, but from an urban planning point of view, there are both economic and cultural benefits to be gained by facilitating and assisting clusters. Within the Australian context, there are potentially three levels of government which can facilitate and promote the viability of existing and nascent clusters - National Australian Government, State governments and Local Government.

In order to collate evidence for the various government programs relevant to the visual entertainment industries a further series of interviews has been conducted at all levels of government, NGOs and other stakeholders and academics with specialised knowledge of the visual entertainment industry sector. The results of some 30 interviews have been used to inform the following analysis of current Government policy settings below.

3.1 National contribution

Since the 1970s, National Government involvement/intervention in the television and film industries market has been considerable. That involvement has included the establishment of the free to air Channel SBS; contributions towards the South Australian Film Corporation; the NSW Film and Television Office (now Screen NSW); Pacific Film and Television in Queensland; Film Victorian; and, Film West in WA. Similarly, Government support for education and training has included the establishment of the Australian Film Television and Radio School in Sydney, and the Swinburne Film School (now Victorian College of the Arts) in Melbourne (Goldsmith and O'Regan 2003).

Another highly significant area of government involvement in infrastructure, has been the establishment of major film studios in Queensland (Warner Roadshow), in Sydney (Fox Studios) and in the Central City Docklands Studios of Melbourne. Such projects reflect a general shift in cultural policy away from support for individual productions, to support for more general capacity building (Goldsmith and O'Regan 2003: 17). Quite apart from generating a more mature production capacity, the studios have also been effective at attracting Hollywood productions, although the Melbourne studio, without any ownership stake by a Hollywood major, has been less effective in this regard (Macdonald and Wasko 2008 author David Newman: 301).

3.2 Screen Australia

Screen Australia is the main arm of National Government vested with management of the film and television industries in Australia. Its Charter includes an intention to support the development, production, promotion and distribution of Australian screen content by a range of policy measures including financial policies:

- supporting the growth of screen business;
- supporting marketing and screen culture initiatives which focus on engaging audiences with Australian content; and,
- administering the Government’s Producer Offset and International Coproduction Program to increase the commercial sustainability of production in Australia (Australian Government 2009).
As noted above, a key responsibility for Screen Australia is the administration of Federally funded taxation offsets. Taxation subsidies are not a new phenomenon in Australia, and successive Australian Governments since the 1970s have provided significant tax benefits for film production, in the interests of economic and cultural growth. The focus of Government support in the past has been on infrastructure and capacity building as a means of encouraging local production. However, recognising the recent interest by Hollywood to film in Australia, the government has moved to encourage internationally mobile productions via tax incentives including tax credits (Macdonald and Wasko 2008 author David Newman: 303).

The so-called “Producer Offset” is of particular importance for larger production companies. It comprises a refundable tax offset (rebate) for producers of Australian feature films, television and other projects (Screen Australia 2010). To qualify for the grant, a feature production has to be above a threshold of A$1.0 million and documentaries A$250,000. Some have argued that the “bar” has been set at an arbitrary and unfairly high level (Ginnane 2009). However, there is other evidence to suggest that groups of individual production companies have formed collective corporate structures so that they can qualify for such grants. Sometimes this arrangement is reflected in a collective physical arrangement or, alternatively, via the communications network with some examples of production companies located in cities as far apart as Sydney and Melbourne co-producing a slate of productions in this way (STAKEHOLDER “B” 2009).

A similar collaborative trend has been reported where some post production houses are investing in the films they are working on – either by discounting fees or by putting their own equity in as investment capital. One example of this is the recent establishment of a new studio to compete internationally with the Hollywood Major Studios, and branded with the strange name: DrD Studios. This new studio has been formed from an alliance between George Miller and Doug Mitchell in partnership with the OMNILAB Media Group (Miller, Mitchell et al. 2009). As explained by a prominent stakeholder in Melbourne, mutual benefits accrue to such partnerships, because post production services (such as provided by OMNILAB) are effectively “cash business”, whereas film production requires risk capital for investment. Under the current production offset allowance the cash investment is effectively underwritten by the Government and is predicted to create a far more prosperous industry in the near future (STAKEHOLDER “B” 2009).

The “Enterprise Program” is another financial strategy administered by Screen Australia which will provide funding of up to $350,000 per year, for a three-year period, to support production companies that have identified opportunities to develop and expand their business in terms of turnover, range and number of projects and/or the range of business activities undertaken to enhance the company’s sustainability. While the official claims made by Screen Australia suggest that the Program will encourage “a diverse range of companies and budget levels through this program” (Screen Australia 2010 B), a Departmental insider explained that, in reality, a more pragmatic/rationalist approach favours those production businesses which in the longer term are most likely to succeed – namely companies which are able to demonstrate convincingly, an intention to grow sustainably in a new business area rather than continue to do “more of the same”. In his words, avoiding “too many kitchen tables all vying for a piece of the pie” (RESPONDENT 28 2010).
3.3 Creative industry centre

Another Commonwealth agency the Creative Industry Centre (“CIC”) has a broader remit of managing creative industries generally. CIC has a national focus and provides business advisory services to creative industries that have at least $1 million in turnover, with an estimated 15,000 Australian Companies fitting into this category (RESPONDENT 31 2010). According to the Centre’s figures, an estimated 16% of all creative industries are involved in film television and radio, although separate evidence suggests few of these have a turnover of this magnitude. However, in recognition of the fact that many businesses in the creative industries generally come well under the $1 million threshold, CIC has recently initiated a new “incubator” program the main effort being to link candidate businesses into already existing networks, and to sources of venture capital (RESPONDENT 31 2010).

3.4 NSW state government agencies

3.4.1 NSW industry and investment

The main responsibility of this Department is to build a more diversified state economy by attracting investment and supporting innovative, sustainable and globally competitive businesses (NSW Government 2010). Its Creative Industries Department facilitates film and television projects via three main “strands”: including attracting major investments from overseas; secondly, working with Film New South Wales on assisting small producers to get projects to fruition with investors; and thirdly, assisting certain service providers such as post production houses to gain more exposure in international festivals like "ADDEST" (ADDEST 2010; RESPONDENT 33 2010).

A separate section of NSW Industry and Investment has been established to promote clustering via a recent initiative known as the “Strategic Business Clusters Program”. This scheme will award grants of A$30,000 in matched funding to existing clusters for specific cluster activity that increases employment, productivity, competition and promotes innovation (NSW Industry and Investment 2010). While this is a seemingly generous and worthwhile scheme, the response from mainstream film producers has been underwhelming (RESPONDENT 28 2010). In all likelihood, the lack of interest is a reflection of the fact that many of the Company Directors who were interviewed, are independently-minded, creative and anti-bureaucratic, particularly the small players. Such entities will be reluctant to take advantages of available governments support or respond positively to new policy initiatives unless the benefits can be very clearly and convincingly demonstrated. As expressed by a senior member of staff: “creative people, entrepreneurial people, their view is that they’ve got too much on their plate...to bother filling out a new government form, which is understandable” (RESPONDENT 33 2010).

3.4.2 Screen NSW

Screen NSW (former NSW Film and Television Office) has recently been moved as part of a departmental re-structuring to come under NSW Industry and Investment. The Charter of Screen NSW is quite similar to its Commonwealth counterpart, Screen

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For example data compiled by the former NSW Department of State and Regional Development indicates that in the film and video production industries the majority are non-employing and only 4% of the NSW sample have more than 20 employees Department of State and Regional Development (DSRD) (2008). NSW Creative Industry Economic Fundamentals: 113.
Australia. The main elements of the charter are: to provide financial and other assistance to the film and television industry in carrying out the industry's activities in New South Wales; to provide financial and other assistance for persons (including directors, producers, actors, writers and technicians) whose work in the film and television industry merits encouragement; and to provide policy and support services and advice to Government agencies on the production of films and sound recordings. Significantly, the Charter does not provide for infrastructure support such as the establishment of studio complexes. Similarly the identification and facilitation of clusters is the responsibility of a separate section within Industry and Investment as described above (NSW Government 2010).

3.4.3 NSW Department of Planning

In theory at least the State Planning Authorities could play an important role in facilitating the film industries via spatial planning and regulating major developments connected with the industry. In practice, the involvement has been limited to large scale premises/studios, most notably the Fox Studios Complex, located in the former Moore Park Showgrounds. Since Fox was established some 10 years ago, State Government powers transcending the local government role have been greatly extended with the enactments in 2005 of a special State Environmental Planning Policy “SEPP Major Projects 2005” and corresponding amendments to the NSW Environmental Planning and Assessment Act (NSW Department of Planning 2007). The heavy-handed intervention of the State Government in establishing Moore Park Studios was not without its critics (Williams 1997). Similarly, while the market for international feature films is now far better catered for in terms of studio capacity, there has been a general consensus amongst the film producers interviewed that they are of little help to local visual entertainment production (Jensen 2010 A).

Another area which in theory might come under the purview of NSW State Planning is the identification and facilitation of film clusters. As noted, above a separate State Government Department (Industry and Investment) is responsible for facilitating industry clustering, although in an administrative rather than in a spatial sense. There is clearly scope for greater integration between these separate bureaucracies. However, a senior member of staff in the Department of Planning suggested that any incentives connected with clusters could be problematic in terms of side-effects and was opposed to measures such as offering payroll tax for particular industries – “Actually I think it’s interfering with the market” (RESPONDENT 27 2010).

3.4.4 Film Friendly Protocol

The new "Local Government Filming Protocol", commonly known as the “Film Friendly Protocol” (NSW Department of Local Government 2009) is intended to facilitate on-location filming throughout New South Wales and radically change the "unfriendly" culture under which former productions have been treated by some local councils. The Protocol has its genesis in action, originally taken a decade earlier, by the Screen Producers Association of Australia (“SPAA”). SPAA took their concerns about the lack of support for on-location filming to the State Government. After a lengthy period of political resistance to reform, and a continuation of deeply entrenched and unhelpful local government practices (during which NSW began to lose ground to other states in terms of competition for film production, particularly to overseas feature films) SPAA submitted a second report to the NSW Government which recommended a number of urgent measures
be implemented without further delay. The measures included: greater financial resourcing to the NSW Film and Television Office (now Screen NSW), “a protocol with teeth”, and more incentives for local councils to get behind the local film industry (RESPONDENT 46 2010).

As expressed by a senior NSW Government Officer, the situation prior to the policy being introduced into NSW was so difficult, that many production companies de-camped to other states because of the relatively high costs of on-location shooting (RESPONDENT 29 2010). Several production companies, with recent experience of on-location shooting, indicated that, on occasion, they might resort to guerrilla tactics to evade the local council bureaucratic barriers then in place:

“...it is always a pain in the arse. These days cost means that you shoot on-location. You can't afford not to. And also you need reality and to get reality in sets is just horrendously expensive. And with high definition and all that you just can't get away with cardboard’. So I've always shot on-location because I prefer it. The last location shooting that I was doing was 5 to 8 years ago. We ended up shooting “Production X” at Concord... And more recently “skip” shooting we just do a sort of semi-guerrilla and make sure we don't shoot on any council property, we'd rather be shooting in a Woollies car park and deal with Woollies. It's just the council attitude [that] they can screw fees off people (RESPONDENT 08 2010).

Similar views were also expressed by several other small businesses in the sample. By contrast, a larger company with international experience, held a different viewpoint:

“I think it's reasonably easy. In fact, some places like London and New York are far more regimented in around the kinds of hoops that you could jump through. I think the only problem with on-location shooting, a lot of it, comes down to local councils and they have different regulations (RESPONDENT 13 2010).

An obvious explanation for the commonly held perception that some Councils are particularly difficult, is that some “favourite” locations become over-used, and consequently the impact of a fleet of trucks, cars, actors and lights as typically required in location shooting may give rise to resident complaints to their local councils. For this reason, over-use sets in train negative responses, and leads to some Councils earning a reputation for being unhelpful when it comes to filming in those areas.

Opinions are divided as to how effective the Film Friendly Protocol has been in establishing significant reforms, although there is evidence from those most well informed both in the private sector and government that it has already brought about significant changes in attitude. One of the most important changes has been that Councils are now only permitted to levy charges on a cost-recovery basis. But in some cases, this has had the unforeseen adverse result that the staff who are charged with the responsibility to recover such charges have become even less flexible than they might have been prior to the new Protocol being enacted:

“I remember when the protocol came into force there was a particular Council contact who said to me without malice 'you know we've got restrictions on how much we can charge you’ and he was obviously disappointed because could see that he was going to be losing revenue in that regard so he said: ‘we'll be charging you the maximum possible fee that we can’. And as I said he said it without malice but that was the attitude...”(RESPONDENT 30 2010).

3 Reference to building a studio set from cheap materials, resulting in poor realism
4 “Guerrilla” is filming on a minimal budget with simple equipment, handheld camera work, and often no insurance or permits approved.
Screen NSW, the Government Department responsible for administration of the Protocol is intending to review and further refine it later this year (RESPONDENT 29 2010). Given the short time within which the new Protocol has been in force, it is probably too early to say how effective it has been in facilitating on-location shooting in NSW. Changing entrenched attitudes of staff within government requires more than a change in legislation. The objective of SPAA - *more incentives for local councils to get behind the local film industry*, will need to be implemented via further training and marketing of the new reforms, to achieve a significant change in attitude. Hopefully, that will be followed by the introduction of appropriate management methods, including scheduling to minimise over-impacting on particular locations.

3.5 *Non Government Organisations (NGOs)*

In each of the Australian States, there are State and Commonwealth-funded NGOs, whose remit is to facilitate and foster the local production industry. Examples of these in NSW are “ICE” (Information and Cultural Exchange) and “Metro Screen” (ICE 2010; METROSCREEN 2010). These groups do much to assist young production businesses, and specifically target disadvantaged groups, indigenous groups and groups having strong links with underdeveloped countries. ICE focuses on a “fringe” territory of the Sydney Metropolitan Region while other similar NGOs are located further afield, including the regional centres of Wollongong, Newcastle and Byron Bay. The Commonwealth Government under its Infrastructure Fund recently provided significant grants to ICE and Metroscreen ($1.5 million, and $0.5 million respectively), because of their capacity to stimulate and assist disadvantaged groups and locations (RESPONDENT 29 2010). This form of assistance therefore represents an unusual collaboration between national government semi-government organisations and target groups with politically based objectives of maximising the cultural economy via disadvantaged groups, while aiming to achieve greater equity and multiplier improvements at the same time.

However, it remains open to question whether such programs actually yield significant industry benefits, as opposed to more general social or community benefits. Some overseas evidence suggests that the growth prospects of these markets have proved to be of quite limited value:

“...those with the highest take up of support (ie training, business advice) exhibit the poorest growth and improvement... incubator units, studios and digital media centres continue to feature highly in creative quarter developments and strategic plans...Given the fragile employment and markets involved in these small-firm clusters, these ubiquitous economic development initiatives rely heavily on blind faith in the growth prospects of the creative and knowledge economy and in their role as catalysts of regeneration and innovation” (Evans 2009: 1030).

However, there are significant dangers in diluting or abandoning policy on the basis of such evidence, particularly for an environment such as Australia which is so economically and demographically different from the Europe where the above conclusions were reached. Difficulties in evaluating such programs are nevertheless likely to arise, as evidenced by an interview with one of the Sydney- based NGOs:

“Every program, every funding program, that is, requires you to do that [evaluation], but they require different information in different ways/measures a lot of the reporting especially for arts funding the kind of information they require doesn't necessarily reflect what you actually do. So I don't think that we are necessarily organisations or programs that have the tools or capacity to really capture it properly, and what we're trying to do is
to start to develop new tools to do it. There is a big interest in this area at the moment, so a lot of other organisations and people are also looking at this thing and we are wanting to develop some new tools...”(RESPONDENT 32 2010)

3.6 The role for local government

Local Government has a major role to play with regard to the visual entertainment industries in the four main areas of:
- strategic or policy stimulus;
- development management or control;
- special works or projects including public domain embellishment; and,
- via facilitation of on-location shooting subject to the new NSW Film Friendly Protocol as described above.

Given the confines of this paper, I will confine my discussion to the first two of these areas of responsibility.

Under the Council system, a policy position, at least in theory, precedes all activities at the administrative level. Those include proactive facilitation policies for certain forms of activity and prescriptive management procedures to govern development, via the local council development control unit.

Issues relating to development control and the current statutory planning system in NSW have been previously reported by the author see (Jensen 2009, September). In summary there are problems with the zoning and development standards approach used in NSW which does not sit well with the highly mixed nature of activities ranging from home occupation to commercial and light industrial usage. Recognition of this problem has meant that in combination with the NSW zoning system a special State Policy is now proposed to introduce a new standard activity definition for film and television production which would enable such production companies to locate in both industrial and mixed use land use zones (NSW Department of Planning 2010; RESPONDENT 26 2010; RESPONDENT 27 2010).

3.6.1 Place management

An alternative to land use planning is place management, a system which has been implemented in different Australian capital cities, to a greater or lesser extent, including Brisbane, Sydney and Melbourne (Kumic 2010). As the name implies, place management is fundamentally about the management of places, and traditionally the responsibility for place management in Australia has been via State and Local Government Departments. Because of its potential to focus on the distinct characteristics of particular areas, it seems intrinsically more suited to facilitating clusters or quarters containing the visual entertainment industries

Walsh, the author of a seminal paper on place management, argues that the fundamental raison d’être of place management is addressing social disadvantage and improving equity, with a focus on particular neighbourhoods. Place management strategies must be accountable in terms of identifying, setting and measuring a series of planned outcomes. Service delivery must be a coordinated and integrated policy response. An institutional reorientation of the basic processes of governance and public administration is required. Flexible approaches to decision making and accountability are also needed to secure the role of the community:

“In summary, the fundamental purpose and outcome of place management is to overcome complex, multiple and interdependent problems afflicting specific areas and communities,
the causes of which often reside outside those areas, in order to achieve measurable benefits and improved outcomes for people living there” (Walsh 2001: 9).

Two questions relevant to the facilitation of the visual entertainment industries arise with regard to this formulation. The first, is whether the focus on social disadvantage and equity, might be shifted to address economic growth and sustainability. The second, is whether the systemic reforms offered by a place management approach can be more broadly applied, particularly in the local government sector, to overcome the deficiencies of prevailing systems of management and governance, based on land use planning.

As described earlier, when faced with particular needs of an industry cluster covering a complex mix of economic social and environmental issues a planning system focussed largely on physical and infrastructural goals is likely to be extremely limited in effectiveness. Mant, an experienced lawyer-planner, with considerable experience in advising government administrations at all levels, analyses the traditional system typically constructed to achieving system outcomes as distinct from place outcomes. System outcomes originate from broad policy objectives such as economic development, health and accessibility. Place outcomes are more specifically targeted on place and achieved by a process of place management to do “only what is needed” to achieve place outcomes. Mant argues that in the traditional model, management operates as a series of professional “silos” or “guilds” whose outcome objectives are narrow such as better road maintenance rather than integrated and complex goals such as better general access and environmental improvement for a particular place. A reform in management and governance, entailing the appointment of a place manager and sufficient resourcing to achieve place outcomes is a key part of the reform from a system outcome approach to a place management approach (Mant 2008 C).

Nevertheless, the model as described by Mant remains largely the responsibility of a government agency, and therefore remains an essentially top-down approach to managing place. A system of management which is both place focussed and more self-help, or cooperatively focused is the Business Improvement District or “BID”.

3.6.2 Business Improvement Districts (“BIDs”)

The BID model originated in the United States in the 1980s, and subsequently has been implemented in many other places including Britain Canada Europe and Australia. Briffault’s comprehensive analysis of BIDs, from a US Governance perspective, indicates that even within the context of a single, albeit large national perspective, BIDs take numerous forms and flavours:

“There is no canonical definition of a business improvement district and no single model in use nationwide. The state laws and local ordinances authorizing BIDs take differing approaches to such basic questions as district formation, functions, finances, and governance. Yet, most BIDs share a few basic characteristics: A BID is a territorial subdivision of a city in which property owners or businesses are subject to additional taxes. The revenues generated by these district-specific taxes are reserved to fund services and improvements within the district and to pay for the administrative costs of BID operations. BID services are provided in addition to those offered by city governments. Most BIDs focus on traditional municipal activities, such as garbage collection, street maintenance, and security patrols. A few provide assistance to the homeless. Some engage in street repairs, undertake landscaping, provide street furniture, maintain parks, and create public amenities. Many sponsor street fairs and special events, produce promotional brochures, and engage in other direct efforts to draw shoppers, tourists, and businesses into their districts” (Briffault 1999).
What the BID takes responsibility for, is often a matter of local context, culture and industry mix. The important innovation, relevant to visual entertainment industries and creative industries more generally, is the fact that it opens up the possibility of self-help both in the public domain and in the private sector. The relevance to a cluster of creative industries such as the visual entertainment industries is particularly evident, given their sensitivity and responsiveness to environmental and other spatial conditions as referred to earlier.

In essence, a BID marks an evolutionary step in the move away from administrative government involvement in the market [free spirits in the visual entertainment industry are wont to term this “bureaucratic interference”]. In the context of the British and European BIDs, Ward remarks that the trend is a reflection of a general changing spatiality in industry.

“BIDs appear to encapsulate the neoliberalisation of the city...liberalised because it is based on a presumptive equality of ownership and ownership rights, a world in which relations of exchange predominate, neo because it does not eliminate the public entirely so much as change its meaning and change who has control over it...BIDs constitute a significant innovation in urban governance cementing the already well documented shift to entrepreneurial discourses, policies and practices” (Ward 2006: 55).

In the United Kingdom there was a significant lapse of time, from when the BID system already in use in the US and Canada was noticed and assessed, to when it was finally implemented via a Local Government Bill, and granted assent by the Crown in 2003 (Ward 2006: 66). Since then, many BIDs have been commenced in various parts of the United Kingdom. Recent mapping by Cook shows that in 2008 that there were 27 BIDs throughout the UK, with more than one third of those in the London Metropolitan Region (Cook 2008; 787). At a similar time that Britain began its experiment with BIDs there were already five BID or BID-like organisations in Croydon5 Australia (Hoyt 2003; Ward 2006).

Seemingly, BID or BID-like forms of management have grown by extreme stealth and lack of fanfare in Australia. Few in the planning profession, and academic arena seem aware of their existence, or the availability of statutory powers already in place to enable implementation both in Victoria and NSW and possibly elsewhere in Australia. A report by SGS Economics identifies Geelong, Newcastle, Gosford and Auckland as having BIDs or BID-like forms of management, while at the same time Melbourne City Council has been contemplating the implementation of the BID system as recently as beginning of 2010 (SGS Economics and Planning 2010). Similarly, Lane Cove, an inner City local government authority in Sydney has a BID known as “Lane Cove Alive” (Alive 2010).

Yet BIDs are not without their own problems. In the United States it has been reported that over-zealous and privately managed security systems have restricted or locked out certain “undesirables” including political activists and social misfits from some BIDs (Nathan L. Clough and Robert M. Vanderbeck 2006). This issue has some similarities to a similar (and in the author’s opinion) undesirable trend for some up-market housing estates to be built with walls around them. However, BIDs normally embody a combination of public domain areas, and privately owned or leased properties, in contrast to the so-called “gated estates”, which are privately owned.

5 In the eastern fringe of the Melbourne Metropolitan region,
A similar and more subtle segregation has been reported in Camden London, home to a significant cluster of both large and intermediate scale visual entertainment businesses and also now operating as a BID. Gornostaeva contrasts the activities and rights of the “lambs” comprising low-level creatives or disadvantaged sub-culture of Camden with the “wolves” representing well-established and successful film and television companies. Gornostaeva argues that on the one hand, the operation of the BID undermines the unique diversity and vitality historically created in Camden and will lead to further negative gentrification processes such as the low rents and low prices in restaurants and bars that have helped to sustain the “lambs”. On the other hand, removal of the BID would lead to “a claustrophobic and seedy quarter of small shops, takeout restaurants, and drug dealers, abandoned by the more successful creatives...devoid of diversity and vitality”. Her call is for a compromise between these approaches assuming that evidence can be found of greater interdependency between the stakeholders (Gornostaeva 2009: 55).

From sources like these, the obvious conclusion is that the spatial and social conditions in which a BID is located have much to do with the form of management which is appropriate or desirable. Importation and application of a BID system from the very different social physical and economic context of the United States or United Kingdom, without careful analysis of the local geography, and corresponding adjustments made, is clearly not advocated.

Evans lists nine reasons for economic intervention based on a survey of international creative industry policies. The three most significant are economic development/employment, infrastructure and regeneration. Social/access, amenity/quality of life and heritage were ranked at the lowest levels in the reasons and benefits claimed for creative industry policies. Under the economic development category, the range of interventions encompass: property; business support services; grants and loans; fiscal/tax schemes; infrastructure – physical and soft (Evans 2009: 1024). A similar typology of program objectives, based on the research conducted by SGS Economics is a useful tool for analysing and comparing the goals and intended outcomes of BIDs in different areas (SGS Economics and Planning 2010: 16). The typology includes eight objectives, which if closely addressed, would provide a strongly synergistic basis for creative industries. The objectives, with notes which I have added on the relevance to visual entertainment industries, are tabulated below:

<table>
<thead>
<tr>
<th>Program objective (after SGS formulation)</th>
<th>Relevance to visual entertainment industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network development</td>
<td>Networking both spatial and electronic are an essential aspect of the highly fragmented and interdependent nature of the visual entertainment industries. Spatial proximity goes part way to meeting this objective.</td>
</tr>
<tr>
<td>Trader group enhancement</td>
<td>Groupings of like businesses, as opposed to businesses working in isolation, and businesses with a synergy to the visual entertainment industries will be beneficial to business growth.</td>
</tr>
<tr>
<td>Business development and investment attraction</td>
<td>As noted elsewhere SME visual entertainment industries may be more likely to benefit from the producer offset if they collectively have a budget over the stipulated threshold amounts for feature films, documentaries and other film projects. Similarly the sourcing of film</td>
</tr>
</tbody>
</table>
### Program objective (after SGS formulation) | Relevance to visual entertainment industries
---|---
**Scoping development opportunities** | Collaborative effort by like minded businesses may be better placed to secure larger contracts from TV networks and studio conglomerates.

**Destination marketing and promotion** | Branding is an essential and frequently overlooked ingredient of cluster sustainability. The Hollywood brand is familiar throughout the world, whereas a place like Artarmon (for example) is unknown outside Sydney, despite its highly significant association with visual entertainment industries.

**Urban design, safety and amenity enhancement** | A creative atmosphere and “buzz” are the necessary environmental attributes of a creative quarter appropriate to the visual entertainment industries.

**Information gathering and dissemination** | Information and buzz are at the heart of what attracts visual entertainment industries to locate in spatial proximity – since these industries depend on such information as what is happening, who has won work, and where the work is located.

**Policy development** | Involvement in the matters which affect the vitality of the area in which they are located is definitely important and could range from having determinative influence on appropriate or inappropriate development/development standards for the BID, the provision of good public domain amenities, the encouragement of synergistic services, and facilities and infrastructure such as studios or appropriate office space.

#### 3.6.3 Case study -St Leonards sub regional special centre – Sydney metro strategy

The inner core of a group of localities in Sydney’s Lower North Shore sub-region, including St Leonards, Crows Nest, Artarmon and Naremburn has been identified in the NSW Metro Strategy as an area for employment growth, and comes under the administration of three separate local councils: North Sydney, Willoughby and Lane Cove. Each Authority has differing development controls yet with the assistance of NSW Department of Planning, collectively commissioned a planning study of this Special Centre for the purposes of assessing potential for population and workforce growth over the time-span of the Metro Strategy (David Lock Associates and others 2006).

Of considerable relevance to this area’s status as a centre of creative industry or culture, the executive summary of the St Leonards Strategy states: “St Leonards has a number of image and amenity problems that need to be tackled for its attraction as a place to work or live to be strengthened. Chief amongst these are:

- The divisive effect of the highway and rail line
- The segregation of the hospital and TAFE from the heart of the centre
- The ageing building stock in some areas
- The poor condition of the public domain in some areas.

These problems have led to a fractured identity, or the lack of a single, coherent ‘sense of place’ for the centre.”
A key proposal of the study is to move towards a new refurbished environment addressing the above problems. This is articulated by a vision statement which proposes a radical overhaul of the Centre, in effect to move more towards a creative milieu:

"St Leonards will continue to develop as one of the major employment centres for knowledge-based industries within the Sydney metropolitan region, by capitalising on its location within Sydney’s ‘global arc’ and building on opportunities arising from its excellent accessibility and co-location with regional scaled health and educational facilities”.

Nevertheless, there is no reference in the study to the significant film and television industry clustering, or appreciation of the level to which these industries are likely to be contributing not only to the economy, but to the ambience of the centre, the use of facilities in the public domain, and the patronage of places of entertainment and restaurants.

Significantly, however in the conclusion to the Strategy there is a recommendation for a ‘watered-down’ BID:

“The councils may wish to more actively engage with the local community by facilitating the establishment of a Business Improvement District (BID) organisation to advise on the implementation of the Strategy [ie: St Leonards Strategy]. The BID organisation would include representation of local traders, residents and property owners and could advise on infrastructure or streetscape improvement priorities across the St Leonards Centre. The BID organisation would not have direct responsibility for decisions or expenditure of special rate levy funds” (David Lock Associates and others 2006: 114).

A BID for the St Leonards Region has not materialised since the Strategy was published despite the significance of this recommendation, and I think it is unlikely to occur without strong political pressure. Some evidence for public concern/action over the lack of image and direction of the St Leonards Centre has occurred, as recently as May 2010, with an announcement of plans by the local Rotary Club to rebuild and strengthen the community into the “knowledge sharing suburb of Sydney” with discussion groups and community book sharing” (Priestley 2010). Similarly, at the time of writing, urban planning students at NSW FBE are scheduled in the second semester of 2010 to develop strategies for local area improvement of St Leonards, and these are likely to consolidate the community interest already awakened by the Rotary Club initiatives.
The St Leonards locality, as viewed from the Pacific Highway, which bisects it into two main areas.

The central part of St Leonards, note recent streetscape improvements.
Overall, however, the future development of a BID or other innovative strategic improvements for the St Leonards Centre seem unlikely to occur, under the clumsy arrangement whereby the three local council Areas are required to cooperate over any policy changes. Similarly, the NSW Department of Planning, has presided over the collective future planning of this sub-region, with an inability or reluctance to change these fundamental local governance impediments into something rational such as unitary authority. This is regrettable, given the issues at stake, including lack of support and ignorance of the important role of the visual entertainment industries in this sub-region (Jensen 2009).

4 Analysis

The conclusions from this research program, are relevant not only to the visual entertainment industries, but have broader implications for the creative industries as well. Having interviewed a variety of sources in all tiers of government it becomes obvious that there is a significant level of policy "interest" in the creative industries. However, there does not appear to be much linkage between the different programs, or a unified view of where the resources should best be placed. A common and recurring theme expressed by several of the senior government officers interviewed, is that the role government should be playing is one of the enabler as opposed to controller. When you look at the financial/incentive schemes that are available, including the Taxation Offset, and the Enterprise Programme managed by Screen Australia, there is a decided effort to assist larger organisations, and those which are calculated in the longer term to yield the greatest payback to our national/community interest.

There is some merit in this approach, since government agencies have finite resources and the community/taxpayers have some right to expect that the resources they manage should be targeted on the greatest efficiency, the least risk, and the best overall outcomes. On the other hand, there is a somewhat Darwinian consequence, that the "small and the weak" will inevitably suffer under such a premise. For the visual entertainment industries, several considerations also argue for a slightly less rationalist approach. Firstly, there seems to be some risk that the powerful conglomerates in the visual entertainment industries (and these would include the major television networks and the largest film production companies) potentially will "cream off" the bulk of the available resources. The young and aspiring businesses attempting to break into this highly competitive market have limited opportunities to succeed, unless they are specially provided for.

For this reason, despite the somewhat negative thoughts of Evans regarding incubators and the like (Evans 2009), I think this is an important role, which the government should continue to play. However, assistance should only be given to the small/SME groups which have been carefully evaluated, to hold the promise of long-term sustainability. Similarly, a system of agreed evaluation bench-marks should be applied to these more equity-focussed programs, to assist in the follow-up and monitoring of the outcomes.

There is another broad consideration, which affects the whole visual entertainment industry, and that is their scale. Up until now, the visual entertainment world has been dominated by major conglomerates, with massive resources to bring to bear, both in terms of marketing and overall production. It is that pattern of industrial “muscle” which has led to the extraordinary success of the Hollywood Majors. By comparison, the pattern for
Australian visual entertainment industries has been of a far smaller in scale, likened to “cottage industry”. The lack of scale, means that work is intermittent and sporadic and there is a consequent flow-on effect to the many dependent external contractors who are involved in the production of screen material. From that point of view, I think there is some merit in government policy favouring the survival and growth of the players which have already been able to demonstrate a track road record (for example, in winning awards in the global market, or achieving high ratings on the domestic market).

Another obvious conclusion from the survey of government policy, is that the balance of assistance is currently focused on financial and management programs and far less on infrastructural and environmental conditions. Going to the question of clustering, there are definitely certain spatial and physical characteristics which will either support or militate against the sustainability of visual entertainment clusters. The factors which have been analysed in the largest clusters in Sydney/Australia support this conclusion, however there is quite limited understanding of this by the government agencies, which have the greatest potential power to do anything about it.

The NSW Department of Planning, for example, does not presently either recognise or address the issues of clusters by way of planning policy at all. Their focus is mostly on strategic land-use and transportation issues, a historic consequence of the way the planning has always been thought about up until the present, starting with the first major plan for Sydney – the County of Cumberland Plan, completed shortly after the Second World War. Its focus was on simple land-use zones and substantial reservations for a network of "County roads", few of which have ultimately seen the freeways for which they were originally intended.

Local government similarly operates under a land-use system dictated by the New South Wales Environmental Planning and Assessment Act, a statutory framework which in recent times has been manipulated by the government to progressively deny local communities a substantive say and influence over major development affecting their territory.

Local government also has a major responsibility for regulating on-location filming within its boundaries. It does appear that, with the New South Wales Film Friendly Protocol, reforms are occurring. However, it would appear from interviews held, that other states in Australia remain more ready to embrace the public face of filmmaking than New South Wales. The Protocol is nevertheless a very important first step, but there remains more to be done on the evidence. The most important message which local government offices should be given, is that there is a national interest at stake with on-location filming, which to a degree, transcends short-term local interests. While, understandably, local communities safeguard their amenity (noise, traffic, disruption, loss of parking etc.) the loss is generally very short-term, and in the overall scheme of things, a far smaller cost than the overall long term benefit of a sustainable and successful visual entertainment industry to our country as a whole.

I also think that local government is the place where the greatest reform can occur with regard to the environmental conditions, which either facilitate or militate against the sustainability of the visual entertainment clusters. The first and most important step in this, is a recognition both by the policy makers in local government and senior staff that the clusters exist in the first place. Secondly, having gained such recognition, the more problematic question is how such clusters should be helped to survive and grow.

This brings me back to the question of the degree to which local government should play a regulatory role or facilitation one. The tradition of local government has mostly
been focused on regulation and less on facilitation. In fact, it may well be that the greatest assistance that councils can give to existing and nascent clusters will arise not from their planning departments, but from their community/infrastructure ones.

These lines of thinking, suggests that planning, such as it is in local government, should favour far more strongly a place management approach. Place management has traditionally focused on equity and assisting areas with social disadvantage. However it seems to me equally able to assume a more proactive focus on the sustainability of the visual entertainment clusters.

The business improvement district or BID is in reality a species of place management. From my perspective, it has the added advantage that it is a more bottom-up and a grounded commercial way of achieving improvements in environment gains for particular clusters. Business Improvement Districts are a very recent and isolated phenomenon in Australia and further research is needed to determine how they can best be encouraged to facilitate visual entertainment industries and creative industries more generally.

There is, however, a question whether the disposition of filmmaking businesses is compatible with such a challenge. That question arises from the lack of interest by production companies to take up grants on offer by the Department of Industry and Investment to assist clusters. On the other hand, there is evidence that some players in the industry have recognised that they must collaborate more effectively to secure their growth and maximise their share of the available government resourcing.

Taking the specific example of St Leonards, which I have explored in this paper, there are many reasons which appear to justify further exploration of the BID in that context. The most obvious of these is the fact that it was recommended in the St Leonards Strategy by experienced consultants who after considerable research, going well beyond simple land use considerations, recognised that a concerted and cooperative involvement in the management of the area might be best facilitated by the establishment of a BID. Secondly, it is an area which contains the largest or second largest cluster of visual entertainment businesses in Australia (depending on how this is measured). That is a fact which to large extent has eluded the policymakers and the consultants. Establishment of a BID would provide an opportunity for significant improvement in identity, branding and recognition of the expanded role that the visual entertainment industries could play in this locality.

It is encouraging to discover that a spontaneous eruption of local pressure has recognised that the St Leonards Special Centre has a potential which goes beyond simply increasing commercial floor space and meeting population and employment targets.

5 Conclusions

Because of Australia’s western-style economy, with its high standard of education and technology (relevantly in regard to world standard post-production facilities) it is well placed to continue to capture runaway production from the United States, and other international film-making centres. However, from a long term sustainability point of view, the growth of local production in visual entertainment for the domestic market is of paramount importance to our cultural economy and sense of national identity. Global competition, and the new technologies, come with both threats and opportunities for growth. The environment in which those industries are located is an important and overlooked aspect of future sustainability.
In this paper, I have used empirical evidence connected with visual entertainment industries in Sydney, to draw broad conclusions concerning relevant policy settings and governance reforms to facilitate sustainability. These include an important need for the State Planning Authority to understand and acknowledge the importance of creative industry clusters and begin to plan accordingly. Similarly, there needs to be a far better integration of policy between all tiers of government and particularly between the different state government agencies and local government.

In NSW, the “Film Friendly Protocol” justifies a transparent review process, including consideration given to further education and training. The goals of the review should have an overriding recognition of the national benefits of supporting local visual entertainment production.

Local Government is a key area where the interface between the visual entertainment industry and government could be better exploited. In that context, the use of place management as a system of spatial regulation and management is preferred to simple land use planning. Similarly, the embryonic use of BIDs, by some Councils, should be extended into localities where the greatest potential for collaborative and cooperative arrangements with particular town centre businesses can be established.

As explored, in the case study of the St Leonards Centre, there is a strong case for a BID to be promoted by the coalition of State Government and the three local Councils who share responsibility for implementing the St Leonards Strategy.

The visual entertainment industries indeed comprise one of the most important categories of the creative industries. Further research is needed to ensure that they continue to compete in the highly competitive national and global markets. Their important contribution to and dependence on the spatial environment in which they are located must not be overlooked. One can only hope that the information and conclusions reached in this paper will make some small contribution to a renewed focus on the way in which the visual entertainment industries can more properly be facilitated in the urban context.

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Innovation in education: a unique model of knowledge creation, development and transfer in an Australian school

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Structured Abstract

Purpose - This paper will explore one school’s response to the need for knowledge creation and development by the establishment of a research facility within a school.

Approach - Often educational research is located within a tertiary setting with little transfer to the practising teachers who (ideally) should be employing the fruits of such research. In response, the Wesley College Institute for Innovation in Education was established by the current Principal of Wesley College, Dr Helen Drennen. From its inception, the Institute has been supported by an Advisory Committee of experts from a range of fields of endeavour beyond education, and since March 2007 has had a Research Committee of eminent academic researchers.

Originality/value - It is the only research institute situated within, and operated by a school in Australia. The Institute aims to be a leading provider of innovative thinking and research in education. It does this by exploring new learning frameworks for the 21st century, by enhancing cross-cultural connections in education and by expanding the link between society, home and school. Through key partnerships with tertiary and cultural organisations across Australia and around the world, the Institute has developed programs that foster intercultural understanding, contribute to knowledge of quality learning in classrooms and acted as a medium to connect the school sector with developments in academia and research.
**Practical implications** - A significant aspect of the Institute’s operations involves a strategic partnership with the Fitzroy Valley Aboriginal peoples of Western Australia. This partnership has resulted in a series of initiatives that are actively contributing to the knowledge flow between two cultures: Aboriginal and non-Aboriginal Australians.

Other key areas of operation that will be outlined in the presentation include an active Colloquia series which bring conversations relating to education to the broader public. In April 2010, the Institute also hosted the 2010 Global Language Convention, held in Australia for the first time and attended in significant proportions by both schools and universities.

The Institute was also the host for the first post-graduate education tertiary course in Australia that was delivered in an active, functioning classroom by current teacher practitioners. Through the RG Menzies Fellowships, teachers are actively supported to undertake research in an educational context.

The Institute is a concept that is, we understand, unique in Australia and is providing a model for knowledge transfer to other education organisations around the world.

**Keywords** – education, intercultural understanding, cross-cultural understanding, community education

**Paper type** – Practical Paper

1  **Introduction**

Often educational research is located within a tertiary setting with little transfer to the practising teachers who (ideally) should be employing the fruits of such research. In response, the Wesley College Institute for Innovation in Education was established by the current Principal of Wesley College, Dr Helen Drennen. From its inception, the Institute has been supported by an Advisory Committee of experts from a range of fields of endeavour beyond education, and since March 2007 has had a Research Committee of eminent academic researchers.

It is the only research institute situated within, and operated by a school in Australia. The Institute aims to be a leading provider of innovative thinking and research in education. It does this by exploring new learning frameworks for the 21st century, by enhancing cross-cultural connections in education and by expanding the link between society, home and school. Through key partnerships with tertiary and cultural organisations across Australia and around the world, the Institute has developed programs that foster intercultural understanding, contribute to knowledge of quality learning in classrooms and acted as a medium to connect the school sector with developments in academia and research.

A significant aspect of the Institute’s operations involves a strategic partnership with the Fitzroy Valley Aboriginal peoples of Western Australia. This partnership has resulted in a series of initiatives that are actively contributing to the knowledge flow between two cultures: Aboriginal and non-Aboriginal Australians.

2  **Knowledge development and creation within an educational and broader community context**

**Cross cultural approaches to learning** – development of literacy in Australian Aboriginal ways of knowing within a predominantly white Australian context and the reverse, in which Aboriginal Australia develops authentic literacy about white Australia is
imperative for bridging the gap between the two main cultures that assert claims of
ownership and heritage in the geo-cultural space now known in Australia.

From a knowledge development and knowledge creation perspective, learning that
facilitates the knowing essential to bridging what might, with some legitimacy, be
referred to as the two Australias is an area of focus that has been central to the work of
the Wesley College Institute since its inception. It is one of the three main defining
preoccupations of the Institute and shares strong connections to the other two –
developing new learning frameworks for the 21st century and expanding the dialogue
between society, home and school.

Developed within the context of the Institute’s partnership arrangements with the
Fitzroy Valley community of North-western Australia, endeavour in this area has been
shaped by the learning generated through pursuit of a social justice agenda that by
building capacity and, thereby, expand life choices available to the youth of both the
Wesley College and Fitzroy Valley communities (considered exploration of a global issue
as manifested locally) seeks explicitly to re-imagine and re-shape the contemporary
reality of Australia.

While the potential for knowledge development and creation would seem limitless in
this context, it should perhaps be no surprise that the very factors that make a social
justice agenda imperative are those that constitute the more intractable challenges to the
enterprise.

By definition, authentic cross-cultural endeavour would suggest a bridging process
that facilitates two-way communication and easy flow of traffic from both ends for
mutual benefit. It is a process that should disrupt preconceptions and lead to the valuing
ways of knowing different from what is assumed to be the norm – modern and scientific
and therefore reliable – and making them a part of the ‘mainstream’ curriculum. It should
be a multidimensional process that shapes expectations and attitudes, and manages their
evolution across different phases from resistance through acceptance to eager embrace. It
should essentially facilitate and encourage contestation of notions of superiority and
inferiority in regard to different ways of knowing.

Yet a contemporary reality of ongoing othering and devocalization – both literal and
metaphorical – deriving from a long history of dominance and dispossession in regard to
land, language and culture, have strengthened life and living on one side of the bridge
while enfeebling the other in more ways than is immediately apparent. Against such a
background, all authentic interaction or enterprise in the interest of appreciating different
ways of knowing, and thereby developing existing knowledge and creating new
knowledge, is threatened with the very real possibility of becoming ‘a dialogue of one’
or, equally real, ‘a monologue of two’.

The Institute continues to grapple with an enterprise in which the language of
knowledge development and creation is itself a knowledge problem and with implications
for the viability of cross-cultural or intercultural learning. In a situation where the
languages related to the two cultures seeking to engage with each other do not enjoy an
equivalent status nationally, and are not recognised as having equal capacity to carry what
is worth knowing, there is every danger of our cross cultural bridge becoming a
treacherous and slippery slope on which traffic may move in one direction only. With
English as the only language of formal and academic discourse in a space that is
multilingual, all its cultural others are rendered voiceless, for all intents and purposes,
through lack of recognition at a national level. The implications for participation of the
other in the processes of knowledge creation, development, and dissemination via an
alien language requiring skills, protocols and practices that alienate even further must be obvious.

Importantly, operating within such a context raises for the Institute some hard questions about how a cross cultural enterprise in knowledge creation has to be conducted if it is not to end up merely reinforcing and perpetuating the very real structures of power and dependence, advantage and disadvantage that currently exist. Here, the process of starting, developing and sustaining, at systems level, the relationships essential to the viability and progress of the enterprise is itself a study in partnerships that will bear rigorous academic investigation in the interests of creating useful models of best practice to be shared. Significantly, in this regard, the Wesley College Institute and Fitzroy Valley community partnership continues to thrive on the deep wells of trust that unceasingly water its abiding principle and pedagogy, “the herd is not home until the last calf comes through the gates”.

And still, the hard questions must be recognised and grappled with at the levels of both concept and practice:
- How is equal participation, so desirable to the objectives of this enterprise, to be defined and ensured, and with what measures of value?
- What will success on this venture look like and, in a context of deep inequality, for whom?
- How is mutual benefit to be defined and ensured in a world lacking equality of opportunity?
- How might the potential brain drain and its dangers – deriving from the navigation of a bridge that could easily function as a narrow one-way tunnel which only the very able and relatively privileged may dare to traverse – be averted?
- How does each side manage and harness for the development and creation of knowledge the continual disruptions to its preconceptions?

To address any and all of the above requires what the Institute calls, “a new learning framework”, also a means of knowledge creation central to this plank are two key developments – the concept of a Studio School and the design, in partnership with the Australian Council for Educational Research (ACER), of a new senior secondary curriculum model that integrates Academic Learning, Industry Learning and Personal Learning.

The Studio school is an opportunity for Aboriginal and non Aboriginal young people to learn together in a unique learning framework. A key aspect of this is the initial learning that takes place ‘on country’ in Fitzroy Valley, operating for the first time in August 2010.

3 Transfer of new knowledge within an educational and broader community context

What is the point of developing new knowledge unless it can be transmitted? Much of the literature relating to knowledge transfer focuses on the sharing of knowledge, once developed by a particular organisation, to other parts of the same organisation. The challenge for the Institute is infinitely broader than this as there are two sources of knowledge with which the Institute is concerned – that knowledge relating to education that is developed by other institutions and the knowledge relating to teaching and learning that the Institute itself creates or is associated with. The Institute has also identified two audiences for this knowledge: its own community (the Wesley College community) and

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the broader community comprised of other schools, universities and institutions in Australia and beyond. An audience implies a passivity that is the antithesis of the intention behind the Institute as the challenge is to engage all in meaningful dialogue.

As an education institution, it is imperative that we consider carefully the most successful mode of knowledge transfer. It was also considered important that whatever knowledge was gleaned be put into practice effectively and in a timely manner. There is little doubt that people learn to understand most effectively when immersed in a situation where the learning provides the right balance between challenge and success. The establishment of the Studio School and concomitant development of the new learning framework provide such a balance.

At the Wesley College Institute it quickly became apparent that, in Australia at least, there is a particularly wide gulf between knowledge creation in relation to education (often tertiary level research) and the dissemination of this knowledge to the practitioners (the teachers). The irony of this is observable to those on both sides of the gap – researchers often comment that material shared at conferences/conventions appears particularly radical to audience members (teachers) when in fact the knowledge has been available for years, and teachers, who often remain wedded to principles of teaching and learning often developed in their early years of practice, frequently claiming lack of time, energy and opportunity to embed new practices. Through the work on the Studio School, academics, teachers and Aboriginal people have worked together to design the buildings, the content, assessment and pedagogy employed: learning by doing in the most literal sense. This approach required significant change in modes of operation on the part of the School.

A two-fold response was developed to bridge this gulf. Firstly, existing primary and secondary teachers were financially and practically supported to conduct knowledge creation activities through research by the provision of time release, access to students and teachers, and, in particular, access to the highly skilled researchers on the Institute Advisory and Research Committees. Every year, teachers are invited to apply for a Menzies Fellowship. The Fellowship allows a teacher to undertake a research project in

<table>
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<th>Modes of Knowledge Transfer</th>
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<tr>
<td><strong>Active Learning</strong></td>
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<tr>
<td>Increasing Growth of Deep Smarts</td>
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<td><strong>Passive Reception</strong></td>
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**Learning by Doing**

- **Guided Experience**
  - Guided Practice
  - Guided Problem-solving
  - Guided Observation
  - Guided Experimentation

Socratic Questioning
Stories with a Moral
Rules of Thumb
Directives/Presentations/Lectures

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relation to an area of personal interest that, in turn, links to the 3 areas of operation of the Institute, namely: exploring new learning frameworks for the 21st century, enhancing cross-cultural connections in education and expanding the dialogue between society, home and school. The time release may extend from 0.2 to 0.6 of a full time load. It may be linked to a post graduate study, if approved. Teachers seconded to the Institute contributed actively to the development of the Bunuba Walmajarri Land Language and Culture Unit, an International Baccalaureate Primary Years Program unit experienced by all Year 4 students across the 3 campuses of the College and the Studio School and its accompanying new senior secondary curriculum model. The practical support of College educators ensured that they had the time to travel and meet with Aboriginal Leaders on the other side of the country. Documentation of the curriculum and extensive personal reflections at all stages ensured a data base of the work that could be called upon. Of significance was the dependence of all on the oral mode of knowledge transfer as non-Aboriginal teachers and students listened to the narratives of the Aboriginal people, framing them into constructs that they could understand and apply.

A seminal moment came when the Aboriginal work was to be shared with the broader community. The work completed by the Institute to develop the Bunuba/Walmajarri and new senior secondary curriculum model (National Diploma) programs was timely. The Australian Prime Minister’s 2008 apology to the Stolen Generation put in place a mood of optimism regarding receptiveness to Aboriginal ways of knowing and being. Subsequent research by the Wesley Institute into the first of the programs indicated that non-Aboriginal educators were anxious – mainly in relation to misrepresentation of Aboriginal material as well as a sense of ignorance/inadequacy. Aboriginal Leaders had to hold the hands of the non-Aboriginal educators and lead them through the Aboriginal journey. The power of this relationship, where the Aboriginal people are the leaders, is evident in the positive outcomes all involved are citing.

Another way to support knowledge transfer was the invitation to practising tertiary academics to take an active role in the operations of the Institute. The roles the academics employ include membership of the Advisory and Research Committees, intensive involvement in curriculum development (those academics at ACER), strand readers in the organisation of conferences, involvement as presenters in the regular Colloquia that the Institute presents or as mentors to existing staff who themselves are undertaking further study. It is the access to academics that ensured current thinking from outside the school community was deeply influential.

How do we measure the success of the knowledge transfer? Interestingly, the involvement of the academics in the school through the Institute resulted in a number of teachers commencing post graduate study – the circle is complete. Currently more than 19 staff of the School are undertaking further tertiary study.

Another aspect of Institute functioning is the operation of the post graduate opportunities offered through the partnership of the Institute with significant universities

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2. Anderson, Kim; Meeting of Cultures: How a PYP service project led to a greater understanding of the challenges facing the Aboriginal community and its unique traditions, IB World, Issue 53, May 2008 p 24

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in Melbourne. The Post Graduate Certificate in Educational Studies (International Baccalaureate) was developed as a result of the cooperation between The University of Melbourne and Wesley College Institute. This was the first time in the world such a course had been offered, its unique aspect being that the course was taught in its entirety, at the School, by current Wesley College IB teachers (approved by the University). Assessment, after being developed with the University, was conducted by the Wesley Institute staff. The rationale for this approach was the recognition that expert practitioners are in a position to share their expertise in their own educational environment, if only they may be given the opportunity and support so to do. This is an example of guided experience through practice. A significant aspect of these courses was the focus on the development of intercultural understanding in the adult students.

4 Conclusion

The embedding of the Institute in a school environment ensures the legitimacy and explicit nature of the knowledge creation and transfer. It allowed for Aboriginal people, tertiary academics and primary and secondary teachers to work together in a supportive environment to create the Studio School and a unique Bunuba Walmajarri Land Language and Culture Unit. A blend of academic theory grounded in practice.

References


Anderson, Kim; Meeting of Cultures: How a PYP service project led to a greater understanding of the challenges facing the Aboriginal community and its unique traditions, IB World, Issue 53, May 2008 p 24

La Salle matrix thinking – a structured approach to innovation – opportunity capture and systematic thinking

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Abstract
Creativity is quite an abstract terms, more an overview of the opportunity to think differently. Unfortunately, creativity in itself does not present a methodology for “outside the box” thinking, innovation or opportunity capture. What is presented is a structured approach to innovative and opportunistic thinking that is represented by several purpose developed thinking platforms (Matrices) that have been developed into complete learning modules delivered through agents in more than 26 countries and more recently licensed to one of the world’s largest consulting firms for e-learning. The best way to envisage the power of this, as demonstrated in many conference presentations, is to ask an audience member to brainstorm, perhaps a glass of water. This will leave people speechless, it’s not possible. However, provide them with some structure, such as complete this sentence “I wish this glass of water would….” And answers abound. The matrices presented provide more than 100 such thinking stimuli in a structured matrix format that gets everybody “on the same page” and all making innovative contributions to the problem at hand.

1 Introduction
The pursuit of knowledge has many motives, some purely altruistic, some more personal such as with genealogy, others in the development of the pure sciences or applied science and research or the collection of the date that underpins historical research.

However, it would not be unreasonable to suggest that by and large the pursuit of knowledge is for commercial gain, for business and for the growth an enterprise.

Whilst the latter may be the most common motive for the pursuit of knowledge and in particular innovation, the methods employed too often lack rigour and thus the results obtained are more by good luck than good management.

Further, whilst the imperative that drives the search for new knowledge, innovation and perhaps the wider span of endeavour referred to in this paper as ‘Opportunity Capture’ are perhaps well understood, few systems exist that provide the structure and rigour in that search.
The material presented in this paper is all the original development of the author and presents insights into business, innovation, opportunity capture and the mitigation of the single biggest risk in most new business endeavours, that of market risk or ultimately market failure.

2 The business plan

Do you know anybody that has ever written a losing business plan? Whenever anybody has a new idea or initiative, before investment dollars are won, the necessary prerequisite of a business plan is demanded, as it should be. The problem is, too often those tasked with writing the business plan are the very same people that conceived the idea, and thus they are biased even before they start.

The final page of most business plans is usually a spreadsheet that quantifies the opportunity. What happens if when the numbers are “run”, the outcome is not quite as good as you expected … easy, change the numbers to get the result you always knew would be correct.

Unfortunately the above scenario occurs all too often. Thus, not surprisingly most new ventures, whether they are purely business orientated or altruistically targeted are usually supported by a ‘winning business plan’ that too often fails to be played out in reality.

3 Market failure is the biggest risk

Further, if we examine the reason for such failures, by far the single biggest risk is that of market failure – you just don’t sell as many widgets or obtain the market interest originally forecast.

Indeed there have been some classic market failures, even after the most in-depth and rigorous market research. The infamous Edsel Ford motor car in the 1950’s is just one classic text book study. The much heralded Apple Newton and the SEGWAY two wheel transporters were also less than impressive in the commercial realities of consumerism.

So too in the development of cities and the thinking that underpins big plans. One does not need to look to hard to identify classic failures in all of our big cities and in many cases the costly and embarrassing consequences of these.

4 Why bother with a business plan?

A valid question at this point may be to ask, “why bother with the business plan at all? Or perhaps still better, ‘how can we reduce the risks in writing business plans?’

Business plans start you on the journey and are usually demanded, especially by astute investors as a test of your commitment and competence. It is often said, investors invest in people more so than the opportunity. Hence the necessary test of your capability in developing a logical business plan that considers all the important issues and presents a good business case.

At this point, perhaps we should perhaps dispel the common myth that if we persist we will succeed. This is nonsense, no amount of persistence will turn a “dog” into a “star”.

Perhaps this is best summed up in the following:

Persistence is an important element of success
Persistence is an essential element of failure. © La Salle 1995
The business plan is the first step that wins funding, allows you to assemble a competent team and commence the journey. Few if any people who take this first step towards a goal actually end up where they expected. Indeed the astute entrepreneur will most often find that the real “pay dirt” is off to the side somewhere, but they are astute and brave enough to recognise this and capture the real target.

In other words, you have to know when something is not working, stop and find the real opportunity.

5 Making the purchase decision - or in fact any decision

Turning now to the question of reducing the risk in writing business plans, the answers lie in understanding the market, the value proposition, the value chain and the real meaning of innovation?

In simplistic terms people only purchase things for one reason, they see value for money. Be it a power tool or a ROLEX watch, people assess and reach the value decision before they make a purchase.

The value proposition simplified says:

If I invest $A to get $B
I will only do so if I believe that $B is at least equal to or greater than $A.

We need to understand this value equation and relate it to the venture on which we are about to embark.

In addition we need to consider the participants in the chain of events that will get a product to the market. This is commonly referred to as the “value chain” and includes all the players from the inventor or creator through the distribution network to the seller, the purchaser, the user and now even the disposer. (It is the breakdown of the value chain in the case of the disposer than promises to spell the demise of the plastic bag in supermarkets).

Finally consider the new value chain player, the carbon footprint. If your new venture is not carbon friendly (a small carbon footprint) then beware as you will likely have great market resistance.

All players in the value chain need to have a positive value proposition. Even in the case of “loss leader” items, the sums have been very carefully done to ensure the ultimate value or return on the investment is obtained.

Notice also that in some cases the user is not the purchaser. Such cases need special consideration as to what value the purchaser gains. This case may apply to purchases of special treats or toys for children. But there are also examples of industrial products that have failed because of a failure to understand that the purchaser was not the one deriving the ultimate value.

6 Understanding market risk

To gain a snap shot of market risk consider the following diagram that can be representative of any product or service.

On the horizontal axis are the sectors that characterise everything, these being Industrial/Commercial products and services, Consumer products and services and finally Fashion and products and services.
In the case of industrial/commercial products such as power tools, fax machines, and high speed photocopiers etc the value proposition can usually be easily quantified and a rational purchase decision reached.

In the case of consumer products, advertising is what attempts to establish a value proposition, such as “this brand tooth paste cleans whitest of all” etc. People who are not moved by this type of argument often purchase lower priced home brand items.

Finally there are the fashion items where the value propositions are so abstract they beggar belief. Fashion companies spend many millions of dollars establishing their “Brand” as their value proposition.

On the vertical axis of the market risk map is the degree of novelty. How new is it, is it completely novel or have I seen it before? Unfortunate newness often spells high risk.

It is important in developing a business plan to understand where you fit on this map. The blue area is the ideal place to be because items in this area usually have a quantifiable value propositions together with low novelty that that allows people to relate to what they are purchasing and how it can be used.

Any mechanic will instantly relate to the benefits of a double ended or shifting spanner compared with a single ended one.

The top left hand yellow area represents products that when introduced were completely novel. These include such things as the photocopier, the fax machine, the PC and even the internet.

The thing common to all these high novelty products is that they all had long and difficult gestation periods. People simply could not relate to them or how they could be best used. Indeed many of these products took decades to pervade the market.

Moving to the top right hand corner, it is virtually impossible to make even the vaguest estimate of the likely sales volume of such an abstract product where the value is virtually impossible to understand. True the Rubik’s Cube was a remarkable success, but if asked in advance where would you invest your money, a Rubik’s Cube or an improved spanner, I believe the answer is quite obvious – the product for which you can both see the value and understand its function.
The same sort of thinking can be applied to intangible products, such as services as represented in the Market Risk Map shown below.

**Product Category**

On the top right hand corner may be the psychoanalysts and perhaps personal trainers. When these services were first introduced they were high novelty, certainly in the fashion space, ultimately moving to the consumer space. In the lower right hand corner there may be “in” restaurants, bars and coffee shops. How they became “in” is an interesting question worthy of exploration, though not in this paper. The fact is, once an ‘in place’ has the name as ‘somewhere to be seen’ its stocks rise dramatically.

In the bottom left hand corner are industrial/commercial services of low novelty. In this area we may identify much of the accommodation industry, hotels, motels and the like. Clearly there is a need for accommodation for executives and travellers going back for centuries. The opportunity to provide better, different or innovated accommodation arrangements is obvious and has spawned a vast market today ranging from budget motels, through hotels to five, six and even seven star accommodation and more recently the strong growth in serviced apartments.

This is a classic example of an innovation in a service enterprise where changes are constantly being made to win new customers.

In the top left hand corner we may position the credit card when it was originally introduced. The credit card took more than a decade to start to really become popular, thus eventually moving from the top of the diagram to the bottom. For most people the credit card may seem to be a consumer service, but for the vendor of goods, eager to find an easier trouble free way of winning your purchase, the credit card may be a commercial service.

Notice also, as discussed previously American Express and then VISA were followers of Diners Club, and in fact VISA has now overtaken Diners as the card preferred by most vendors in most places. Once again when we look at the market risk one may seriously query whether it’s a good idea to be first or it’s a better idea to be second or third and simply innovate the offering of the first into the market and do it better. This is a valid and significant way to do business and it’s all based on the premise of innovation; that is
changing what is already in the market to add value and go back to the market with a better offering at perhaps even a better price. It is a very low risk way of doing business and is almost bound to succeed.

The credit card, from its shaky beginnings with just 20,000 users after its first introduction has now grown to be one of the world’s most used financial transaction instruments. People carry multiple credit cards because of their security, convenience, the ability they afford people to purchase virtually anything at a whim, as well as removing the need to carry excess cash.

Once the widespread acceptance of the credit card was achieved, the card business became very competitive forcing the card companies to innovate their original offering to provide value added services in the hope of winning customers from competitors, as well as attracting new users.

Innovated benefits of the credit card now include airline points, monthly statement acceptable to taxation authorities as valid receipts, deferred payments (of course incurring huge interest rates), instant cash. Credit cards are now even seen as status symbols and a sign of financial standing to anybody interested enough to observe, with Gold, Platinum or even Diamond cards now available.

A final example of a service with slow beginning that has now overtaken the world and spawned a host of new consequential businesses is the internet and the creation of the Internet Service Provider (ISP), a term barely thought of just 20 years ago. Today the internet is ubiquitous and having world changing effects with large numbers if ISP’s now available and all offering some form of special attraction to have us use their services.

The idea of a connection of computers enabling easy and rapid communication is credited to Vinton Cerf as part of a project sponsored by the USA Defence Department in the early 1970’s. The creation of the World Wide Web in 1989 is attributed to English computer scientist Timothy Berners-Lee for the European Organization for Nuclear Research (CERN).

From relatively slow beginnings in the 1970’s the internet would now rate as one of the standout inventions of the 20th century. Again, with this novel technology we see a relatively slow gestation period before acceptance, much like the credit card, then explosive growth.

Notice also that once the internet and interconnectivity had become an accepted part of the everyday life, it has thus repositioned itself in the eyes of the market from the high novelty industrial commercial space to that of low novelty in both the industrial commercial and the consumer space. The ISP has become common and the ISP that can deliver higher speed at the best price is the one that will win the most business. Thus innovating delivery capability and value added services is high on the agenda of ISP’s with these innovated offerings being low novelty, and thus readily understood and accepted.

Clearly, if you can relate an offering to its location on the market risk map a much clearer understanding of the possible risks in the business can be realised, and efforts made to find ways to move the offering to the lower left hand sector.

7 Repositioning your offering and reduce risk

Another clear inference that can be drawn from an understanding of this diagram is the benefit in trying to find ways to reposition your offering and move it to the lower left hand corner. In other words try and find the customer “touch point” that would see your
offering as providing some sort of realisable value. In some cases this is difficult, especially in the world of fashion, but it is still not impossible.

For example, why would anybody buy a Mercedes Benz car for say, $160,000 when they could purchase a Korean car with a longer time and unlimited kilometre warranty for a tenth of the price? Many people may buy a Mercedes because they believe in its extra safety features and good German technology, and that’s fine. But if you are an investment advisor or business coach, then the fact of driving a Mercedes Benz sends a message to a customer that you are successful, and thus are likely to know what you are talking about. Hence in this regard as a Mercedes sales person, I would be playing that card in the sales conversation, thus moving the car, or more correctly its badge, to the left of the diagram. This is clearly a very sensible approach and presents the Mercedes Benz to these markets as a must have item, not a mere luxury.

A further example of repositioning comes from looking at the introduction of the compact disc. In fact the CD is touted as one of the most successful technology products ever launched. Yet one could well argue that the CD may be positioned at the top of the diagram in perhaps the consumer, even fashions space. Whilst at first glance this may be so, in fact the CD was introduced as not some technology novelty, and thus with the risk of a long lead time to market, but as a simply a better vinyl record, simply a better way of storing and playing music than we had before.

Thus we can see the value in this market risk map in looking to position offerings as low as possible and as far to the left as possible as shown.

### Market Risk Map

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<tr>
<th>Product Novelty</th>
<th>Improved Product</th>
<th>Product Category</th>
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<tbody>
<tr>
<td>Unprecedented HIGH</td>
<td>LOW</td>
<td>Fashion HIGH</td>
</tr>
<tr>
<td>Improved Product LOW</td>
<td></td>
<td>Consumer MEDIUM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Industrial/Commercial LOW</td>
</tr>
</tbody>
</table>

#### Product Category

- Compact Disc
- Mercedes Benz

If we accept that pioneering may be a risky place to be, is it possible that there is some merit in being a follower, not bringing too much novelty to the market.

### 8 Fast second can be a great strategy

The strategy of following is called “fast second” and is founded on the strong belief in the definition of innovation, and many companies have successfully exploited that model to great advantage.
Rather than the questionable so called advantage of being, “first mover”; in many cases being second is better, and certainly carries a lot less risk.

Just observe history to see examples of this fast second strategy in play as second market entrants move to become the big winners.

Henry Ford did not invent the motor car, but when he saw the market opportunity afforded by the first clumsily built and expensive cars, he “innovated” the process for making them and thus brought cars to the masses.

The ill fated COMET jet passenger airliner, a revolution in its day, plagued with technology problems created an opportunity for Boeing, un tarnished by the pioneering COMET failures. Boeing won the world market for passenger jets from second place.

Concorde is another example of a technology before its time, ultimately supersonic passenger transport will become commonplace, but not to the benefit of the Concorde pioneers.

The fax machine invention was credited to Scotsman Alexander Bain before the turn of the 20th century. However, it was not until the Japanese, as late comers, developed and used this technology within their own businesses that led the facsimile machine to popular use, and the success of these second comers.

The electric light when finally brought to market suffered enormous resistance, especially from the gas companies. In supplying power to the “new fangled” electric light Thomas Edison chose to use Direct Current (DC) and was a brave pioneer, but ultimately it was the vastly superior second into the market alternating current method that won the race.

Even with the ubiquitous personal computer, an invention commonly credited to Steve Jobs who was first to the market with the Apple Mac, the rich rewards went to the second comer, IBM.

When IBM realised the market potential of the first personal computers it quickly moved into the market, as fast second. In doing so IBM virtually stole the business, making IBM and the IBM compatible the industry standard.

Further, as computer technology became commonplace and PC’s became a commodity that could be built by almost any technology company, including the low labour cost third world manufacturers, IBM exited the market for desktop PC’s.

However, IBM did for a time remain in the laptop market, as the market entry price for this business is far higher than for larger tower and desktop models.

Ultimately and quite recently, as laptop technology became commonplace and the laptop moved to become a commodity product, IBM also exited that business.

In the case of IBM, their “play” in the personal computer market was a classic “fast second” strategy. Get into the business early, and exit before the business is commoditised.

City based convenience stores are a striking example. The early ones were amazing success stories charging exorbitant prices for “must have” conveniences. Look now and you will find most cities saturated with these stores all fighting for a share of a now much diluted market. Video rental shops are another example as are farmers where crops are planted in accordance with market trends.
Clearly, one can see the advantage of a fast second strategy and the benefit of seeing what is working and innovating the offering and moving in to the market to take advantage of what is clearly an emerging paradigm.

If one wishes to challenge the proposition that an existing product or business cannot be innovated to provide a better market offering, or that some things cannot be innovated, modified or improved in some way, then consider the alternative argument. This view would hold that whatever you are considering, product, process or service will remain the same, indefinitely, unchanged, for the rest of eternity – this is a highly unlikely proposition.

Thus we need to consider the strong argument for coming second in the race, in fact “fast second” and of course innovation is the key to doing just that.

Based on the foregoing it may now be appropriate to coin a definition of innovation. Not some abstract scientific definition but a simple one that essentially embraces all of the above insights.

The word innovate literally means “change” thus a good definition of innovation is “Change that adds Value”. © La Salle 1992

It is with this definition as a firm starting point that we can now progress the systematic growth of knowledge, innovation and opportunity capture, in the main targeted at commercial focused outcomes.

Innovation is a systematic process, so too the sourcing of infinite opportunities, it just needs some structure. This is not black magic of science fiction, but engineering at its best.

Thinking Matrices have been developed for the innovation of:
- Products
- Services, that is, the way you do business
- Processes, that is, how the business operates.
- Finding Opportunities – That is - How does one walk down the street and find a business opportunity?
- Generating your specialised Innovation matrix

For example, Innovation of products can leverage off the four fundamentals, called “Seeds”, these underpin any product.

The seeds are:
- Change or add value to your product in some way. - No product is immune from change for the better. If you disagree with this you are essentially saying that any product will remain unchanged for eternity, a highly unlikely proposition.
• **Add Accessories** to your products - Many companies today exist just by selling accessories, just look at the chains of shops selling auto accessories, to cite just one example

• **Add Complementary Products** - When somebody is about to make a purchase, you should take advantage of the mindset they have at the time by offering them complementary items, such as a drink or fries with a hamburger

• **Enhance the Sales Channel** - The existing channel or the access you have to your customer, is a valuable asset that can be leveraged. - This is like the petrol station being certain that you will come into their shop to pay the fuel bill, so they also offer extremely high priced commodities once they have you figuratively, “captured”.

Once you realise the business building opportunities afforded by embracing these seeds, the next thing to do is find ways to stimulate your mind in developing ideas based on the seeds. **Catalysts** are the fuel for this thinking and twelve key ones have been identified.

Some of the catalysts include:

• **Tracking** - If you follow your product through its life you will find a multitude of opportunities. Such as putting honey into squeeze containers as a result of observing the frustration of users with messy jars.

• **I Wish** - Like making a wish about your product, such as a glass that never gets empty and solving this with a pressure sensor and miniature radio transmitter that signals a drink waiter to refill your drink

• **Frustration** – this may well be the biggest source of all business opportunities. Listen for somebody cursing a product and you will have an instant opportunity for innovation

By arranging both seeds and catalysts in a rectangular grid, a matrix results for thinking. Each intersection of Seed and Catalyst creates a stimulus for creativity. The difference with this innovation matrix, unlike most other way to stimulate thinking, is that the thinking is immediately and directly applicable to your products.

**Product innovation matrix**

<table>
<thead>
<tr>
<th>Seeds</th>
<th>Tracking</th>
<th>I Wish</th>
<th>Frustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access’y</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Complement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enh’mnt</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Consequential Change
At the bottom of all thinking matrices is the catalyst of Consequential Change. This is the trigger to think of the consequences of what you are about to initiate, and moreover, perhaps create a consequence for you business that will have a positive effect. For example, finding a way to deliver a strong word of mouth message to a customer, this is possibly the most powerful means of promotion, far more so than advertising.

The important thing to remember is that getting started in business is the hard part. After that, moving to the next level is a systematic process of innovation based leverage and, if done properly, it can be virtually risk free.

In the case of services and service companies a similar innovation approach is employed; only in this case the seeds are a little different.

In the case of processes, a Process Innovation Matrix is used; again in this case the seeds and catalysts are quite different. A similar approach is used to identify new business opportunities using an Opportunity Matrix.

With the knowledge of seeds and catalysts for each particular situation and their application to any business, breakthrough thinking can be developed as it applies directly to your products, processes and services.

The generic term for this type of structured thinking I refer to as “La Salle Matrix Thinking”. The fundamentals are clearly quite simple, and universally applicable.

Opportunities can be found in similar manner if we start by first defining the word opportunity and then building a purpose built opportunity search matrix.

A dictionary definition of the word opportunity is something like, an opportunity is a fortunate intersection of events, however this definition falls short as it provide no insight as to how one may find an opportunity.

However, if we use the definition of opportunity as “An observed fortunate set of circumstances” © LaSalle 2000 the opportunity search horizon broadens considerably.

With this definition in mind an opportunity search matrix has been developed in that it identifies the five fundamental things that should be observed in order to find an opportunity.

The opportunity matrix is presented hereunder and has been used to very good effect in all sorts of industries and even not for profit organisations.
Finally, if the above matrices are not appropriate for the knowledge seeking at hand or do not best address the finding of an appropriate solution then a purpose built problem specific matrix can be developed.

Indeed it is often the work of actually creating discussion to identify the appropriate seeds of the issue that can provide the real insight to the solution.

9 The message is clear

The systematic pursuit and growth of knowledge can be best achieved using thinking matrices such as those presented, or purpose built matrices, depending on the issue at hand. The benefit of this approach are many fold, but one of the prime benefits is that is engages everybody on the same journey with a common structure.

This is a powerful way to harness the combined power of a group of people for the development of new insights and knowledge.

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Tacit knowledge network development: the comparative analysis of knowledge threads in complex systems

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Structured Abstract
Knowledge-based groups or communities are complex systems that emerge, evolve and mature through stages that display specific features and capabilities of the community or group. Understanding these capabilities and features are fundamental to building sustainable economic, social and learning networks systems. Understanding emergent behaviour within and beyond organizational communities requires understanding the social or sociological aspects in relation to the explicit formal/physical structures in the organization. Looking deeper into the development of informal networks across boundaries highlights the geographic structures and scales of knowledge flows and their influence on urban communities.

Purpose – The purpose of the paper is to examine the theory of knowledge networks through applied research
Design/methodology/approach – This is a case study approach, incorporating action research through embedded practice, utilizing interdisciplinary (or rather non-disciplinary) techniques and is thus a novel approach and application.
Originality/value - This methodology translation of knowledge networks from theory into practice to yield little known or understood technical issues when working in social complex adaptive systems.

Practical implications – The outcomes of the application contributes to the understanding of how, what and why sustainable social networks develop, offering the possibility of application in the field.

Keywords – tacit knowledge networks, small medium enterprise, company structure, formal and informal knowledge networks

Paper type – Academic Research Paper

1 Introduction

The importance of what specific elements are required to underpin sustainability becomes evident when attempting to grasp the difficult dynamics of tacit knowledge exchange and emergent networks. Existing and emergent knowledge networks display dynamic responses to their rapidly changing environments. This paper attempts to identify and discuss the processes of these systems and how knowledge networks behave across boundaries. Through case study work, this paper will also examine how individuals within networks combine knowledge exchanges within and beyond the group network to resolve issues.

The case study work investigates networks from the focal point of a business entrepreneur at management level, in a manufacturing small medium enterprise in urban Thailand (so as to translate/compare the concepts found in previous Australian work) and the dynamics of other workers within the same and other similar types of companies. Their networks may differ, however, their practices and their processes for creating new knowledge through respective extended networks are strikingly similar. This paper describes the growth of knowledge networks and knowledge management processes (informed by biological and autopoietic theoretical concepts) of different individuals from different levels of professional and social networks in our case study organizations.

Human organizations display many features that are not predictable from our traditional understanding of knowledge exchanges. Our analysis must look at behaviours of the organizations’ individual members from a “biological” point of view. It has been proposed that human economic/social organizations might be considered to be autopoietic. This paper argues for a broad-based analysis that supports the emergent behaviour and autopoietic nature of many organizations. The term “autopoiesis” (= self + production) was coined in the 1970’s by the Chilean biologists Humberto Maturana and Francisco Varela (Maturana 1970; Maturana and Varela 1980) as a set of criteria for recognizing when a complex system could be considered to be living, that have been applied to human organizations (von Krogh and Roos 1995; Maula 2000; Hall 2005; Hall et al., 2005; Hall and Nousala 2010; Nousala and Hall 2008; Parboteeah and Jackson 2007).

2 Case study

The case study examines differing focal points within and beyond the business to track knowledge exchange, but more importantly, track the behaviour between various levels of explicit corporate structure and informal knowledge networks. The case study will initially present the traditional company structure and product range and then explore the behaviour of knowledge networks of management and others in their networks. The
case study utilized a comparative analysis approach using in-depth semi structured surveys and group interview discussions. The aim of this approach was to allow individual details to be examined collectively.

The methodological approach utilized methods from previous research projects (Jamsai et al. 2007; Nouala 2006; Nousala, John and Jamsai 2005; Nousala, Miles et al. 2005, 2009) and subsequent testing from previous industry based work (Hall and Nousala 2007). This case study approach is not novel in itself. The novelty arises from the way in which “knowledge threads” are tracked through to highlight individual and collective “key experiential intersections”.

The case study work is based a longitudinal research, reflecting on the multi-layered, historical/longitudinal experiences of the individual, team and company wide activities. The case study work has incorporated action research through embedded practice, utilizing interdisciplinary or rather non-disciplinary techniques and is novel in approach and application.

The longitudinal research reflects previous work which is been listed here to outline the chain of investigation and how this current paper addresses the latest questions:

Nousala, John & Jamsai, (2005) discusses the problems of a Thai manufacturing company and what company members did generally to retain their product knowledge during production and beyond. It highlights a conscious attempt to understand what the company’s knowledge network was doing and how it was behaving.

Jamsai et al. (2007) discusses the conscious effort by the company to not just understand knowledge exchanges but to build and benefit from current and future knowledge networks.

Nousala & Jamsai-Whyte (2010) builds on the previous experience to determine what training and knowledge is needed to build a sustainable knowledge network, not just within the company also its external network.

Nousala & Jamsai-Whyte. S. (2010a) focuses on why the management needs to understand the value of knowledge networks. Without this understanding it becomes difficult to maintain innovative knowledge exchange within the company and beyond. This paper underpins previous efforts and understanding.

The present work continues this chain of papers to discuss knowledge networks both within and beyond company boundaries, but will focus on the emergent behaviour of companies and their individual members and the impact on communities. With organizational boundaries becoming more fluid, knowledge exchanges can no longer be described as moving between the traditional internal or external networks.

Nousala (2006) states “For such research, ‘There is no standard or uniform approach to qualitative analysis’ (Ticehurst & Veal, 2000: p, 96).” Looking for emergent organizational phenomena, (classified under complexity theories) was seen as a way of combining various observations to find commonalities that would help identify any interactive behaviour by carrying out the following:

- The organization was approached with a view to observe and to record the experiences of individuals.
- Action research was selected with an embedded practice approach.
- In-depth interviews were conducted across the organization.

The identification of interactive behaviours would also highlight intersections of commonality.
3 The organizational structure

There is a general understanding within the company that products will change and diversify according to availability of new opportunities via customer demand. This attitude is fairly typical of small, medium, enterprise, companies that need to maintain a level of flexibility and dynamics to survive.

The company “Invincible Co. Ltd. Thailand”, (the subject of this paper) with 24 staff members organizes itself according to the new emerging products and specific workloads. “Core” staff consisted of 1 General Manager, 4 engineers and 19 technicians. The organizational structure tended to be flexible and informal, adjusting to match the needs of evolving product lines; utilizing staff expertise according to existing work-loads. This flexibility allowed staff to deal with different types of customer demand.

The company’s prior experience manufacturing fire fighting trucks, involved all staff members forming one large team (regardless of core working unit or expertise), to work collectively. Over time this translated into new specific working units. The retention of the “whole team flat structure” experience influenced the way in which information and experience was now being shared through new and different types of projects. The current company formation involves four teams which tackle different projects with different development phases and production stages.

Figure 1 shows a fairly typical company model. Project Manager 1 is responsible for interior design of the coastal patrol ship. Project Manager 2 in charge of all auxiliary systems of the same ship, while the main task of Project Manager 3, is delivering the services of integrated logistic support systems. Project Manager 4 is responsible for production of mobile outdoor television broadcasting.

Each manager in Figure 1 had the authority to control and make decisions concerning their area issues and budget. Every project was treated as a profit centre for the company. The General Manager had overall supervision of the projects, providing sufficient resources as and when required by individual teams. This structure allowed the General Manager to focus on the strategic plans, issues and policies of emerging markets.
4 The history behind the knowledge networks at Invincible Co. Ltd. in Thailand – a diverse story

The company, Invincible, was established in 1994 by Mr. Thanade Panchand, a Thai entrepreneur and current Managing Director. Panchand based his business on sub-contracting work from several big companies around Thailand to design and manufacture various items for civil and marine defence, for example, cable discs and telephone poles. In 1998, he decided to expand the business into the field of information technology by designing marine logistic systems and other related information technology systems for the Thai navy. During 2005-2007 the company focused mainly on a single contract project involving the design and manufacturing of high-tech fire fighting trucks for use by the Airport Authority of Thailand at the new Bangkok International Airport.

Currently, the company engages in a variety of projects such as designing and manufacturing portable restrooms, mobile filtration unit for Bangkok Metropolitan Water Authority, mobile outdoor television broadcast for television channels in Thailand, costal patrol ships for the Thai Navy, light-weight bullet proof army vehicle and a database for maintenance specifications for integrated logistic support systems and software design of ships for the Thai Navy.

The variety product and success reflects the company’s earlier experiences of “whole team flat structure” flat translated into various team-based projects. The flexibility needed to produce a variety of products, required rapid change in production methods. The company capability directly reflects the wide and in-depth knowledge of staff, gained over time, through flexible “working team practices”.

These capabilities have resulted in company members acquiring the ability to balance company and project vertical structures with horizontal exchanges of knowledge experience. This is not something that is easily achieved within project based manufacturing organizations. The various “layers” of experience were developed over time and formed the basis for the application of quick and timely in-depth expertise.

The horizontal knowledge exchanges of staff members built over time formed the basis of new individual and company knowledge (from various sources) utilizing internal and external networks to update or advance specific or general knowledge.

5 Knowledge networking – examining the layers

5.1 Managing Director/General Manager and his network impact

To build a knowledge network, the General Manager utilized a variety of sources; for example, the contacts he formed through a part-time university course with classmates from different levels and all types of businesses, and with universities lecturers. The network the General Manager formed was both a formal and informal knowledge network, with staff from at least five universities in Thailand. Friends and family members were also part of his knowledge network since most work for various organizations all over the country.

This approach both individually and organizationally contributed in no small way to identifying (over time) a niche in the market for the company’s products. The General Manager seemed to keep all of his previous customers with him, through various layers of value adding supported by a stable knowledge network. This network had a reputation of providing solutions, which in turn, contributed to a wider basis for the General Manager’s
total knowledge network. Suppliers were also kept in the Manager’s database adding to the foundation of any new knowledge initiative.

Figure 2. The managing director’s knowledge network.

An example of knowledge network behaviour was described through an experience the General Manager had when attempting to gain knowledge for a new project for designing and making a light-weight bullet proof vehicle. The specifications of the material used in the car body were a result of collaboration with a university lecturer and other industry colleagues that had specific fragments of the overall product knowledge. The collaboration pieced together the solutions via knowledge from automotive, previous customers’ experiences, suppliers’ experiences and technicians. The quick and in-depth knowledge response from the Manager’s network resulted in a signed contract for the company.

5.2 Project Managers and their network impact

Each Project Manager tended to form a similar knowledge network to that of the General Manger’s network. For example, take the case of the Project Manager 3. The Project Manager 3 was mainly responsible for designing computer software particularly the integrated logistic support systems, and servicing and training customers of how to operate the software.

To accomplish the tasks within the budget and on time, the Project Manager 3 contacted a university staff member who knew of advanced and new computer technology, and who proved to be a prime knowledge source. The external knowledge network then extended to the university students enrolled in information technology program, who could participate in testing which technology was applicable to most equipment and users. The traditional external knowledge network extended beyond usual boundaries to those of previous users who provided information on what should be improved. Some of Project Manager 3’s knowledge sources were personal contacts while others came from the General Manager’s networks.

Considering the traditional internal knowledge network, all Project Managers always shared their knowledge and discussed issues from their previous experiences and how they dealt with previous products as well as problems encountered. It was interesting to note that Project Manager 4, an Electrical Engineer, seemed to be a central knowledge transfer source, a key “human attractor” (Nousala 2006; Nousala, Miles et al 2005, 2009) and channel for the company in several technical aspects. As such, it was felt that the company should place more effort in facilitating and supporting his knowledge networks.
and personal knowledge platform. It also showed that the company may need more similarly qualified staff. Blurring the lines of knowledge exchange behaviour between the traditional internal and external exchanges within and beyond the company, was showing different ways to link with the general community.

5.3 The theory behind the field experience

Hall and Nousala (2007) and Nousala (2009) discuss how Michael Porter and others (Porter 1990; Johnston 2003; Dahl et al., 2005; Paija 2001; Pedersen, 2005) write of dynamic interaction between industrially related organizations within a specific geographical area, contribute to “industry cluster” formation, where Porter (1990) defined the concept of an industry cluster as "a cluster consists of industries linked through vertical (buyer/supplier) or horizontal (common customers, technology, channels) relationships”. Cluster dynamics helps organizations to substantially improve their international competitiveness compared to organizations working in isolation (Hall and Nousala 2007). Hall (2006) and Hall and Nousala (2007) discuss their first hand experience trying to form an industry cluster. Nousala (2009) listed some key features contributing to cluster formation. These include local linkages and formal and informal interactions for sharing knowledge. Following Johnston (2003) these include: (1) easy exchange of knowledge, information and ideas between firms – especially tacit and informal knowledge, (2) access to generic qualified labour, (3) access to markets, (4) access to new ideas, (5) access to specialized services or facilities and (6) access to highly skilled and specialized staff. Again, following Nousala (2009), different forms of knowledge exchange pertinent to organizational survival take place on many different levels of organization.

As discussed previously, Project Manager 4, an Electrical Engineer, was considered a “human attractor”, who provided an intersection for company knowledge transfer. Project Manager 4 had a deep knowledge store of “Key experiences” that could be adapted to individuals and their networks alike. Through the case study interviews, the process of analysis exposed layers of key experiences identified and described by the individual being interviewed (Nousala 2006; Nousala, Miles, et al 2009). Nousala (2006) states “These key experiences are important enough to the individual to have been retained and shared. These key experiences are then subsequently followed through by the analyst using the mind map process, which allows for the emergence of the experiential thread. This experiential thread is followed as the individuals have presented it, in context”.

989
Iterated OODA cycles
Aggregation of people with knowledge needs in common

Constraints and boundaries determine what is physically allowable
Organizational imperatives and goals

Organizational history and circumstances determine start
"universal" laws governing components determine possibilities

Higher level needs
Higher level system / environment
SUBSYSTEMS / COMPONENTS

Figure 3. The knowledge spiral process (Nousala 2006).

Figure 3 illustrates the growth of organizational knowledge through time, driven by organizational imperatives and goals, constrained by history, circumstances and physical possibilities. Knowledge building involves repeated cycles of Observation, Orientation, Decision and Action, where Orientation is a complex process of sense making, analysis, and synthesis based on organizational capabilities and memory of history (after Popper 1972 and Boyd 1996 as discussed in Hall 2005, 2006; Hall and Nousala 2010; Osinga 2005). Needs for particular kinds of knowledge leads to an aggregation of people who share those needs (e.g., to form a community of practice), as shown in Figure 4.

Figure 4. An emerging social network created by a “human attractor”.

Figure 4 (Nousala 2006; Nousala, Miles, et al. 2005, 2009) illustrates the role of the human attractor in the organization. ‘Faces’ in Figure 4 correspond to people/actors belonging to the organization. In this figure, “a” is a “human attractor” seeking knowledge to address a high-level organizational imperative or need; “b” are other knowledge seekers socially transferring knowledge relating to what the “human attractor” seeks to know for the benefit of the organization; “c” are other actors in the organization.
who are not connected to the seeker's current interest; lines “d” indicate knowledge transfers between individual actors. Line weights indicate strength of the connection. The open vertical arrows indicate the possibility that the community may assemble and generate knowledge that will be valuable in addressing organizational needs” (after Nousala and Hall 2008).

**Figure 5.** This is a modified representation of the cycles in building organizational knowledge through time (Nousala 2006; 2007).

Figure 5 illustrates the role of the human attractor in the company’s knowledge network through time. This involves horizontal knowledge exchanges with buyers, suppliers and others in a wider knowledge ecology (seen here as the friends, previous customers and previous suppliers cited from Figure 2), and the necessary involvement through time of the management levels to provide guidance as to knowledge requirements and apply knowledge gained. The transition of interaction between layers shows W2 (the transitional world of tacit knowledge exchanges) and W3 (the world of codified knowledge - after Popper 1972 as extended by Hall 2005 and Nousala 2006). Notice that the managerial levels ultimately interact within the network ecology to gain what is necessary for them to achieve their various outcomes.

An example of when individuals group through their networks these build clusters which can be single project based experiences or develop into full organizational or industrial/regional clusters capable of continuously developing and sustaining great social capital. “When cluster members do interact effectively, the result is a powerhouse for concurrent innovation, development and marketing that can contribute significantly to the total export success of their host nations” (Hall and Nousala 2007).

6 Conclusion

The case work examined the “translation” (from theory to practice) between explicit corporate knowledge and the behaviour of informal knowledge networks. The case study examined differing focal points (with differing approaches) utilizing specific capabilities to access similar knowledge networks in different ways within and beyond the business.
A central knowledge transfer source, the key “human attractor” (Figure 4 - Nousala 2006; Nousala, Miles et al 2005, 2009) seemed to channel knowledge for the company in several technical ways. As such, these human attractors were not only found within the company but within the general community as well. The sustainable networks were built on such human attractor nodes and subsequent networks which did not necessarily rely on more traditional concepts of internal and external organizational knowledge exchange. There was an understanding that permeable organizational boundaries were responsible for solutions that would not come about without human attractor networks. However, there was little understanding of the true value of such networks.

Placing more effort in facilitating and supporting the building of knowledge networks and personal knowledge platforms could lead to innovative activities and healthier organizational and community behaviour.

This knowledge exchange behaviour was blurring the lines between the traditional internal and external exchanges within and beyond the company and showing different ways the company was linked within its community. Individuals moved within the company and beyond sometimes becoming part of larger groups and organizations to complete specific tasks.

Tracking the behaviour between various levels of explicit corporate structure and informal knowledge networks, showed (at least) two differing structures of equal importance that impact one another (being formal and informal). Experience of both individuals and collectives are the basis of knowledge networks that form the basis of sustainable organizations, communities, clusters and regions. Informal networks are time sensitive, meaning that they develop longitudinally. The capabilities that keep informal networks developing are in a sense the building blocks of sustainable organizations, communities, clusters and regions.

The development and use of a comparative analysis approach using the in-depth semi structured surveys and group interviews discussions, allowed collective individual details to be examined. The focusing on commonalities in the interviews and on overt behaviours seen in the organizations day-to-day interactions and between the organizations helped to identify any emergent organizational phenomena (Nousala 2009).

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Intelligence capital: a comprehensive model

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Structured Abstract

Purpose - Intelligence has been studied from the viewpoints of philosophy, psychology, sociology, information technology, management and neuroscience, just to mention a few disciplines. Several theories and concepts have been developed to understand intelligence phenomena. Some of these theories focus on the individual, such as psychometrics, others on the way the individual’s organizational skills, like business intelligence, and some other on society, such as collective intelligence. The objective of this research is to develop a comprehensive model that includes these different approaches on intelligence that can be used to identify and develop Intelligence Capital. The hypothesis of this research is that this capital is an intangible asset that can create value within a personal, organizational, or social value system. The population selected for this research is the city of Monterrey, which has been deemed a Knowledge City (ITESM, 2008).

Design/methodology/approach - The selected method for this research is systematic operationalization. This approach consists of defining all the involved concepts in terms of measurable operations. This derives from Percy Williams Bridgman methodological position, operationalism. Operationalization is often used in the social sciences in the empirical research process. If a hypothesis relates two concepts, both of them must be measured, and their relations should be represented in a conceptual framework. This framework can be operationalized by the construction of questionnaires that can be applied at a later stage of the inquiry.

In this research, the first part was the compilation of relevant and multidisciplinary theories and methods around intelligence. A conceptual framework or comprehensive model has been constructed from the information gathered. The concepts defined in this new model are then operationalized through a measurement system. The second part of the research proposes an extended Intelligence Capital Framework that could be applied to the city of Monterrey, México and other MAKCi (Most Admired Knowledge City) Award nominees.

Originality/value - The main problem of research on the field is the lack of a comprehensive model that integrates the heterogeneous theories around intelligence. In order to really understand the subject matter, it is necessary to study it from different perspectives, aiming to reach all its dimensions. For instance, a focus solely on information gathering would probably impact negatively the study of cognitive processes.
On the other hand, without an understanding of individual intelligence it is barely possible to understand collective intelligence. Knowledge Cities are capital systems; their Intelligence Capital is the measure of the adaptive capabilities of society as a collectivity. Intelligence Capital also represents the understanding of the external world of the system. The main contribution this research intends to make is to put forward a more robust framework to assess and develop Intelligence Capital in the social domain.

**Practical implications** - Because the model my research is suggesting is a comprehensive one and takes into account different perspectives on intelligence, an important characteristic of it is that it defines intelligence as a capital, which is in itself part of entire capital systems. In addition to this key characteristic, there are others which describe the way the model aims to be:
1. It starts from the understanding of intelligence. The definition of this concept is going to be built upon the vanguard of several disciplines related to intelligence.
2. It deals with the personal, organizational and social domains.
3. Assumes a strategic perspective, because it takes into account all the value dimensions of the intelligent entity.
4. It is adaptive.

**Keywords** - intelligence, capital systems, knowledge management, intellectual capital, intellectual assets

**Paper type** - Academic Research Paper

1 **Introduction**

Intelligence has been defined and studied from several perspectives over the last centuries. There are different approaches and scopes. According to the Merriam-Webster (Merriam-Webster, 2010) dictionary, Intelligence has the following definitions:

- The ability to learn or understand.
- The ability to apply knowledge to manipulate one’s environment.
- Information concerning an enemy or possible enemy.

These three definitions seem to be different, but they all agree in considering intelligence to be integral to an adaptive process.

The ability to learn or understand something is related to a value creation system. The learning process must be aligned to certain values, goals and objectives. For example, psychometrics is more focused in measuring this kind of ability, but cognitive-contextual psychologists question this approach because in some cases IQ is not directly related to the ability to succeed. Sometimes intelligent people just cannot adapt to their environment. The second definition takes into account the environment or context: to be intelligent means not only to learn or understand something, but also to be able to use this knowledge in the adaptation process. The last definition refers to the context of war, where intelligence means gathering information about the enemy or the battle field, which is in turn used to develop strategies and tactics to beat him. This last element completes the definition and stresses the importance of planning, organization, analysis and communication for adaptation and survival.

Neo-classical economics recognized only two factors of production: labor and capital. Knowledge and intellectual capital were considered exogenous, outside the system. The New Growth Theory, developed by Romer, Schumpeter and Solow, proposed to change this point of view by identifying technology and knowledge as an intrinsic part of the
economic system. Knowledge, in this respect, is the third factor of production on leading economies (Romer, 1986, 1990). According to Romer, knowledge is the basic form of capital. Economic growth is, in fact, driven by the accumulation of knowledge. A knowledge asset is a stock of knowledge from which services are expected to flow. In contrast to physical assets, knowledge assets may in theory last forever (Boisot, 1998).

There are several approaches that try to measure intellectual capital, including those of Sveiby (1997) and Stewart (1997). One tool, now widely used by US companies is Kaplan and Norton’s Balanced Scorecard, combines financial with non-financial indicators, such as internal business processes, learning and growth, and various customer-related indicators (Kaplan and Norton, 1996). Competency models seek to define and classify the behaviours of successful employees and calculate their market worth, while the business value approach aims to consider more the importance of information and the costs of missed or under-utilized business opportunities.

Knowledge assets are a subset of dispositions to act, embedded in individuals, groups, or social systems with future prospects of value creation (Malhotra, 2003). The accounting based perspective of knowledge assets and intellectual capital can be appreciated by clarifying the term “asset”. Assets are economic resources controlled by an entity whose cost at the time of acquisition can be objectively measured (Antony and Reece 1983). Professionals in the field of accounting, in this respect, realize that the valuation of all assets is a subjective process, especially for intangible assets (Malhotra, 2003).

2 Capital systems

The recognition of intangible assets in companies led to an intellectual gold rush aimed at identifying, measuring, and capitalizing on such intangibles. A system’s value categories taxonomy is expressed in Carrillo’s Capital Systems Model (Carrillo, 2002). According to Carrillo, there are several kinds of capitals which interact in a system to create value:

1. Meta Capitals
   a. Referential Capital
      i. Identity Capital
      ii. Intelligence Capital
   b. Articulating Capital
      i. Relational Capital
      ii. Financial Capital

2. Input Capital
   a. Investment Capital

3. Production Capital
   a. Agent Capital

4. Output Capital
   a. Product Capital

Referential Capitals are value elements which allow the identification and alignment of the rest of the Capitals. Identity and intelligence are strategic elements of the whole system. The better knowledge about “what the system is” and “what the system wants to be”, the goal setting becomes more coherent. Intelligence, within this perspective and defined as environmental knowledge of the system, increases the probability of adaptation and survival.
From the Capital Systems Framework approach, intelligence is a capital that creates value within the whole system, enhancing the adaptation capacity of the entity. It is important to understand how this knowledge about the environment could be assessed and developed in order to maximize value creation, and strengthening the performance of a system.

3 Intelligence capital framework

3.1 Definitions of intelligence

One of the challenges faced while understanding how intelligence creates value within a capital system is the variety of definitions of the notion. For this research, there are a couple of elements that are considered basic because they are two of the earliest references we can find: Aristotle’s logic and Sun Tzu’s *Art of War*. For Aristotle, logic is the instrument by means of which we come to know anything. His contributions on reasoning had a noticeable impact in science since the IV Century B.C. In the other hand, the *Art of War* is one the first systemic approaches of intelligence in the military context. Sun Tzu stresses the strategic and tactic importance of knowing, both the enemy and the battle field.

Twenty five centuries after, we still recognize that intelligence is related to both a reasoning and information gathering process. Based on this two mayor tracks, intelligence capital defines the Basic Intelligence Cycle (BIC) by:

1. Sensing the environment.
2. Analyzing the information.
3. Responding to signals.

These three steps represent the simplest intelligence process. All of them have to be performed in a systematic way in order to show intelligent behavior. The BIC is not focused on either information gathering or the reasoning solely, but rather in the whole system that accomplishes the evolution process. An intelligent entity must know what is happening in the environment, must make sense of the signals, and adapt itself in order to respond in an effective and efficient manner to whatever is happening.

3.2 Multidisciplinary approach

Since the 19th Century, with the evolution of science and knowledge, several disciplines have developed around the concept of intelligence. Some of them follow the track of reasoning and logic, and some others focus more on information gathering for strategic purposes. The Intelligence Capital Framework is based on a multidisciplinary approach, and takes into account several models and definitions in the pursuit of a more holistic understanding of the issue. Intelligence Capital has its origins in Knowledge Management (KM), and more precisely in Capital Systems and Knowledge Based Development (KBD).

Within KM and KBD, the External Business Intelligence 360° (EBI 360°) was the first attempt to represent and assess intelligence capital. EBI 360° includes a set of intelligence objects and processes. The idea of this model is to identify external entities that have to be monitored in relation to elements of the system (customers, markets, competitors, suppliers, technology, etc.) and to apply ten continuous intelligence processes (value alignment, decision makers’ characterization, access strategy, and so on.
until the evaluation and adjustment process) to them. This is a dynamic approach in which new objects could be incorporated, while obsolete ones could be discarded as research progresses. The process is a continuous cycle that has no defined end and should be adjusted at several moments for intelligence enhancement.

Psychology is an academic and applied discipline that involves the scientific study of human mental functions and behaviors. Psychometrics, within psychology, attempts to measure cognitive capacities comparing an individual against the larger group. The Intelligence Quotient (IQ) is one of the most accepted psychometric instruments. Since intelligence capital intends to assess intelligence in organizations and societies, psychometrics is relevant to this framework, because individual IQ tests could be used as a way to measure collective intelligence.

Cognitive-contextual theories deal with the way that cognitive processes operate in various settings. Two of the major theories were developed by American psychologists Gardner and Sternberg. In 1983 Gardner challenged the assumption of a single intelligence by proposing a theory of multiple intelligences. In 1985 Sternberg proposed the Triarchic Intelligence Theory, stating that intelligence is composed of the Componential, Experiential and Contextual Intelligence sub-theories. Intelligence capital is very mindful of Sternberg’s theory, as it identifies a set of connected and specialized components. The contextual approach is very characteristic of KM (and Intelligence Capital as well), because it is unsustainable to maximize value creation without taking into account the environment: knowledge must be contextual.

Business Intelligence is an umbrella concept related to the abilities, processes, technology, applications and practices that support decision making in organizations. In 1958, Luhn (1958), an IBM researcher, proposed The Business Intelligence System. Luhn defines intelligence as the ability to learn the correlations between facts in order to make better decisions. In 1989 Howard Dresner, a Gardner Group analyst, defined business intelligence as a set of concepts and methods that improve decision making in organizations through the use of fact-based systems.

Let us take a look at the concept and scope of Decision Support Systems (DSS), which has evolved since its introduction in 1970’s. At the beginning, DSS focused on static reports generated by computer software. Later, DSS became more interactive and supported decision makers in the use of databases and complex models for problem solving. Both DSS and BI are a very important part of the information technology tools used in intelligence capital implementation. There is, in this approach, a component specialized in decision making, which is closely related to DSS. BI tools, methods and practices are widely used for integrating and spreading information.

Artificial intelligence (AI) is a branch of computer science that aims to create and emulate human intelligence in machines. Some authors define AI as the study and design of intelligent agents (Poole, 1998). A Multi Agent System (MAS) is a group of intelligent agents that interact. The purpose of MAS is to solve problems that are impossible to handle by a single agent. The understanding of how MAS could be constructed by several interacting agents could help us explain what collective intelligence is. These concepts are relevant to intelligence capital because they could be applied to develop organizational intelligence based on individual intelligence, and social intelligence based on organizational and individual intelligence. Intelligence capital deals with all three domains, individual, organizational, and social.

Data Mining (DM) and Knowledge Discovery in Data bases (KDD) are two concepts used in artificial intelligence. DM is the process of pattern detection in large data sets.
The first methods used for DM were Bayes Theorem (18th Century) and Regression Analysis (19th Century). These methods have been perfected with computational science’s newer algorithms such as Neuronal Networks, Clustering and Genetic Algorithms. In 1989, Gregory Piatetsky-Shapiro (1996) was the first to use the term KDD for the process of creating new knowledge based on three steps: data preparation, data mining and results interpretation. For intelligence capital, DM and KDD are very useful tools for the experience component and the knowledge-based building process.

Competitive Intelligence (CI) is the definition, recollection, analysis and distribution of information about products, customers, and competitors for strategic decision support in organizations. Ben and Tamar Gilad institutionalized CI (Gilad, 1988). Organizations measure and evaluate against each other through CI in order to indentify risks and opportunities within their markets. Strategic Intelligence (SI) focuses in long term decisions, sensing the environment for Strategic Early Warnings (SEW) (Gilad, 2001). Market attractiveness could be assessed by indicators on Market Intelligence (MI) (Skyrme, 1989). This kind of intelligence focuses in information gathering regarding Price, Place, Promotion and Product, the 4P’s Model. Based on the definitions of CI, SI and MI, it’s not clear how to distinguish one from the other, but according to Gilad (2001), CI has some elements that differ from the other two. For the intelligence capital approach, the issue is to identify and understand all the concepts encompassed in intelligence in order to select the best suitable elements every time we wish to measure and assess intelligence.

3.3 Intelligence capital model

The Capital System Model identifies Intelligence as a referential capital which has the function of aligning the rest of the elements of the whole system. From this standpoint, knowledge from the environment could be capitalized through intelligence. This process is not easy to understand or to define; several disciplines have been working, with little progress, in theories and models around this problem. What can be said is that intelligence capital has the following characteristics:

- A multidisciplinary approach.
- Meta intelligence (Intelligence about Intelligence; understanding of intelligence).
- Individual, organizational and social domains.
- Operationalization (can be assessed and managed).

The Intelligence Capital Model (ICM) is the result of interdisciplinary research. It feeds from the expertise of artificial intelligence, cognitive science and knowledge management. There are five ICM components:

- Alignment component.
- Sensorial component.
- Experience component.
- Decision component.
- Acting component.
Value alignment is the first process identified in ICM. The alignment component interacts with the identity capital to define what the entity is and what it is not, what kind of value it is pursuing or avoiding, and how this value creation can be evaluated. The environment is monitored by the sensorial component – the set of sensors through which the entity gets to know the external objects. ICM rearranges the rest of the capitals through the acting component. In this sense decisions that have been made should have an effect on the rest of the capital system.

The decision component is focused on decision-making processes: from decision-makers' identification, information specification, to the final choice selection. The decision taxonomy helps the definition process of the component. For each decision domain, there are several tools that support decision makers, such as Knowledge Discovery in Data Bases, Data Mining, Multi Agent Systems and some other artificial intelligence algorithms.

Instead of having sub-processes, the experience component has three sub-components. The knowledge base is the accumulation of previous experience and the representation of everything that has been learnt and proved valuable to the system. Learning components deal with new situations, namely concepts that are not represented in the knowledge base. In this sense, once that something is proven to be beneficial to the system, it becomes learnt knowledge that can be stored in the knowledge base. The critic unit questions, from time to time, previous experience and knowledge. This facilitates innovation because the unit ultimately aims to improve performance trying and testing new alternatives.
4 Research project

4.1 Problem statement
The Capital Systems Framework has been applied to individuals, organizations, and communities, but there is no complete operationalized model of intelligence capital. One of these applications was the Monterrey as a Knowledge City Diagnosis performed by Tecnológico de Monterrey in 2008 (ITESM, 2008). In this report only two dimensions of what intelligence capital is where identified. Given that there is a need for a comprehensive model on intelligence that should be used to operationalized intelligence as part of a Knowledge City Capital System, the new Intelligence Capital Framework that is being advanced in this paper effectively expands the one that was used in 2008 for the city of Monterrey and enhances the understanding of this intangible asset. This same framework could be applied to other MAKCi Award nominees as has been mentioned earlier.

4.2 Research aims
Based on the problem statement, the aims of this research are:
- To have a multidisciplinary understanding of intelligence.
- To develop a comprehensive model of intelligence.
- To propose a method to operationalize intelligence capital in the city of Monterrey.

4.3 Research question
The research question is: How can Intelligence Capital be operationalized in a social domain?
The reason Monterrey has been chosen as the studied population is based on the existence of a prior report:

- City: Monterrey, México.
- Prior report: Monterey as a Knowledge City Diagnosis (2\textsuperscript{nd} Phase)
- Institution: Tecnológico de Monterrey
- Date: July 2008.

4.4 Method

Based on the problem stated, the Intelligence Capital Framework has been adapted from the Monterrey Diagnosis. The proposed way will extend the understanding of the intelligence capital dimensions and measurement for a Knowledge City. A seven steps method was devised for quantitative and qualitative data gathering:

1. Value Alignment.
   As a capital system, a city must define what is valuable for all its members. A shared mission and vision, aligned with its identity capital is a social asset. The challenge is to identify all the social sectors relevant to this task and to promote their participation in city planning. To measure value alignment an instrument must be designed though. A survey is suggested in order to be acquainted with the set of values of each social sector (citizens, organizations, institutions) and also at the top level, the city government.

2. Decision Inventory.
   Based on value alignment, a decision inventory helps identifying what kind of decisions have to be made, and who is going to make them. Decision taxonomy is used to define what information is needed and what information is useful to optimize value creation. Most decisions are made by the government; therefore surveys could be conducted to measure citizen’s approval or disapproval of government actions.

3. Value Alignment Matrix.
   The value alignment matrix is a correlation between value alignment and the decision inventory. In this process, every decision is analyzed to assess the impact on the value the city shows in itself.

4. Environment Objects Inventory.
   Environment objects are external entities that interact with the city like in any other city. Federal governments, transnational organizations, demographics, are examples of this. Once the decisions that have been made are clarified, the set of environmental elements related to decision making must be pointed out. During this process, the objects are classified based on the impact they have on value creation.

5. ESI Matrix.
   The External Social Intelligence matrix is the result of applying ten social intelligence processes to each of the environmental objects. Decision-makers define what information about each object they need, and how this information has to be presented in order to facilitate the decision process. Intelligence channels and resources should be described and clear during this process.

   Based on the ESI Matrix, a sensorial system has to be designed to gather information from the environment. Primary and secondary sources are identified and a Social Intelligence Unit (SIU) has to be assembled. In turn,
a collaboration web portal could be implemented for SIU interactions. The sensorial systems must be evaluated and calibrated to meet the specifications of the decision process.

7. Analysis Tool Kit.
Some business intelligence applications can be implemented to support the decision making process. The information gathered by the SIU and the knowledge data base could be integrated in a data warehouse.

4.5 Preliminary results
This research is not yet completed. The model will be presented and validated next year. The preliminary results of this project are the Social Intelligence Capital (SIC) Operationalization Guide and Formulas, alone. Much more has to be done so the model is completed and presented adequately. Still, the SIC Operationalization Guide helps us already to understand how to measure each of the components and sub components. The SIC Operationalization Formulas represent the measurement system and establishes relationships between the variables.

Social intelligence capital operationalization (Olavarrieta, 2010)

<table>
<thead>
<tr>
<th>Social Intelligence Capital Operationalization (Guide)</th>
</tr>
</thead>
</table>
| **Alignment Component** | Definition | What is valuable to the city?  
What is valuable to organizations, institutions, citizens within the city?  
How could value be aligned and maximized in the city?  |
| Planning | What are the goals of the city?  
What impact do these goals have for the city?  
What impact do these goals have for the organizations, institutions, citizens?  
What is the representativeness of the society in the city planning?  |
| Evaluation | What is the evaluation process of the city plans?  
What are the consequences of the evaluation process?  
How does the city respond to changes?  |
| **Sensorial Component** | Definition | What data must be collected?  
How this data must be presented?  |
| Planning | How the data is going to be collected?  
Who will collect the data?  
When the data must be collected?  |
| Execution | Data gathering by social intelligence units.  
Data validation and integration.  |
| Evaluation | Are the sensors calibrated?  
Are the sensors collecting data in the specified form?  |
| **Decision Component** | Definition | What decisions must be made according to value alignment?  
What is the decision process?  |
| Planning | Who is going to make the decisions?  
When the decisions must be made?  
What are the goals related to each decision / value impact?  |
### Social Intelligence Capital Operationalization (Guide)

| Acting Component | Execute | How were the decisions made?  
|                  |         | What data was taken into account?  
|                  |         | What is the representation of each of the social sectors?  
|                  | Evaluation | Are the decisions being made according to plans?  
|                  |         | What is the impact of the decisions on value alignment?  
|                  | Definition | What are the connections between intelligence and the rest of the capitals?  
|                  |         | How decisions are informed to the rest of the system?  
|                  | Execution | How fast and accurate is the response of the whole system?  
|                  | Evaluation | Is the whole system acting according to decisions?  
|                  |         | What is the impact of these actions on the value alignment?  
|                  | Knowledge Base | How knowledge is represented by the city?  
|                  |         | What is the impact of KB in value creation of the city?  
|                  | Learning | How does the city learn from prior knowledge and new experiences?  
|                  |         | What is the impact of Learning in value creation of the city?  
|                  | Critic Unit | Do the actual KB is validated systematically?  
|                  |         | What is the impact of CU in value creation of the City?  

### Social Intelligence Capital (SIC) Operationalization (Formulas)

$$SIC = AC + SC + EC + DC + AcC$$

**Alignment Component (AC)**

$$AC = ACD + ACP + ACE$$

**Definition (ACD)**

$$ACD = CV + CP$$

- **CV** = Common Values, values that are common to all the social sectors.
- **CP** = Common Priorities, priorities that are the same to all the social sectors.

**Planning (ACP)**

$$ACP = PQ + PA$$

- **PQ** = Planning Quality, planning process of the city, vision, continuity and goal setting.
- **PA** = Planning Alignment, the extent to which the Values of the city are represented in the city planning.

**Evaluation (ACE)**

$$ACE = GT + VC$$

- **GT** = Goal Tracking, the accomplished goals that were set in the city planning.
- **VC** = Value Creation, the increase of value as a result of the intelligence process.

**Sensorial Component (SC)**

$$SC = SCD + SCP + SCEx + SCEv$$

**Definition (SCD)**

$$SCD = SS \times ID$$

- **SS** = Sensorial System, amount of sensors installed in the city.
- **ID** = Input Data Rate, sensed data divided by input data needed.

**Planning (SCP)**

$$SCP = SPQ \times PS$$

- **SPQ** = Sensorial Planning Quality, planning process of the city sensors, continuity and goal setting.
- **PS** = Planned Sensors Rate, number of planned sensors divided by SS.

**Execution (SCEx)**

$$SCEx = DC \times ID$$

- **DC** = Amount of data collected by the sensorial system.

**Evaluation (SCEv)**

$$SCEv = SGT \times SD$$

- **SGT** = Sensorial Goal Tracking, accomplished goals set in SCP.
- **SD** = Supported Decisions Rate, number of decisions supported by the sensorial system divided by the total number of decisions made.
### Social Intelligence Capital (SIC) Operationalization (Formulas)

<table>
<thead>
<tr>
<th>Component</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision Component (DC)</strong></td>
<td><strong>DC = DCD + DCP + DCEx + DCEv</strong></td>
</tr>
<tr>
<td><strong>Definition (DCD)</strong></td>
<td>$(DCA) = DA * DIL$</td>
</tr>
<tr>
<td><strong>Planning (DCP)</strong></td>
<td>$(DPQ) = DPQ * PD$</td>
</tr>
<tr>
<td><strong>Execute (DCEx)</strong></td>
<td>$(TD) = TD * DIL$</td>
</tr>
<tr>
<td><strong>Evaluation (DCEv)</strong></td>
<td>$(DGT) + DMA$</td>
</tr>
<tr>
<td><strong>Acting Component (AcC)</strong></td>
<td><strong>AcC = AcCD + AcCEx + AcCEv</strong></td>
</tr>
<tr>
<td><strong>Definition (AcCD)</strong></td>
<td>$(DAC) = DAC * RTL$</td>
</tr>
<tr>
<td><strong>Execution (AcCEx)</strong></td>
<td>$(EA) = EA * RTL$</td>
</tr>
<tr>
<td><strong>Evaluation (AcCEv)</strong></td>
<td>$(CAR) * AIV$</td>
</tr>
<tr>
<td><strong>Knowledge Base (KB)</strong></td>
<td>$(KR * KU) + KVC$</td>
</tr>
<tr>
<td><strong>Learning Capability (LC)</strong></td>
<td>$(KD + INN + LVC)$</td>
</tr>
<tr>
<td><strong>Critic Unit (CU)</strong></td>
<td>$(KVR * CUVC)$</td>
</tr>
</tbody>
</table>

**Social Intelligence Capital (SIC)**

$(SIC) = AC + SC + EC + DC + AcC$

### Social Intelligence Capital operationalization (Olavarrieta, 2010)

<table>
<thead>
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<tr>
<td><strong>Decision Component (DC)</strong></td>
<td><strong>DC = DCD + DCP + DCEx + DCEv</strong></td>
</tr>
<tr>
<td><strong>Definition (DCD)</strong></td>
<td>$(DCA) = Decision Approval, citizenship approval of decision process. DIL = Decision’s Information Level, level of information taken into account during decision process (From zero to one).</td>
</tr>
<tr>
<td><strong>Planning (DCP)</strong></td>
<td>$(DPQ) = Decisions Planning Quality, planning process of the city decisions, continuity and goal setting. PD = Planned Decisions Rate, number of planned decisions divided by total number of decisions.</td>
</tr>
<tr>
<td><strong>Execute (DCEx)</strong></td>
<td>$(TD) = Taken decisions, amount of decisions taken in the city. DIL = Decision’s Information Level</td>
</tr>
<tr>
<td><strong>Evaluation (DCEv)</strong></td>
<td>$(DGT) = Decision Goal Tracking, accomplished goals set in DCP. DMA = Decision Making Approval, citizenship approval of taken decisions.</td>
</tr>
<tr>
<td><strong>Acting Component (AcC)</strong></td>
<td><strong>AcC = AcCD + AcCEx + AcCEv</strong></td>
</tr>
<tr>
<td><strong>Definition (AcCD)</strong></td>
<td>$(DAC) = Decision – Actuator Connection, links between intelligence and the rest of the Capitals of the System. RTL = Response Time Level, Sum of (Response Time divided by Time Expected) divided by TD.</td>
</tr>
<tr>
<td><strong>Execution (AcCEx)</strong></td>
<td>$(EA) = Executed Actions, amount of actions executed by the city. RTL = Response Time Level, Sum of (Response Time divided by Time Expected) divided by TD.</td>
</tr>
<tr>
<td><strong>Evaluation (AcCEv)</strong></td>
<td>$(CAR) = Completed Action Rate, Completed Actions divided by Started Actions. AIV = Action’s Impact on Value Creation, the increase of value as a result of the Completed Actions.</td>
</tr>
<tr>
<td><strong>Knowledge Base (KB)</strong></td>
<td>$(KR = Knowledge Representation, the amount of knowledge that the city has represented and accumulated in the Knowledge Base. KU = Knowledge Utilization, the level of knowledge utilization by the city in the whole Intelligence Process (sensing, analyzing and acting). KV = Knowledge Value Creation, the increase of value supported by the Knowledge Base.</td>
</tr>
<tr>
<td><strong>Learning Capability (LC)</strong></td>
<td>$(KD = Knowledge Discovery, new knowledge discovered by the city based on prior KB. INN = Innovation, new knowledge as a result of new experiences of the City. LVC = Learning Value Creation, the increase of value supported by the Learning Capability.</td>
</tr>
<tr>
<td><strong>Critic Unit (CU)</strong></td>
<td>$(KVR = Knowledge Validation Rate, the amount of knowledge rules validated divided by the total amount of rules represented in the KB. CUVC = Critic Unit Value Creation, the increase of value as a result of the Critic Unit validation.</td>
</tr>
</tbody>
</table>

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5 Future Applications

As this research is geared to amend the Intelligence Capital Framework used in the Monterrey as Knowledge City Diagnosis, a model to enhance the understanding of this type of capital in a social domain will result from these efforts. Further and applications of this model could be:

- To apply this proposed model to the city of Monterrey.
- To apply this proposed model to other MAKCi Awards nominees.

6 Conclusions

The Monterrey as a Knowledge City Diagnosis (ITESM, 2008) defined only two dimensions for the Intelligence Capital:

1. Installed capacity.
2. Vanguard.

The report describes the centers that focused in intelligence activities within the government and the two largest universities. The proposed model extends the dimensions to five components that not only take into account the information gathering process, but the whole intelligence cycle. The alignment component is very important to understand the extent to which society is aligned to certain values or ideals as a whole and how the decisions impact in a positive or negative way different sectors and organizations.

References

From absorptive capacity to best practices to mobilize knowledge and open innovation

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Structured Abstract

Purpose – The purpose of the paper is to develop a research model on how absorptive capacity triggers knowledge mobilization from best practices to value practices in companies involved in an open innovation strategy to compete and to lead in the global economy.

Design/methodology/approach – We propose a revised research model from the work of Cohen, Levintal, Zahara, George, Tudorova, Durisin. The research methodology followed was a case study for an in-depth approach on a Mexican MNC dealing with a continuous organic growth via acquisitions.

Originality/value – This methodology puts in evidence the importance of knowledge mobilization from best practice to value practice starting with a strong sense of absorptive capacity and with an institutionalized capital systems based on relational, structural and human capitals.

Practical implications – The outcomes of the application was to learn, to energize, to apply and to defuse a business case for the MNC:

Keywords – absorptive capacity, best practice, value practice, open innovation and capital systems

Paper type – Academic Research Paper

1 Introduction

In the globalized economy of today, characterized by rapidly changing environment and fierce competition, multinational corporations (MNCs) face challenges that force them to continuously search for dramatic improvements and to develop new critical capabilities that would allow them to create and sustain competitive advantage. However, in order to succeed in an environment where competition becomes increasingly more knowledge-based, to possess superior knowledge resources is not sufficient. The competitiveness of today’s organizations lies in the capability to create, integrate, and exploit internal and external organization’s knowledge. Now knowledge networks allow firms to innovate and to capitalize, integrating ideas, expertise and skills with those of others outside the organization to deliver the result to the marketplace, using the most effective means possible. Furthermore, firms must develop a thorough understanding not
only of their own knowledge, but also the process by which they convert knowledge to capabilities, and the capacity of those capabilities (Lane and Lubatkin, 1998). This highlights the need for Absorptive Capacity, a concept that stresses the importance of the firm’s ability to identify, adapt and utilize new sources of knowledge in order to increase the firm’s competitiveness. Firms then will harness outside ideas to advance their own business while leveraging their internal ideas outside their current operations will likely thrive in this new era of open innovation.

Cohen and Levinthal (1989) were pioneers of the notion of Absorptive Capacity as “the firm’s ability to identify, assimilate, and exploit new knowledge from the environment”, proposing that the firm’s prior related knowledge is the key antecedent to the development of firm’s Absorptive Capacity as it permits the assimilation and exploitation of new knowledge.

A review of the literature on Absorptive Capacity made by Zahra and George in 2002 found that the Absorptive Capacity construct needed greater clarity and they proposed an extended conceptualization, as a “a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability” (Zahra and George, 2002).

In 2007 Todorova and Durisin claimed that the distinction between potential and realized Absorptive Capacity used by Zahra and George did not hold, but instead they proposed the term efficiency of AC. Furthermore, they added that Zahra and George fail to incorporate the research done on learning and innovation. Instead, they put forward a new model building on both the studies done by Cohen and Levinthal (1990) and Zahra and George (2002). The most significant changes were the feedback double learning loops among acquisition, assimilation, transformation and exploitation.

Absorptive Capacity is being treated in this paper as a source for knowledge mobilization, best practices and open innovation and of salient consideration for emerging markets and developing countries.

2 Theoretical framework

Cohen and Levinthal were pioneers of the notion of AC. Cohen and Levinthal (1989) put forward a new notion of AC and defined it as: “the firm’s ability to identify, assimilate, and exploit new knowledge from the environment”. Figure 1 below illustrates the AC conceptual model. The authors propose that the firm’s prior related knowledge is the key antecedent to the development of firm’s AC as it permits the assimilation and exploitation of new knowledge. Additionally, an ‘interface function’ (Cohen and Levinthal, 1989) must first be able to recognize where the knowledge is relevant within the organization in order for the AC process to be set into motion.
The definition of AC by Cohen and Levinthal (1989) suggests that AC is a three-dimensional concept consisting of knowledge identification, assimilation and exploitation.

A review of the literature on AC made by Zahra and George in 2002 finds that the AC construct needs greater clarity in order to be operationalized. Based on the review performed they prepared the following definition of AC: “...a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability” (Zahra and George, 2002). Figure 2 shows their re-conceptualized model of firms’ Absorptive Capacity.

Zahra and George (2002) proposed four instead of three basic dimensions of AC: acquisition, assimilation, transformation and exploitation. “Acquisition refers to a firm’s capability to identify and acquire externally generated knowledge that is critical to its operations.” “Assimilation refers to the firm’s routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources. “Transformation denotes a firm’s capability to develop and refine the routines that facilitate combining existing knowledge and assimilated knowledge.” “Exploitation as an organizational capability is based on the routines that allow firms to refine, extend,
and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations.”

In 2007 Todorova and Durisin claimed that the distinction between potential and realized AC used by Zahra and George did not hold, but instead they proposed the term efficiency of AC. Furthermore, they added that Zahra and George fail to incorporate the research done on learning and innovation. Instead, they put forward a new model building on both the studies done by Cohen and Levinthal (1990) and Zahra and George (2002).

As Figure 3 shows, the most apparent and significant changes are the flows between variables. For example, it is argued that power relationships affect both the valuing and exploitation of new knowledge; that social integration mechanisms affect all dimensions of AC, and not, as suggested by Zahra and George, only between potential and realized AC; and that feedback links should follow cyclical patterns instead of static relationships in order to make the model more dynamic (Todorova and Durisin, 2007).

![Figure 3](image-url)

**Figure 3. A Refined Model of AC by Todorova and Durisin (2007)**

### 3 Research model

The AC Research Model in Figure 4 is based on the work of Cohen and Levinthal (1990), Zahra and George (2002) and Todorova and Durisin (2007). Absorptive Capacity is required to reach synergies during M&A and to deploy best practices from knowledge networks in order to position in a leading position in terms of flexibility, innovation and business performance.
Determinants of AC

Taking point of departure in Cohen and Levinthal’s study (1990), Schmidt (2005) organized the determinants of AC into four main categories: 1) Prior related knowledge; 2) Effort; 3) R&D investments; 4) HRM practices and organizational determinants.

3.1 Prior related knowledge

Prior knowledge can be a set of learning skills, prior learning experience, problem-solving skills and other capabilities. Likewise, Zahra and George’s model suggests that past experience influences the development of its AC. According to Minbaeva et al. (2003), prior related knowledge refers to employees’ ability, their educational background and acquired job-related skills.

3.2 Effort

Minbaeva et al. (2003) termed the organization’s innovation effort as the ‘organizational aspiration’ and expressed it as employees’ motivation. They argued that motivated employees want to contribute to organizational effectiveness.

3.3 R&D investments

The role of R&D expenditure in determining the firm’s AC was already described in Cohen and Levinthal’s study from 1989. The critical role of R&D in building a firm’s AC
is demonstrated in the fact that investments in R&D increase a firm’s stock of knowledge and employees’ skills what in turn enlarges the organization’s knowledge base.

3.4 HRM practices and organizational determinants

According to Daghfous (2004), human resource management practices that affect firm’s AC include interdisciplinary workgroups, quality circles, systems for the collection of employee proposal, job rotation, empowerment, integration of functions and performance-related pay. It has furthermore been argued that firm should invest in building human capital by hiring highly educated employees since they are said to be the main contributors to the generation of the firm’s stock of knowledge (Mangematin and Nesta, 1999; Vinding, 2000).

3.5 Research propositions in relation to M&A and knowledge networks

- The firms’ level of absorptive capacity in relation to M&A knowledge will influence competitive advantage through enhanced flexibility, innovation and business performance.
- AC and external network knowledge will positively influence flexibility, innovation and business performance

4 Method

The general purpose of this paper, as the first phase of the overall project, then becomes to explore the topic of AC and its association with Networks and M&As through established literature and in the context of a CEMEX Case Study. As defined by Cooper and Schindler (2006) explorative studies tend “toward loose structures with the objective of discovering future tasks” (p. 139). An explorative study is relevant when researchers “lack a clear idea of the problems they will meet during the study. Through exploration researchers develop concepts more clearly, establish priorities, develop operational definitions, and improve the final research design” (Cooper and Schindler, 2006, p. 143). In this way, this paper provides the basis for the following ‘formal’ study of AC in Networks and M&As.

Qualitative studies can provide insight into complex and diverse institutions which quantitative research would never be able to deduce. This paper includes a case study, which means that it is a context specific study that seeks to investigate a previously established pattern (derived from theory) in relation to that of an empirical example. If patterns coincide (establishing a causal relationship) then it gives internal validity to the case study. Several authors argue that case studies can, in fact, produce generalizable results. They refer to ‘analytical’ as opposed to ‘numerical’ generalization (Yin, 1984; Flyvbjerg, 2006).

In this paper the combination of purposive and convenience type of non-probability sampling was utilized in order to choose respondents. This was mainly due the need to select participants with unique experience or from within a specific field of expertise.

The sample size was relatively small as only 15 in-depth interviews were included in the study. However, the selected interviewees were very knowledgeable within their areas, as well as on overall issues concerning CEMEX’ strategy. It was therefore still possible to cover all aspects of the research model. Interviews were held with fifteen people.
For each interview a set of open-ended questions that were related to the individual’s function in the company and that reflected certain dimension of the research model, were developed in advance. Attention was paid to the fact that the questions were formulated in a clear and precise manner in order to reduce the risk of misunderstandings and enhance the speed of the interviews. Furthermore, the fellow research participants were used to ensure that the order of questions was logical and that the language used was comprehensible.

Respondents were, prior the interview, provided with a list of questions to be answered during the interview. The supply of information before the interview was hoped to increase the authors’ credibility and furthermore to enhance the reliability and validity of the data collection method. This allowed the respondents to prepare themselves for the event, to consider the requested information beforehand and eventually, to prepare some additional supporting material. This was seen as advantageous in terms of effectiveness and speed of the whole interview process. The interviews were held privately with each respondent in a closed meeting room either at EGADE or at CEMEX, and were approximately 1-1½ hours in duration. All interviews were documented using audio recorder, and following the interviews, these audio recordings were transcribed. To make sense of the data collected, color codes were assigned to paragraphs according to which themes, determinants or variables were being discussed in order to identify commonalities, provide a better overview and make the subsequent analysis of findings easier. Thus, no software was used in the analysis of qualitative data collected.

5 Results: the CEMEX case

As the world became increasingly open to internationalization and trade barriers became less of a concern the way for companies within this industry to grow was through globalization of markets and production. A wave of aggressive expansion within the industry meant a growing trend towards industry consolidation like in the case of the Cement Industry. By 2004 the six largest companies accounted for 42% of the world’s cement capacity (Lessard and Reavis, 2009, p. 14). This trend becomes clear by examining some statistics of the four market leaders: Lafarge, Holcim, CEMEX and Heidelberg.

Between 1987 and 2009 CEMEX has acquired 61 companies and taken stakes in 52.

Company Profile

In 2009, CEMEX is a global enterprise which produces, distributes and markets cement, ready-mix concrete, aggregates and other complementary building materials and services (CEMEX Website, 2009).

With the appointment of Lorenzo H. Zambrano as CEO in 1985 (and chairman of the board in 1995), the company took a new and important step into forming the CEMEX we see today. Zambrano has been described as a visionary leader who was an early adopter of information technology, where others within the industry did not see the value in it. Table 1 highlights some key financial figures over the past five years. As discussed in before, the financial crisis in 2008 was a damaging year for the whole industry.
Table 1. Key financials, in million USD at year end exchange rate

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sales</td>
<td>8149</td>
<td>15321</td>
<td>18249</td>
<td>21673</td>
<td>21695</td>
</tr>
<tr>
<td>Operating income</td>
<td>1852</td>
<td>2487</td>
<td>2945</td>
<td>2971</td>
<td>2487</td>
</tr>
<tr>
<td>EBITDA</td>
<td>2538</td>
<td>3557</td>
<td>4138</td>
<td>4586</td>
<td>4343</td>
</tr>
<tr>
<td>EBITDA % change</td>
<td>40%</td>
<td>16%</td>
<td>11%</td>
<td>-5%</td>
<td></td>
</tr>
<tr>
<td>Consolidated net income</td>
<td>1328</td>
<td>2167</td>
<td>2488</td>
<td>2467</td>
<td>203*</td>
</tr>
<tr>
<td>Free cash flow</td>
<td>1478</td>
<td>2013</td>
<td>2689</td>
<td>2578</td>
<td>2600</td>
</tr>
<tr>
<td>Net debt</td>
<td>5588</td>
<td>8665</td>
<td>5811</td>
<td>18904</td>
<td>17908</td>
</tr>
</tbody>
</table>

Sources: CEMEX Annual Reports 2004-2008, (*) Majority net income

CEMEX in 2009 employed over 57,000 people in its operations in more than 50 countries and maintained trading relationships with more than 100 countries worldwide (CEMEX Website, 2009). As of end 2008 CEMEX had an annual production capacity of approximately 96 million metric tons of cement, 77 million cubic meters of ready-mix concrete and about 240 million tons of aggregates (CEMEX Website, 2009). With the acquisition of British RMC Group in 2004, the ‘United Kingdom’ and ‘Rest of Europe’ categories were added in 2005 due to RMC’s representation on the European markets as one of the largest producers of ready-mix concrete, cement and aggregates.

5.1 The M&A process

In the case of CEMEX and its gradual expansion into more distant markets, the individual stages of the M&A process (outlook, due diligence and post merger integration) were devoted more and more attention and were gradually being formalized and standardized. Furthermore, the accumulated M&A experience greatly supported all related processes.

5.2 Outlook

Outlook activities are often described as opportunity identification in terms of markets and targeted companies in these markets. The company believes the key drive for value creation in acquisitions, derives from the ability to apply CEMEX’ management and turnaround expertise on the target, and other factors that CEMEX can influence (CEMEX Website, 2009).
5.3 **Due diligence**

After a target company is identified, a process of due diligence is performed in order to thoroughly assess the company. Therefore, an acquisition is not necessarily an outcome of every due diligence (hereafter DD).

The examination is conducted by a so-called DD team. In the case of CEMEX, the DD team is usually comprised of ten members. This phase usually lasts one or two weeks, involves negotiations and meetings with the local government, competitors and industry association and results in a standardized report on base of which the bidding strategy is formed.

5.4 **Post merger integration**

Finally, the post-merger integration (hereafter PMI) process is initiated after the target company has been acquired. The PMI process includes integration at three levels: the improvement of efficiency of the newly acquired company, adaptation to CEMEX’s management principles, and harmonization of cultures.

It is said that in the implementation plan, CEMEX typically retains 20% of the acquired company’s practices and processes due to specific local market requirements. The remaining 80% are replaced by standardized practices prescribed in the CEMEX Way.

The significance of the RMC acquisition lay in the fact that it was for the first time CEMEX acquired another global player in the industry. Moreover, RMC was geographically, culturally, and linguistically very diverse. Hence, even though CEMEX had managed to accumulate a lot of PMI experience so far, the RMC acquisition still posed a major challenge (Marchand, 2008). CEMEX’ most recent acquisition of Sydney-based Rinker was different from RMC, because Rinker was well-managed.

The CEMEX Way

According to Homero Reséndez, Strategic Planning and Support Services Director (Reséndez, 2009), CEMEX Way has two domains. The first being, how CEMEX operates its business processes, which means how the company is organized in terms of the roles performed in different production units or at the corporate level. As well as the systems which are in place to support operations. The second domain consists of a unique CEMEX culture. According to Homero Reséndez, the CEMEX Way represents a philosophy of standardization.

The original methodology implemented for the CEMEX Way was to establish nine e-groups (expert groups) with the responsibility for improving and disseminating the CEMEX Way. These 9 groups, each specializing in a core process, were: Commercial, Controllership, Ready-Mix Concrete, Operations, Finance, HR, IT, Planning and finally Procurement. The organization was then aligned to the best practices. The best practices were standardized through a process of (1) assessment and identification of best practices; (2) dissemination of standardized best practices through the entire organization; (3) accommodation to specific local conditions; and finally (4) evolution and constant reassessment of standardized best practices to secure long-term effectiveness (Whitaker and Catalano, 2001, p. 36). The members included were experience, carefully selected and from diverse backgrounds. The benefits of the CEMEX Way have been described as sharing best practices, increasing organizational flexibility, faster integration of acquisitions, reduced overhead costs, and elimination of redundancies. CEMEX developed a map with three types of process standardization (see Figure 5).
5.5 Propositions and research questions results regarding AC on M&As

The overall proposition was that the firms’ level of absorptive capacity in relation to M&A knowledge will influence competitive advantage through enhanced flexibility, innovation and business performance. This proposition was then divided into three working propositions separating the three constructs of competitive advantage in the form of flexibility, innovation, and business performance. This paper based its analysis on the fact that the competitive advantage would be obtainable, if absorptive capacity was strong and the company utilized new knowledge from M&As. The three working propositions will be presented on the basis of their relevance in the case of CEMEX.

The first working proposition stated that the firms’ level of absorptive capacity in relation to M&A knowledge will positively influence flexibility. Although the theoretical grounding of this paper to a large extent supports the statement that flexibility will be increased as the company’s absorptive capacity and knowledge sourcing from networks increases, the actual case study showed more ambiguous results. On the one hand, the analysis of CEMEX found that absorptive capacity has indeed worked as a promoter of flexibility. This was shown in the way the company from prior related knowledge and its growth trajectory got better at identifying and absorbing knowledge and best practices from others. It also showed an increased willingness and capability to change. On the other hand, however, the rate of flexibility has shown to be countered by a very strong focus on standardization, which ultimately makes it hard to establish a good balance. It is therefore questionable whether CEMEX truly wants to focus on company flexibility, or perhaps only within certain areas. In the context of M&As, the inflexibility is caused by the established PMI model and the need for its rapid implementation. This approach, obviously, does not leave much room for openness towards other practices. However, the positive impact of the M&A activity on enhancing flexibility can be detected in the acquisition of RMC and Rinker and especially in processes that require local customization, for example in commercial and supply chain domains (Villalobos, 2009).
It is believed that CEMEX will continue to become more flexible and open to learn from acquired companies if more effort is put into this aspect (Villalobos, 2009). This goal can be actively supported by increasing the firm’s absorptive capacity in relation to M&As.

The second working proposition stated that the firms’ level of absorptive capacity in relation to M&A knowledge will positively influence innovation. This statement was relatively easy to find support for, both theoretically and empirically in the case of CEMEX. The current level of absorptive capacity in CEMEX could be strengthened through several measures, as will be presented in the following discussion; however, already its current level supports innovation to a great degree. CEMEX’ ability in assimilating and exploiting knowledge from newly acquired companies speaks to the company’s ability to recognize superior knowledge and exploit it for innovative purposes. Additionally, it was a clear belief of most interviewees that there is an abundance of external knowledge which if absorbed would benefit CEMEX’ innovative capacity. The level of innovativeness gained specifically through acquiring companies can be described as very high. The influence that M&As have on innovation is enormous and considered very important as in the past M&As allowed CEMEX to gain access to many more efficient and innovative operations (Villalobos, 2009). Hence, a focus on increasing absorptive capacity in relation to M&As will ultimately lead to more innovation.

Finally, the third working proposition focused on that the firms’ level of absorptive capacity in relation to M&A knowledge will positively influence business performance. This statement implies that by improving the company’s absorptive capacity in relation to M&As it should be able to improve many aspects of the company’s performance, for example in terms of better standards, higher quality, reduced costs, faster procedures and so on. In the case of CEMEX this statement can be verified because the knowledge absorbed from acquired companies has improved performance. The impact on performance is easily proved by metrics that are used in almost every operation in the company (Villalobos, 2009).

5.6 Propositions and research questions results regarding AC on knowledge networks

The overall proposition was that absorptive capacity and external network knowledge will positively influence flexibility, innovation and business performance. This proposition was then divided into three working propositions separating the three competitive advantage constructs, in the form of flexibility, innovation, and business performance. The paper based its analysis on the fact that these competitive advantages would be obtainable, if absorptive capacity was strong and the company utilized external networks.

The first working proposition stated that absorptive capacity and external network knowledge will positively influence flexibility. Although the theoretical grounding of this paper to a large extent supports the statement that flexibility will be increased as the company’s absorptive capacity and knowledge sourcing from networks increases, the actual case study showed more ambiguous results. On the one hand the analysis of CEMEX found that absorptive capacity has indeed worked as a promoter of flexibility. This was shown in the way the company from prior related knowledge and its growth trajectory got better at identifying and absorbing knowledge and best practices from others. This allowed CEMEX to become more flexible in the sense that it was possible to unlearn routines and replace them with new ones, showing an increased willingness and capability to change. In relation to networks, this seems to still be the overall goal,
especially since standardization cannot be forced upon this area. It is clear, therefore, that an increased absorptive capacity will be able to enhance the external knowledge sourcing ability of the company and hence should create more flexibility if, and only if, the company decides to actively support this.

The second working proposition stated that absorptive capacity and external network knowledge will positively influence innovation. This statement was relatively easy to find support for both theoretically and empirically in the case of CEMEX. This can be illustrated through the company’s ability to internalize practices for innovative purposes researched by for example the APQC, even though these results were not directly targeted CEMEX but instead a broader audience of member companies. Another example could be the research done in collaboration with universities, which is often characterized by linguistically very different presentation forms and less practical information on actual implementation of findings. CEMEX’ ability in assimilating and exploiting this knowledge speaks to the company’s ability to recognize innovative knowledge and exploit it for own purposes.

Finally, the third working proposition stated that absorptive capacity and external network knowledge will positively influence business performance. This statement implies that by improving the company’s absorptive capacity and focusing on open innovation, it should be able to improve some aspects of the company’s performance in terms of better standards, higher quality, reduced costs, faster procedures and so on. For CEMEX, what seems so far to have been the most important network contribution are the production performance improvements allowed through supplier networks mostly related to improved technologies.

5.7 CEMEX absorptive capacity on M&A

As we can observe in Table 2, the most pressing issue limiting the company’s M&A absorptive capacity was identified as its path dependent thinking that substantially hinders organizational responsiveness and minimizes efforts put into identification and utilization of new knowledge. A severe hindrance to M&A absorptive capacity was revealed in insufficient documentation of the M&A activities which the company could capitalize on in future M&As.
5.8 **CEMEX absorptive capacity on knowledge networks**

As we can see in Table 3, an overall strategy and vision should be formulated and shared regarding external network collaboration. TMT commitment to spread and support a flexible and open approach to network relationships.

R&D investments should be increased so that CEMEX recognizes less targeted, however potentially valuable knowledge. This would also aid in the assimilation, transformation and exploitation processes.

<table>
<thead>
<tr>
<th>Table 2. CEMEX absorptive capacity in M&amp;As</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRONG</strong></td>
</tr>
<tr>
<td>Prior M&amp;A Knowledge</td>
</tr>
<tr>
<td>Number of prior M&amp;As</td>
</tr>
<tr>
<td>Relatedness of merging companies</td>
</tr>
<tr>
<td>Joint meetings between PMI team and local team</td>
</tr>
<tr>
<td>Documentation database</td>
</tr>
<tr>
<td>Job rotation</td>
</tr>
<tr>
<td>Interdisciplinary work</td>
</tr>
<tr>
<td>IT support in PMIs</td>
</tr>
<tr>
<td>Training for new knowledge areas</td>
</tr>
<tr>
<td>Experience with different cultures</td>
</tr>
<tr>
<td>Geographical diversification</td>
</tr>
<tr>
<td>Joint training programs and meetings</td>
</tr>
<tr>
<td>Cross-unit teams</td>
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<tr>
<td></td>
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<tr>
<td>Competency Transfer</td>
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<tr>
<td>Human Resource Management in M&amp;As</td>
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</tbody>
</table>

5.9 **Best Practice Inventory (BPI)**

In order to improve Absorptive Capacity for M&A and Knowledge Networks, CEMEX integrated a BPI. A BPI includes techniques, methods, processes, activities, incentives and rewards to be more effective at delivering a business outcome. The idea is that with proper processes, checks, and testing, a desired outcome can be delivered with fewer problems and unforeseen complications. Best practices defined as the most efficient way of accomplishing a task, based on repeatable procedures that have proven over time by the top 500 companies globally. CEMEX categorizes the BPI in four perspectives for knowledge sharing: strategies, business processes, measurements and tools. See Table 4.
Table 3. CEMEX absorptive capacity in networks

<table>
<thead>
<tr>
<th>Prior Related Knowledge</th>
<th>Strong</th>
<th>Can Be Improved</th>
<th>Lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core business experience</td>
<td>Documentation of network experience</td>
<td>Open innovation</td>
<td></td>
</tr>
<tr>
<td>Cultural experience</td>
<td>Similarity/diversity of knowledge</td>
<td>Breadth and depth of knowledge (to absorb less targeted external knowledge)</td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior learning experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem solving skills</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effort</th>
<th>Strong</th>
<th>Can Be Improved</th>
<th>Lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very strong in core business</td>
<td>Integrated building solutions</td>
<td>Proactive search for knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proactive effort</td>
<td>Strategic effort in external network relationships</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R&amp;D Investment</th>
<th>Strong</th>
<th>Can Be Improved</th>
<th>Lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer differentiation/cost optimization to specific needs</td>
<td>Strong production efficiency</td>
<td>Seeking External Funds, to counter low internal investment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human Resource Management</th>
<th>Strong</th>
<th>Can Be Improved</th>
<th>Lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leasing &amp; skills development (ability)</td>
<td>Trust Building</td>
<td>Employee Motivation</td>
<td></td>
</tr>
<tr>
<td>Encouraging creativity (progress)</td>
<td>Job rotation</td>
<td>Empowerment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organizational Design</th>
<th>Strong</th>
<th>Can Be Improved</th>
<th>Lacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Corporate Culture</td>
<td>Change Management</td>
<td>Knowledge sharing culture</td>
<td></td>
</tr>
<tr>
<td>Standardization in core business practices</td>
<td>General open mind-set towards learning from externals</td>
<td>Interface function controlling external information diffusion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less path dependent thinking</td>
<td>Low level of bureaucraty</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teamwork and knowledge sharing</td>
<td>Close functional communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IT platform standardization</td>
<td>Cross-functional communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decentralization</td>
<td>Non-hierarchical thinking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balance between flexibility/standardization in CEMEX Way</td>
<td>Structures supporting increased network collaboration</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Best practice inventory on knowledge sharing based on strategy, business process, measurements and tools

<table>
<thead>
<tr>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Management (KM) efforts operate hand in hand with its corporate strategy. Any action at the business level has a corresponding process at the K level to prepare and enhance the organizational capability by sharing, creating, and learning.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KM Action Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Win the business owner’s attention to define what is his/her major business transformation in the following years</td>
</tr>
<tr>
<td>2. Talk about key performance indicators (KPIs)</td>
</tr>
<tr>
<td>3. Identify 10 to 12 K areas that are important to the business</td>
</tr>
<tr>
<td>4. Plotting current and future impact of K areas in the quadrants “promising” “key” “basic” and “not relevant”.</td>
</tr>
<tr>
<td>5. Look at K states. (Regarded in 3 dimensions: proficiency, diffusion, and codification).</td>
</tr>
</tbody>
</table>
### Strategy

6. Give support to the leadership team to define K actions for each K area accordingly to the state directions.

<table>
<thead>
<tr>
<th>Benefits of the KM Processes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Joint, strategic mind set and decisions in leadership teams</td>
<td></td>
</tr>
<tr>
<td>• Clear directions concerning how to improve in the basic knowledge dimensions</td>
<td></td>
</tr>
<tr>
<td>• Strong and clear management buy- in</td>
<td></td>
</tr>
</tbody>
</table>

**Knowledge Community of Practice:** enables people to acquire, exchange, and build knowledge around a solution or a competency. Develop competencies and increase access to experts in a specific area.

**Knowledge Brokering** is particularly useful for finding and collating knowledge that is needed to address a complex problem or for assisting someone who is not familiar with HPC knowledge sources and KM processes and tools. Also helps to mobilize members to be active participants in the community.

<table>
<thead>
<tr>
<th>Business Processes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content Management System Roadmap</strong></td>
<td></td>
</tr>
<tr>
<td>1. Establish a structure and roles for design process</td>
<td></td>
</tr>
<tr>
<td>2. Determine user requirements</td>
<td></td>
</tr>
<tr>
<td>3. Conduct content audit or assessment</td>
<td></td>
</tr>
<tr>
<td>4. Conduct workshops to define taxonomy and metadata</td>
<td></td>
</tr>
<tr>
<td>5. Conduct as-is and to-be process analysis</td>
<td></td>
</tr>
<tr>
<td>6. Assess current and future technology developments</td>
<td></td>
</tr>
<tr>
<td>7. Prioritize technology requirements for vendor assessment</td>
<td></td>
</tr>
<tr>
<td>8. Evaluate and select technology and</td>
<td></td>
</tr>
<tr>
<td>9. Finalize project plan and roles</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Governance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sponsors for the KM program include senior VPs and regional VPs, managers, and staff, as well as district managers and staff.</td>
<td></td>
</tr>
<tr>
<td>• The change agents and sponsors measure behaviors, process execution, at the direction of the KM program using a BSC, usage reports, store assessments, testing and certification results, customer satisfaction indicators and business results.</td>
<td></td>
</tr>
<tr>
<td>• Process owners are accountable for process leadership, process design, process performance, and process improvement.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge Sharing Workflow, Audit and Taxonomies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The organization has developed an artifact workflow process.</td>
<td></td>
</tr>
<tr>
<td>• A knowledge worker with an idea is to submit to a knowledge steward.</td>
<td></td>
</tr>
<tr>
<td>• The steward may include the artifact in the organization’s knowledge-sharing system. It is submitted to an administrator for classification and evaluation. It is submitted to a final approval authority for review.</td>
<td></td>
</tr>
<tr>
<td>• The biggest hurdles to overcome while implementing the program are:</td>
<td></td>
</tr>
<tr>
<td>o K sharing</td>
<td></td>
</tr>
<tr>
<td>o Documenting “what we know”</td>
<td></td>
</tr>
<tr>
<td>o Crowding within the KM efforts</td>
<td></td>
</tr>
<tr>
<td>o Committing to a strong KM program</td>
<td></td>
</tr>
<tr>
<td>• Determining user requirements is a very important and sometimes neglected step in planning and designing a CM initiative.</td>
<td></td>
</tr>
<tr>
<td>• A content audit is conducted to assess the value of existing content.</td>
<td></td>
</tr>
</tbody>
</table>

1023
### Strategy

Taxonomies and classification systems reflect the way users work and are primarily developed by the organization.

<table>
<thead>
<tr>
<th>Technology Assessment and Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>• While purchasing technology, assess costs required to acquire, customize, support, and implement an application.</td>
</tr>
<tr>
<td>• An overall cost includes people costs involved in gathering the data, auditing the data, and supporting the users.</td>
</tr>
<tr>
<td>• Challenges developing stand, consistency of metadata/applicatio, funding, and selecting vendors.</td>
</tr>
<tr>
<td>• Tech implementation and conversion</td>
</tr>
<tr>
<td>• Encouraging system use/contribution</td>
</tr>
<tr>
<td>• HW and SW perform</td>
</tr>
<tr>
<td>• Ensuring quality of content, and</td>
</tr>
<tr>
<td>• Experts to validate information</td>
</tr>
</tbody>
</table>

### People and Culture

An active and engaged executive sponsor is critical to sustaining a KM program

• A KM champion practitioner but also an evangelist for the benefits of KM
• Story telling can effectively advance the KM agenda
• KM is a business-driven project
• Culture willing to adapt to embrace the KM program
  KM “the way we do business”.
• Get into action quickly; results will get the attention of the CEO
• Build on success, and learn from failure
• Process measures need to be part of day-to-day responsibilities
• You don’t need approval for everything to do something
• Keep things simple and understandable

You need people’s minds and hearts.

1. Owners of the information (organization)
2. People who use the information (users)
3. How the information is being managed and used (work flows)
4. How the information is handled by the system (taxonomy and metadata)

• Don’t do one big global knowledge management initiative; implement a number of small ones
• Think big, but act small
• Be sure you are solving a real business problem
• Give users content
• Make sure you have proper sponsorship
• Don’t lose track of the cost for support and operation
• Look at how to expand the business opportunities, and be bold

### Business Processes

KM Measures

Measures can improve a KM in 6 ways:

• By establishing a business case for implementation
• By guiding and tuning the implementation processes through feedback
• By providing a target or goal
• By measuring, retrospectively, the value of the initial investment
<table>
<thead>
<tr>
<th>Strategy</th>
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</thead>
<tbody>
<tr>
<td>decision and the lessons learned</td>
</tr>
<tr>
<td>- By developing benchmarks for future comparisons and for others to use, and</td>
</tr>
<tr>
<td>- By encouraging learning from the effort</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maturity Model</th>
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</thead>
<tbody>
<tr>
<td>The framework is a five-level maturity model. A maturity level is determined after the community subjectively answers a set of established questions.</td>
</tr>
<tr>
<td>- Level one indicates that a community can be either in the very early stages or declining.</td>
</tr>
<tr>
<td>- Level two is generally when a community begins to form. It is incorporating guidelines and using the processes provided by the KM team.</td>
</tr>
<tr>
<td>- Level three indicates a community is engaged and operating.</td>
</tr>
<tr>
<td>- Level four is an advanced community.</td>
</tr>
<tr>
<td>- Level five community is driving business innovation.</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Tools</th>
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<tbody>
<tr>
<td>Guide when designing a Community of Practices (CoPs)</td>
</tr>
<tr>
<td>A CoPs is a channel for knowledge to flow and a means to strengthen the social fabric in an organization. Context is critical as CoPs need to connect people to people so they can collaborate and share what they know in a given context, such as a problem process, improvement, or innovation.</td>
</tr>
<tr>
<td>- Form a design team (DT)</td>
</tr>
<tr>
<td>- Determine what, if any, type of CoPs makes the most sense.</td>
</tr>
<tr>
<td>- The design team determines hot topics</td>
</tr>
<tr>
<td>- DT engages the information technology department to assist with the development of tools that facilitate sharing.</td>
</tr>
<tr>
<td>- Tactical Phase: CoPs launch is prepared</td>
</tr>
<tr>
<td>- The design team understands, measures, and evaluates the resources needed to deploy the CoP.</td>
</tr>
<tr>
<td>- DT determines what sort of training need to be prepared for the particular tools</td>
</tr>
<tr>
<td>- DT Communicates the importance within the organization</td>
</tr>
<tr>
<td>- Develop rewards and recognition system</td>
</tr>
<tr>
<td>- Roll out the community</td>
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<tr>
<th>Benefits</th>
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<tbody>
<tr>
<td>Through the CoPs people have community workplace where they can share ideas, mentor each other, and serve other multiple purposes. As CoPs mature, they take an identity of their own and actually enhance knowledge.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tools</th>
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</thead>
<tbody>
<tr>
<td>Building the community</td>
</tr>
<tr>
<td>When building a community, organizations must understand the cultural fit of the different kinds of communities. By identifying the business drivers for building a community and understanding the type of knowledge that needs to be shared.</td>
</tr>
<tr>
<td>CEMEX provided 4 types of communities:</td>
</tr>
<tr>
<td>- Innovation communities: communities working together to figure out new solutions through knowledge they already have.</td>
</tr>
<tr>
<td>- Helping community: focuses on finding answers for people.</td>
</tr>
</tbody>
</table>
**Strategy**

- Best practice community: concerned with attaining, validating, and disseminating best practices
- Knowledge stewarding community: focuses on connecting people and connecting and organizing information and knowledge across the organization

**Design team:**
Is a key component in creating effective CoPs in cases where an organization cannot find a naturally occurring community, is a cross functional group that has to be tactically oriented.
- Develop the scope and determine who’s involved
- Analyze costs and infrastructure needs
- Responsible for planning the project itself

**Critical Success Factors**

<table>
<thead>
<tr>
<th>Critical Success Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sponsor and leadership</strong></td>
<td>The business leaders must demonstrate visible support of the teams engaged in developing and sustaining the communities, and the knowledge network leader must be a skilled leader recognized by both the community and the organization.</td>
</tr>
<tr>
<td><strong>Strategy, vision, and value system</strong></td>
<td>KM goals and objectives to the practitioners and ensure that a plan for achieving these is articulated. The communities must ensure that their mission and plans support the needs of the business.</td>
</tr>
<tr>
<td><strong>Incentives and measurements</strong></td>
<td>To increase awareness and participation. Measurement systems demonstrate the value of the knowledge network to the community and the business.</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>Knowledge acquisition and reuse must be integrated into the business processes.</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>Operational plans provide direction and measure progress to drive and sustain knowledge network activities. Well-defined roles and possibilities.</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Everyone must be educated on how to effectively use the tool set.</td>
</tr>
</tbody>
</table>

**BPI Outcomes.** Table 5 shows CEMEX Metrics for its Best Practice Inventory.
Table 5. BPI metrics based on initiatives, outputs and outcomes for CEMEX.

<table>
<thead>
<tr>
<th>KM Initiative Key Systems Measures</th>
<th>Key Output Measures</th>
<th>Key Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best Practices Directory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Number of downloads, users, and contributions</td>
<td>• Usefulness survey</td>
<td>• Resources saved by implementing best practices</td>
</tr>
<tr>
<td>• Dwell time</td>
<td>• Absorbes</td>
<td>• Number of groups certified in the use of the best practices</td>
</tr>
<tr>
<td>• Usability survey</td>
<td>• User ratings of contribution value</td>
<td>• Changes in operating costs</td>
</tr>
<tr>
<td>• Contribution rate over time</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lessons Learned Database</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Number of downloads, users, and contributions</td>
<td>• Time to solve problems</td>
<td>• Resources saved by applying lessons learned from others</td>
</tr>
<tr>
<td>• Dwell time</td>
<td>• Dwell survey</td>
<td>• Rate of change in operating costs</td>
</tr>
<tr>
<td>• Usability survey</td>
<td>• Anomalies</td>
<td></td>
</tr>
<tr>
<td>• Contribution rate over time</td>
<td>• User ratings of contribution value</td>
<td></td>
</tr>
<tr>
<td><strong>Communities of Practice of Special Interest Groups</strong></td>
<td>• Number of “apprentices” mentored by colleagues</td>
<td></td>
</tr>
<tr>
<td>• Number of contributions</td>
<td>• Number of problems solved</td>
<td></td>
</tr>
<tr>
<td>• Frequency of updates</td>
<td>• Number of problems solved</td>
<td></td>
</tr>
<tr>
<td>• Number of members</td>
<td>• Number of problems solved</td>
<td></td>
</tr>
<tr>
<td>• Contribution rate over time</td>
<td>• Number of problems solved</td>
<td></td>
</tr>
<tr>
<td>• Navigation path analysis</td>
<td>• Number of problems solved</td>
<td></td>
</tr>
<tr>
<td><strong>Expert or Expertize Directory</strong></td>
<td>• Time to solve problems</td>
<td></td>
</tr>
<tr>
<td>• Number of site accesses, help calls, and contributions</td>
<td>• Time to find expert</td>
<td></td>
</tr>
<tr>
<td>• Dwell time</td>
<td>• Savings or improvement in operations</td>
<td></td>
</tr>
<tr>
<td>• Usability survey</td>
<td>• Captured translational memory</td>
<td></td>
</tr>
<tr>
<td>• Contribution and update rate over time</td>
<td>• Attention rate</td>
<td></td>
</tr>
<tr>
<td>• Navigation path analysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Portal**

- Searching precision and recall
- Dwell time
- Latency
- Usability survey

- Common awareness within teams
- Time spent gathering and analyzing information
- Resources saved as a result of portal use
- Reduced training time as a result of central access to multiple resources
- Customer satisfaction

**Lead Tracking System**

- Number of contributions
- Frequency of updates
- Number of users
- Frequency of use
- Navigation path analysis

- Number of successful leads
- Number of new customers and value
- Value of new work from existing customers
- Proposal response times
- Proposal "win" rates
- Alignement of programs with strategic plans
- Revenue and overhead costs
- Customer demographics
- Cost time and produce proposals

**Collaborative Systems**

- Latency during collaborative process
- Number of users
- Number of patents and trademarks produced
- Number of articles published, plus number of conference presentations per employee

- Number of projects collaborated on
- Number of products developed
- Time lost due to program delays
- Value of sales from products recently created
- Average learning curve
- Proposal response times
- Proposal "win" rates
- Reduced cost of product development, acquisitions, or maintenance
- Reduction in the number of program delays
- Faster response to proposals
- Reduced learning curve for new employees

**Yellow Pages**

- Latency
- Frequency of use
- Latency
- Searching precision and recall

- Time to find people
- Time to solve problems
- Resources saved as a result of the use of yellow pages
- Savings or improvement in operations

**E-learning Systems**

- Latency
- Number of users and courses taken per user

- Training costs
- Savings or improvement in operations
- Employee satisfaction
- Reduced cost of training and learning curve for new hires

6 Conclusion

This paper investigated the concept of AC, defined as the organizational capability to acquire, assimilate, transform and exploit new knowledge, in the context of Knowledge Networks and M&A Knowledge.

Knowledge Network for our research focus came from CEMEX Internal Knowledge and from External Knowledge coming from Scientific Sources such as Applied University Research and as Best Practices from Top-Performing Industries.

M&A Knowledge as the other leverage integrates practices and knowledge from outlook, due diligence and post merger integration processes.
It was argued that higher level of AC in relation to Networks and M&A knowledge would lead to increased firm’s capability to identify target companies, to undergo complete and accurate due diligence and to successfully integrate the two merging companies. The organizational capability to identify, assimilate and utilize new best practices from the acquired company was also expected to increase with higher level of AC. This research was motivated by theoretically, and later also empirically validated proposition that the firms’ level of AC in relation to Networks and M&A knowledge positively impacts competitive advantage through enhanced flexibility, innovation and business performance.

Concerning contributions made by this paper, from an academic perspective, this research contributes to the scant body of literature that addresses AC for Networks and M&As and develops a research model combining these phenomena that can be used in further studies. From the business perspective, the findings and recommendations made in this paper would, besides adding value to CEMEX, help other business practitioners to assess their company’s levels of overall AC as well the AC related to Networks and M&As.

In the last years, the economic and management literature has largely stressed the importance of knowledge assets for company’s competitiveness. Grounded in the knowledge-based view of the firm, which interprets the NPD as a cognitive process characterized by the use, development and management of knowledge assets, this paper, by means of a multi case studies analysis, stresses the importance of taking knowledge assets into consideration as value drivers that can support NPD process performance improvements.

References


Grant Kearney argues that today’s global knowledge economy demands a new definition of ‘innovation’.

He reviews the compelling global shift from ‘closed’ to ‘open’ innovation as a consequence of the emergence of the global knowledge economy and explains the driving forces behind this shift and details its implications for government, research and business. Drawing on a combination of original thinking, the work of respected academics, practical experience and case studies Kearney explains why no one can innovate alone anymore.

The traditional industrial age definition of innovation has been “doing something new or different to add economic or social value”. Others place an emphasis on the entrepreneurial application or commercial translation of new ideas. Kearney examines this process and the nature of ‘innovation’ itself and looks at how we are all limited by the “curse of knowledge” illustrating why we must not only use knowledge from within more effectively but also be able to access and effectively use the collective or shared knowledge of others.

He offers a new definition of innovation that provides a platform from which government, companies, research institutes and the social sector can build their economic development strategies through what he terms “collaborative innovation”.

Kearney argues that we must redefine innovation as: “The inspired and collaborative use of knowledge, technology and other capabilities to create economic and social value”.

Importantly, Kearney argues for a sense of urgency in adopting a new approach to building open productive and sustainable economies through developing our capacity to innovate collaboratively around shared or collective knowledge. These include the reform of our legal and education systems in response to the passing of the industrial age and the emergence of the knowledge economy.

His presentation concludes with some practical approaches on how governments and others can more effectively use shared knowledge and collaborative innovation as a driver for economic and social development.

Grant Kearney is an adviser to companies and government agencies on innovation strategy, policy and program design. He was the co-founder and former chief executive of one of the world’s most revolutionary innovation models, the InnovationXchange (IXC).
1 Introduction

It is time for a new definition of innovation. In a world where the only competitive advantage is innovation those economies that come to understand and harness its power will prosper. But first we must be able to define it.

Our ability to define innovation and thus determine the characteristics of innovative companies or economies, the scale of their innovation activities and the systemic factors (such as education, legal and research) that can influence innovation is a prerequisite for the design and implementation of policies aimed at fostering innovation.

We now live in a world where knowledge is a primary commodity and is no longer a privilege and where innovation is a primary driver of economic and social development.

However, although there is a general acceptance of knowledge and innovation as the main sources of economic growth (some argue more important perhaps than land, labour, money, or other ‘tangible’ resources) the predominant view of innovation remains as what I describe as industrial or technology driven innovation.

The shift to the knowledge age from the industrial age of the 20th century holds enormous and as yet largely unresolved implications for the way in which governments, researchers and businesses approach economic and social development.

2 The industrial age: closed innovation

In the industrial or manufacturing age we had might be described as technology driven or closed innovation. It was believed that successful innovation required a company to control the generating of their own ideas, as well as production, marketing, distribution, servicing, financing, and other support.

One of the commonly understood drivers behind closed innovation was the fact that in the beginning of the twentieth century, universities and government were not significantly involved in the commercial application of science and thus some companies decided to do it all on their own. But the reasoning behind companies adopting a closed innovation model is more sophisticated than simply because they did not have time to wait for the scientific community to become more involved in the practical application of science.

They created their own research and development (R&D) departments so as to be able to own and control the whole new product development process inside the company. Companies believed that they had to hire the best and the smartest, and that the only way to develop and bring new products to market was to do it themselves. They believed they had the best ideas and had to invent something themselves to profit from it; they were obsessed with secrecy and the ownership and control of knowledge, particularly through intellectual property rights.

Not surprisingly companies became relatively self-sufficient ‘castles’, with very little external communication or collaboration with other companies, universities or indeed, the market. Internally, their departments operated as knowledge ‘silos’ and it is frightening that even today many companies have not yet broken down this closed industrial age approach to innovation.

Although much of the research and commentary on the closed innovation paradigm has been around how companies approach their product development, the concepts
behind it have found expression within our public universities and research institutions and can also be seen in some of the approaches by governments to innovation, research, industry and other areas of economic policy design.

We have often heard the maxim that change is constant—it has always been so, but today change is faster, moving at an exponential rate across all fields of human endeavour. So too, there has always been innovation but today it must take place in a different more globalised or ‘open’ world.

3 The emergence of open innovation

The emergence of ‘open innovation’ began shortly after the Second World War, and really took hold with the arrival of the World Wide Web and the consequential flood of information and knowledge across the globe, inside companies, between companies and across economies. The implications of this compelling change have been covered by Professor Henry Chesbrough in his ground breaking book, “Open Innovation: The new imperative for creating and profiting from technology”, in which described for the first time what he called the paradigm shift from ‘closed’ to ‘open’ innovation.

The globalisation of financial markets and the movement of capital, along with the movement of knowledge and the increasing mobility of a highly educated workforce have stimulated an unstoppable shift in the way in which not only companies, but entire economies, need to interact. Today skills, capital and knowledge can be shuffled from one country or market to another with lightening-like speed; we only have to witness the fallout of the global financial crisis, the emergence of the BRIC economies and convergence of areas such as ICT and transport or health and food to begin to realise the implications for us all.

The key now is not whose idea was it or who owns the knowledge but who can use it most effectively to create or add economic or social value. The questions to be asked are not simply whose idea was it or who invented it, but how is it to be used to create economic or social value? As more than one exasperated CEO of a multinational corporation has exclaimed in response to sometimes confusing and often frustrating claims of ownership of intellectual property, “I don’t care who owns it. I just want to know if I can use it, and on what terms!”

With the shift to open innovation also came a need for speed and a hunger for knowledge resulting in what some would describe as a knowledge market where knowledge resides external to the company or organisation itself, in employees, customers, suppliers, external researchers and even competitors. Not just something generated internally to be owned, controlled and stored.

Proctor and Gamble is one multinational that sees the world of open innovation (or as some describe it, external innovation) as the new paradigm and is prepared to dedicate the resources necessary for survival and growth. P&G’s logic is quite simple and as explained by their former director of open innovation, Larry Huston, you don’t have to be a genius to work out that there are over 1.5 million scientists around the world with knowledge that impacts on P&G’s businesses and that if you can connect them to the 7,000 or so scientists inside the company then P&G will get better products faster and cheaper.

An example of how P&G practices open innovation through the company’s Connect and Develop Program is the launch of Pringles Prints—a line of potato crisps printed with pictures and words—in record time and at a fraction of the normal cost. Instead of looking inside the company itself for solutions to the problem of how to print images on
crisps, P&G searched its global networks of individuals and institutions. It discovered a small bakery in Italy, run by a university professor who had invented an ink-jet method for printing edible images on cakes and cookies. P&G adapted the method—and its North American Pringles business scored double-digit growth.²

It is now a case of creating and capturing value wherever we can; we must look outside the company or economy to identify and connect with knowledge, technologies and other capabilities to drive growth. It is not a case of companies losing confidence in their own research but rather wanting to take advantage of good science, inside or outside.” This principle has enormous implications for innovation by firms but also for policy makers and researchers.

Industry leaders, researchers and policy makers are becoming increasingly aware that collaboration, particularly at an international level, is now more vital than ever before; connections and effective collaborations between business and research as well as business-to-business and government-to-business have never been more important.

It is equally and perhaps more important to be able to connect and collaborate across internal units or silos. To get the greatest value from external knowledge and connections, organisations need to have an internal system that enables them to comprehensively identify and match their own capabilities and gaps before looking for and taking advantage of solutions sourced externally.

This market demand for collaboration and its challenges has crept up on many managers. Collaboration and partnering is easy in theory but hard in practice as there are many obstacles that limit an organisation’s ability to communicate, connect and collaborate between divisions, business units or departments and geographical locations. If we can’t collaborate to innovate internally, how then can we expect to collaborate externally?

The value of knowledge now resides in its application: if we do not use the knowledge we have then it is highly probable someone else will. We must now accept and take advantage of the fact that not all the smart people work for us or live in our country. In the open world of the knowledge economy not all the best ideas are ours and those companies or economies that get the best use out of internal and external knowledge will prosper while those who isolate themselves believing they can do it all alone will die; it was once said we must ‘innovate or die’, not it is more accurate to state that we must ‘collaborate or die’.

4 Innovation traditionally defined

Innovation is a word that serves many masters and there are as many definitions as there are MBAs or courses in entrepreneurship. Some years back I described it as simply “doing something new or different to create or add economic or social value”.³ Webster's New World Dictionary, has defined innovation as “the act or process of innovating; something newly introduced, new method, custom, device, etc; change in the way of doing things; renew, alter”.⁴ For others innovation is a more formal process of ideation, reflection, planning and implementation that is usually associated with new product or process development and problem solving. There is any number of universities, government programs and consultants that lay claim to holding the ‘holy grail’ of how to be innovative.

Many confuse innovation as being intrinsically linked with the process of commercialising public sector research or technologies (part of what I would describe as
the ‘commercialisation myth’). This myth presupposes that innovations can be placed into some sort of commercialisation pipeline and pop out the other end as something of commercial value; if such were true we could all be ‘squillionaires’ or more likely, we would be living in some form socialist Russia.

Some define innovation as the discovery of new ways of creating value and others look at innovations as new ways of combining things generally to gain competitive advantage.

The importance of innovation is well made by the Australian Department of Innovation, Industry, Science and Research in its 2010 Australian Innovation System Report where it notes “Innovation is a primary driver of sustainable productivity growth and social wellbeing” and describes the Australian innovation system as “an open network of organisations interacting to produce and use new knowledge and technology to create economic and social value”.

It is commendable that the report actually uses the word knowledge to describe innovation but the term ‘new knowledge’ is troublesome; innovation is action based and contextual and, not all innovation will be primarily based on new knowledge. The process of moving something new from inception to ubiquity, whether it is steam power, electricity or the humble computer mouse can take 20 to 50 years and we need to also find systemic ways to shorten what Bill Buxton describes as this ‘long nose of innovation’.

And, while the reference to interaction amongst organisations is welcome, the continuing emphasis on technology is unfortunate. One of the more useful definitions of innovation in my view has come from IBM’s President and CEO Sam Palmisano who said: “It’s no longer individuals toiling in a laboratory, coming up with some great invention. It’s not an individual. It’s individuals. It’s multidisciplinary. It’s global. It’s collaborative.”

It is important to take a systemic or holistic view of innovation but it is equally important to understand and to publicly promote innovation as not being simply about science and technology; nor is it always just about new products and services. Innovation is vitally relevant to areas such as organisational culture and business models, including economic and financial models, product distribution, consumer marketing, and how companies and wider economies deal with new ideas around all of these.

These non-technical dimensions of innovation have become more commonly understood in recent years particularly by business and to a lesser extent by government. There is a growing emphasis on innovation within the services industry and indeed there is increasing evidence that companies which are able to develop innovative business models are more likely to outperform companies relying on technical innovations around new products.

The Oslo Manual is the foremost international source of guidelines for the collection and use of data on innovation activities in industry and aims to provide concise definitions for types of innovations, innovation activities and innovative firms. The 3rd Edition (jointly published by the OECD) defines an innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” and goes on to state that the “minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm. This includes products, processes and methods that
firms are the first to develop and those that have been adopted from other firms or organisations”.

Pleasingly there is an acknowledgement that innovation is increasingly important to the services industry and an emphasis on ‘organisational method in business practices’. For the first time the Manual recognises that there are non-technological forms of innovation and distinguishes four types: product innovations, process innovations, marketing innovations and organisational innovations.

An intriguing example of the importance of innovation to business and financial models can be seen in our response to the challenges of global warming. There are many who question that if we already have all the technology we need to meet the world’s future energy needs then what’s the problem, why can’t this be done? The answer is remarkably simple; no one has as yet come up with acceptable financial and business models (for the motor vehicle industry or the oil and mining industries for example) to enable the necessary transition from coal based energy resources to renewable.

The erroneous emphasis, on commercial pipelines and technologies as the key ingredients of innovation and thus the essential drivers of economic and social value should be a matter of great concern to us all, particularly to policy makers. The fact is that the vast majority of the technology and science we need to meet our challenges over the next two or three generations already exist; our current approach to innovation is just not capable of applying it effectively.

5 Common characteristics of innovation

I believe there are four common elements in traditional definitions of innovation that remain applicable in the knowledge age and a global economy.

Firstly, they are usually action orientated; you cannot innovate simply by thinking, you must actually do something. Even an idea which inspires others to action is still an idea. An idea in itself is far from being an innovation and yet our legal system favours protecting the ideas of the thinkers rather than their application by the doers for economic or social value.

Simply being novel does not make something an innovation, but the process of innovation does require an element of novelty, difference, creativity or what I prefer to term as inspiration; doing the same thing, no matter how valuable is not innovative and nor is doing something different if does not add social or economic value. And yet, education systems continue to value sameness and much of the business world admires solidarity over inspiration.

Central to the notion of innovation is the demand that value be generated, be it economic or social; no matter how creative or inventive something is it is not innovative if it does not deliver social or economic value. There is a disconcerting tendency amongst marketers and policy makers alike to exploit the concept of innovation by attempting to add it to their brand without demonstrating any added social or economic value.

Importantly there is an implicit recognition that innovation is contextual or experience based; what is innovative within one environment might not be in another. An adaptation may deliver more value than the original application and not all innovations are based on new technologies. In my view the inspired application of converging technologies is far more likely to have a greater impact on humankind over the next fifty years than the invention of any new technologies.
Surprisingly, most traditional definitions of innovation fail to recognise two further and fundamental ingredients without which it cannot take place. They continue to describe innovation from within an industrial age context while ignoring the less tangible but far more important elements of collective knowledge and collaborative behaviour. This is a particularly stunning omission given the emerging rhetoric that emphasises collaboration as part of the innovation process and our pursuit of the wonders and rewards of the knowledge economy (or society).

6 A new definition: collaborative innovation

Viewing innovation in a systemic way helps us to better appreciate the need for a new definition of innovation for a changed world. Innovation within a company or within a country is often seen as an eco-system made up of inter-dependant parts each meant to contribute to the health and optimum performance of the whole. Whether we see innovation as a team sport, a network of organisations or a living eco-system, the fact is that we need new rules of engagement, a new shared understanding of its role and nature if we are to reap the rewards it promises.

There is an urgent need for a clearer shared understanding of the power of collective knowledge and what I like to label collaborative innovation (more useful terms in my view than ‘open’ or ‘external’ innovation) and we must invest in platforms to enable these principles to be better exploited for economic and social development.

Companies and economies are now finding they can no longer rely solely on their internal capabilities not just because of costs but because they increasingly understand the power of networked or collective knowledge. Knowledge is a reusable resource capable of being applied to different problems or contexts and the dimensions of collective knowledge far outweigh that of any one individual contributor, company or economy.

Here we must be alert to resistance from the “curse of knowledge”⁹ which seems to manifest itself in two broad two extremes: those of us who are ‘blissfully ignorant’ and those who ‘know it all’. While ignorance may be bliss to most of us from time to time, there is no doubt it is also a major barrier to our capacity to collaborate and innovate; we have all come across companies and other organisations that are so insulated from the rest of the world that they are almost dysfunctional within the context of the modern knowledge economy.

These ‘blissfully ignorant’ organisations and their staff are simply incapable of capturing external opportunities through collaboration failing to look outside of their current sphere, to see opportunities that may exist across sectors and boundaries. The curse of knowledge can be found strangling the potential of major multinationals along with well-known Australian companies and can be particularly contagious within public sector organisations. Third sector groups and charities are not immune and, of course, there is more than one entrepreneurial type who has ‘blissfully’ re-invented the wheel.

At the other end of the scale is the ‘know-it-all’. We think we know so much about the subject at hand that it is almost impossible for us to understand that others don’t share this knowledge. We assume that because something is so obvious to us it is inconceivable that others don’t share the same knowledge. It is a no-brainer to me and “you just don’t get it!” In many ways this is an especially destructive and particularly wasteful barrier to collaborative innovation.

One of most common areas where the know-it-all form of the curse of knowledge is to be found is among the entrepreneur, start-up and SME communities. Experience the
tragedy often described as ‘founders syndrome’ where a viable new enterprise with much commercial or social promise is torn apart often with great personal and financial consequences because the inventor, creator or founder simply cannot accept that others can’t see things the way they do. It can sometimes be a case of my way or the highway.

Another too common waste are all the great ideas that never make it to social or commercial application because the ‘ideators’ think that the idea in itself is so important and so obvious that others will get it eventually. Then there are the know-it-all organisations and individuals that are simply conceited about the depth or breadth of their knowledge and capabilities and believe that they already know or have access to all the knowledge they need to innovate. This group has no idea “that they don’t know what they don’t know” and tend to see collaboration as being something to be done on their terms only.

The curse of knowledge can be a major barrier to collaboration between research and academia and industry and can often be found in larger companies with strong research and development budgets and in well-funded public research institutes. Not only do they both miss out on valuable collaborative opportunities for new business growth but they run the very real risk of being blindsided by what they don’t know.

Ever since humans became capable of communicating we have always documented and passed on our perceptions, our experiences, our learning and our thinking or reasoning (our shared knowledge). Knowledge is like a form of energy, a system of networks and flows that does things, or makes things happen. If we think in terms of a “network” where the network of relationships is more important than the ownership of single assets then the application of collective knowledge becomes more important than who owns it.

Humans have always networked and in some way or other shared their collective knowledge with it being the main source of economic growth (more important than land, labour, money, or other ‘tangible’ resources). The difference today is that access to the internet and other media forms, along with the rapid movement of people and capital, have created a need for speed. This in turn leads to an emphasis on the right to access and use knowledge rather than concern about who owns it; in this sense knowledge is just another resource to be exploited as quickly as possible.

Knowledge must no longer be simply thought of as information that is developed and stored in the minds of experts, represented in books, and classified into disciplines¹. Nor should our cultural and legal rules continue to emphasise ownership over access and use. In a knowledge-based society the community must seek to make effective use of their collective knowledge and in the process further contribute to that knowledge. Like other critical resources knowledge must be defined and valued not only for what it is, but for what it can do.

As alluded to by Sam Palmisano knowledge is created by groups of people often (but not necessarily), with a common purpose and complementary experiences or expertise. We must come to understand that knowledge is no longer the creative privilege of individual experts or research organisations. It is the result the shared, collective experience including accumulated data and information. Never has it been truer that we stand on the shoulders of those who came before us.

Now, if the useful application of knowledge is our most important resource and innovation is fundamentally critical to our economic and social development then surely any contemporary definition of the latter should include reference to the former. Equally, if collaborative or collective behaviour is essential to both the innovation process and the
generation and use of knowledge itself then surely this behaviour must also be captured for any definition to be meaningful.

Thus, my suggestion for a redefinition of innovation in the context of an open global knowledge economy is:

"The inspired and collaborative use of knowledge, technology or other capabilities to create economic and social value."

Of course any new definition must be tested for its usefulness as a descriptor of currency and also for whether it adds any value by refining or extending meaning.

The first test is whether it is in conflict with the commonly understood elements of current definitions, and clearly it is not. It is action orientated; it encourages newness or difference and demands the addition of value whilst allowing for context. I have chosen the term ‘inspired’ over ‘novel’ or ‘new’ to avoid confusions with novelties but more importantly, to allow for the sense of creativity or serendipity which I believe essential to the process.

The new definition clearly adds value to the meaning of innovation by explicitly including knowledge and collaborative behavior as essential components of innovation. I use ‘knowledge’ as a collective concept and other capabilities can be taken to include expertise, capital and other such resources.

7 Implications and Conclusion

How we see innovation has implications that go far beyond the immediate management of the innovation process. Continuing to view it in the same way as we did during the industrial age inhibits social change, business growth and economic development at almost every level imaginable.

Our education system continues to teach students what to know rather than how to connect and use their knowledge, many of the legal rules around ownership of intellectual property inhibit the practical use of the very thing they seek to protect, companies stumble over the application of old business models within a new global economy and governments tinker at the edge.

A new mindset is required: one that recognises the importance of collaboration and shared knowledge. Countries with the courage and foresight to quickly build these intangible principles into the DNA of their education, research and economic programs will prosper while those that continue to invest in only the tangibles will be starved of opportunity.

Those who seek to prosper from innovation must come to understand that significant investments must be made in the ‘software’ as well as the ‘hardware’ that runs the system. There is an urgent need for leadership and investment in updating our innovation software in areas like education, intellectual property laws, industry incentives and research collaboration. Here are just a few practical examples of where immediate action might be directed.

There is a compelling need to invest in school-based courses in human relations that prepare our workforce for a world where success is based on the application of shared knowledge and collaborative behaviour. There should be no reason why young people can’t study the impact of human relations on their potential for a successful career while also studying economics.

Traditionally, young people have not been formally taught the importance of human relations as part of preparing for work life. Yes, we were all encouraged by our parents
and teachers to share our lollies, to play nicely and to respect others but this has generally been within a societal context and not as a formal part of preparing people for the workplace. When it comes to thinking about work and careers, young people are still more likely to be encouraged to be competitive rather than collaborative.

One of the greatest barriers to innovation is the inability of business managers to lead the collaborative innovation process. There is an urgent need for investment in the development of management courses and training programs for business men and women that focus on collaborative innovation; the cult of the individual entrepreneur continues to be applauded and there a pervasive fear of the concepts of collective knowledge and collaborative behaviour driven by ignorance.

I have long advocated the establishment of an Institute for Collaboration where research and the development of education curricula can be conducted around the foundation principles of collective knowledge and collaborative innovation. In order to remain competitive in a knowledge-based open environment I believe it absolutely vital to build both internal and external connectivity into the innovation system, whether within a company or an economy (region). This requires more than simply leveraging or connecting the myriad of research, education, industry support and innovation programs that already exist or the creation of some new web portal or database.

In order to build a national collaborative platform to drive both our productivity and our international competitiveness we need to combine the power of technology and people with new processes and systems for ‘on demand’ access to knowledge and capabilities. This will require new thinking and cultural change on the part of government, research and business as we seek out how to quickly and safely access, move and share knowledge across traditional legal, organisational and national barriers.

Many government agencies claim they are already investing in networks, clusters, industry advisory services, innovation parks and other forms of collaborative platforms but their approaches have generally been disconnected and fragmented; often because of seemingly competing interests amongst the constituents and a fear of supporting any one platform system. I do not advocate any particular model for connectivity but, there must be one standard approach within any one system (or at least a ‘universal’ connector) if it is to function. After all we would not use incompatible software packages in far less important applications.

An understanding of innovation as a process based on collaborative behaviour and collective knowledge also leads to a demand for an overall of laws and regulations around intellectual property. The western legal system was designed to protect ‘real’ or tangible property during the agricultural age and has been adapted ever since and although there has been much discussion and some change around intellectual property laws and regulations much more needs to be done.

For example given the small percentage of legally protected IP that is actually used (around 10%), programs designed to encourage and promote investment in legal protection of IP must be carefully structured to avoid waste particularly by public research institutes and the misdirection of very limited resources by SMEs: financial incentives must be backed by access to professional services.

I have also argued for national “Knowledge Capital Banks” (a little like the concept of IP exchanges) into which all unused publicly funded intellectual capital would be deposited and then made available to the marketplace for application on terms designed to serve the national interest. This would see unused IP around government funded
university research, lapsed patents, trademarks and the like all become available to the local market and encourage greater focus and accountability around investments in such areas.

Finally, the time when companies, scientists and researchers ‘owned’ innovation has passed and I believe there is now a need to empower the community to innovate through the use of collective knowledge and collaborative behaviour; this can be done in many ways even using basic social marketing tools such promoting local innovation festivals and appointing local innovation champions.

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The influence of customer interaction orientation on organizational performance – mediation effect of organization learning

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Structured Abstract

Purpose – The purpose of the paper is to investigate the effects and the mechanism of a firm’s customer interaction orientation on its organizational performance. We proposed that organizational learning plays a mediating role between the relationship of interaction orientation and organizational performance. In addition, we explored the moderating effect of customer-initiated contacts on the interaction orientation-organizational learning relationship.

Design/methodology/approach – We proposed a theoretic framework to investigate research questions. After in-depth interviews, we conducted survey to empirically testify our hypotheses. Structural equation modelling and moderator regression analysis were used to analyze the data.

Originality/value – This research demonstrate that a new extension of market orientation, customer interaction orientation, is a comprehensive construct and can better capture the impacts of interaction technology on organizational process and performances.

Practical implications – The findings of this research provide insights on how to foster customer interaction orientation and organizational learning in the firms. Furthermore, the rich conception of customer interaction orientation provides insight for cultivating conversing knowledge cities, which enhances the capabilities of cities to adapt to future challenge.

Keywords - customer interaction orientation, organizational learning, organizational performance

Paper type – Academic Research Paper

1 Introduction

Nowadays, advance in technology has heightened interactivity capability of business firms with their customers (Yadav and Varadarajan, 2005). Marketers can interact with
customers at a faster rate and can precisely target the right customers. Scholars (e.g., Peppers and Rogers, 1996; Shaffer and Zhang, 2002) contended that interaction capability could facilitate one-to-one marketing and will lead to higher customer satisfaction. However, availability of interaction technology does not automatically transform into interaction capability in the firm. Ramani and Kumar (2008) proposed the concept of “interaction orientation” and empirically confirmed that high interaction orientation of a firm leads to superior organizational performance outcomes. According to Ramani and Kumar (2008), interaction orientation is a complex composite that consists of an organization’s fundamental belief (the customer concept), the relevant processes (interaction response capacity), and practices (customer empowerment and customer value management) that supplement this fundamental belief. Taking Ramani and Kumar’s perspective, for a firm to successfully interact with customers to achieve profitable customer relationships, the firm must have adequate belief, capability and related managerial process. However, how does customer interaction orientation affect performance outcomes remains unclear to the practitioners and academics; the extant literature has yet explored the mechanism that translates interaction orientation into organizational performance. This research aims to fill this knowledge void. In addition, moderating effects of customer initiation of transactions on interaction orientation—organizational performance relationship has been validated in the previous research (Ramani and Kumar, 2008). However, we would also like to examine whether the moderating effect of customer-initiating contact still present in our proposed “interaction orientation–organizational process” relationships. We believe the clarification of the mechanism and moderating factors of interaction orientation—organizational performance relationship could help managers take advantage of the progress of interaction technology more effectively.

This research used firms from design industries to empirically validate our research hypotheses, because we believe that in these industries customer interaction are highly important. The results have significant implications for the development of knowledge cities. As Tresman, Pasher and Molinari (2007) pointed out that conversing within cities, organizations and beyond, is important for cities to adapt to rapidly changing environment. Conversing is one type of interaction; therefore, what we learn from organizational interaction could be used in conversing within cities. On the other hand, cities provide an ideal environment for innovation as they offer proximity, density and variety. That is, “urban factor” could facilitate effective and efficient interaction, which is especially helpful to industry innovation (Athey, Nathan, Webber, and Mathoum, 2008).

In the next section, we present the review of the literature and the research hypotheses. Then the research method is described, which is followed by the presentation of the results. We conclude with discussion, implications, limitation, and suggestions of future study.

2 Literature review and hypothesis

2.1 Interaction orientation

Based on the feedback from their interviews with top marketing managers and survey on both business-to-business and business-to-consumers firms, Ramani and Kumar (2008) proposed interaction orientation as a composite construct that captures (1) a firm’s
belief in the customer concept, (2) a firm’s interaction response capacity that reflects its ability to use dynamic database systems and processes, (3) a firm’s customer empowerment practices that help shape customer–firm interactions and customer–customer interactions, and (4) a firm’s customer value management practices that guide its marketing resource allocation decisions. The customer concept is characterized by the individual customer as the starting point for marketing activities (Hoekstra, Leeflang, and Wittink 1999). Ramani and Kumar (2008) defined the customer concept as the belief that prescribes the unit of analysis of every marketing action and reaction to be the individual customer. Customer concept is not new to marketing practitioners and academics; however, in the past, it is more feasible in the business-to-business markets because the number of customer is usually much less than the business-to-consumer markets, and the customer contact is usually direct and more tractable. However, in recent years, the advance of interaction technology such as information processing and communication equipments makes individualized marketing activities more possible and less costly. Thus, the realization of customer concept has brought to a new high point in history.

Interaction response capacity represents the degree to which the firm offers successive products, services, and relationship experiences, to each customer by dynamically incorporating feedback from previous behavioral responses of that specific customer and of other customers collectively. It reflects the ability of a firm to respond to heterogeneous customers differently and also to each individual customer differently at different points in time by pooling information from multiple sources and points in time. The mingling of these four components would characterize the interaction orientation in a firm, which has been empirically confirmed to have significant impact on the firm’s business performance (Ramani and Kumar, 2008).

### 2.2 Organizational learning

Organizational learning has been defined as the process of development and shaping of organizational knowledge basis (Shrivastava, 1981). Fiol and Lyles (1985) contend that organizational learning is the process of improving behaviors through better knowledge and comprehension. Leivitt and March (1988) contend that organizational learning guides members’ behaviors through transforming historical inference into organizational routine. While Huber (1991) points out that organizational learning changes the behavioral potential through information processing procedures. Summing up the viewpoints of the previous researchers, we conclude that organizational learning is a series of information processing and interpretation processes, through which the organization can improve its knowledge and behavioral effectiveness, and also develop better organizational routines.

Organizational learning can be classified into two types: Single loop learning and double loop learning (Argyris, 1977). Senge (1990) proposed a similar classification schemes: Adaptive learning and Generative learning. While single loop or adaptive learning focuses on solving current organizational problems, double loop or generative learning examines whether the present goals, norms, and values should be changed. Through organizational structural reform, an organization acquires capability to meet the future environmental change. According to Senge (1990), single loop learning is only the first step of organizational learning. Senge proposes that a true learning organization should adopt double loop learning, which is characterized with five disciplines: personal mastery, mental models improving, shared vision building, team learning, and systematic
thinking. That is, personal learning is the foundation of organizational learning, upon which the members of an organization share what they learned and build common knowledge to be testified by the environment challenge. Similar viewpoints have been argued by Sinkula (1994) and Huber (1991), they both contend that organizational learning starts with knowledge or information acquisition by individuals, then the knowledge or information is distributed within the organization. The information brought by different members are shared and interpreted to reach consensus, finally, the consensus are codified or transformed into information systems or other organizational procedures and memories for the future usage.

Narver and Slater (1995) found that organizational learning has mediating effect on the relationship between market orientation and organizational performance. Since interaction orientation can be regarded as an extension of market orientation and puts more emphasis on individual customers, one would infer that organizational learning may also mediate the effect of interaction orientation on organizational performance. When a firm is customer interaction oriented, it is likely to receive plentiful information from customers, which calls for systematic processing and interpretation to be useful to the firm. Therefore, organizational learning plays an important role in translating interaction orientation into better organizational performance.

On the other hand, previous researches suggest that the first step of organizational learning is information acquisition (Huber, 1991; Sinkula, 1994; Slater and Narver, 1995). Therefore, if an organization is interaction oriented, it will have more opportunity to retrieve knowledge and information from individual customers, which can result in better organizational learning. Thus we have the following hypothesis:

**H1. Interaction orientation has positive effect on organizational learning.**

Furthermore, the information or knowledge acquired from customers cannot be directly transformed into organizational performance. The information should be properly analyzed, interpreted, and shared within the organization to turn into more influential new knowledge and perspectives (Senge 1990). That is, through the process of organizational learning, interaction orientation can lead to more effective individualized marketing activities, thus enhance organizational performance. Similarly, Iansiti and Clark (1994) argue that a firm should have sound process and systems to keep updating the reaction of customers towards the products and services of the firm, and to transform the information from customers into organizational knowledge which can be used to develop better products and services. Wayland and Cole (1997) also point out that for a firm to maintain its potential to grow, it should pay high attention to customers, constantly acquire, analyze, and understand customer knowledge, then turn the knowledge into organizational wisdom and practical actions, therefore, enhance organizational performance. The perspective of Wayland et al. (1997) echoes our proposition that organizational learning leads to better organizational performance.

### 2.3 Customer-based organizational performance

For a customer interaction oriented firm, the most relevant performance metrics would be individual customer based. Ramani and Kumar (2008) proposed two customer-level performance measures: customer-based relational performance (CBRP) and customer-based profitability performance (CBPP). The former represents the strength of relationship between a firm and its customers. The stronger the relationship, the more satisfied the customers will be, and the more likely the customers will consider the firm’s
prosperity their own well-being, thus will be more likely to voluntarily help the firm to achieve success. The other customer-level measure is customer-based profitability performance, which represents the degree of customer management effectiveness in terms of individual customer return to marketing investments. By analyzing transaction data obtained from individual customer, a firm can identify profitable customers and their needs, and can design better products and services to meet customer needs. Thus, firms that are customer interaction oriented and equipped with learning capacity are in a position to distinguish between the characteristics of profitable customers and those of unprofitable customers and to use this information to identify potentially profitable customers (e.g., Reinartz and Kumar 2003). A customer becomes unprofitable when the costs of acquiring, selling, and retaining that customer exceeds the revenue contribution from the customer over time. Using modeling techniques, firms could determine variables that drive customer profitability (e.g., Reinartz and Kumar 2003). By dynamically monitoring cost and revenue variables that are controllable, a firm can effectively capture individual customer profitability. Based on the preceding arguments, we contend that an interaction oriented learning organization will result in superior customer-based profit performance, measured in terms of the success in identifying profitable customers, balancing the acquisition and retention of customers profitably, and converting unprofitable customers to profitable ones. We thus propose the hypothesis as follows:

H2: Organizational learning has positive effect on customer-based relational performance (CBRP).

H3: Organizational learning has positive effect on customer-based profitability performance (CBPP).

2.4 Moderator: Customer-initiated contacts

Interaction orientation drives organizational learning, and those firms that have higher degree of customer initiations could have more effective learning. Yet, the strength of the “customer interaction orientation—organizational learning relationship” may be attenuated by the degree of customer-initiated contacts. As Bowman and Narayandas (2001) argued that customer-initiated contacts provide rich information about a customer’s needs and concerns to a firm and enable the firm to interact with the customer and tailor appropriate responses without incurring great efforts to identify potential customers and their needs. We propose that the more the customers voluntarily offer information about their needs, the less the interaction orientation is needed to achieve good organizational learning. We thus have the following hypothesis:

H4: The higher the level of customer-initiated contacts, the weaker the positive effect of a firm’s interaction orientation on organizational learning

2.5 Individual-level performance and aggregate organizational performance.

The literature on relationship marketing suggests that superior relational performance leads to superior aggregate firm-level business performance (Boulding et al. 2005). However, some other researchers found that customer satisfaction and loyalty may not be sufficient conditions for business profitability (Peppers and Rogers, 2004; Reinartz and Kumar, 2003), especially when the long-term customer relationship does not reduce the cost of serving or bring higher price premium. Yet, for the firms that adopt customer interaction orientation should lead to higher organizational profitability because the firm’s relational performance is built upon a whole set of customer management practices,
which includes strong organizational beliefs, response capacity, and precise value management. Therefore, the relational performance will transform into business performance. Ramani and Kumar (2008) empirically confirmed the relationships. This research would replicate the test with a new sample data to further verify the relationships. We thus have the following hypothesis:

H5. CBRP will be positively related to organizational performance.
H6: CBPP will be positively related to organizational performance.

2.6 Interaction orientation and knowledge city.

According to Tresman et al. (2007), knowledge city refers to a city as a dynamic and complex living system, which has a network of integrated subsystems, processes and structures. Just as a living organism, it exists within an environment which experiences and must adapt to external changes. A culture of conversing promotes what is required in order to adapt successfully to changes and the unknown (Stewart, 2001). Stewart contend that in a culture where dialogue, communication and conversing are common, people feel confident to express their thoughts and ideas in regards to questions that matter. As Webber said (1919), “In the new economy, conversations are the most important form of work. Conversations are the way knowledge workers discover what they know, share it with their colleagues, and in the process create new knowledge”. Interaction through sending and collecting feedback in the community and organization is an effective way to maintain good relationships among the members and encourage individuals to express their views and ideas. Goldberg et al. (2006) found that a learning city, just like a learning organization, need to be a place where both individual and group learning occurs through conversation and feedback. Yet, a sensitive issue is identified as “noise in conversations,” or “the paradox of scale” (Fishkin, 1995): too many voices rarely lead to a clear conclusion, or rather fall victims of someone else’s “summing up”. Therefore, it rests upon the responsibility of the city government to ensure that the result of conversation reflect a free, open, and comprehensive social debate, able to build intellectual skills or to leverage upon existing ones (Tresman et al., 2007). That is, interaction orientation proposed by Ramani and Kumar (2008), which has four comprehensive components can be good framework for the municipal administration to apply.

Athey et al. (2008) proposed that cities provide an ideal environment for innovation because they offer proximity, density and variety. According to Athey et al. (2008), the presence of agglomeration economies explain the occurrence of innovation in the cities. In their model, firms are the key innovators, which benefit from interlocking of two processes, “urban hubs” and “local links”. Urban hubs denote critical mass and dynamic diversity, while local links denote specialization, clusters and collaboration. Cities offer access to large markets and aggregate assets to facilitate innovations on the one hand, and attract specialization institutions and provide connectivity and proximity for the network of knowledge to form on the other hand. This model was explored to explain the innovation of five English cities. We believe the urban factors that facilitate innovation would also foster customer interaction to occur.
3 Method

3.1 Data collection

To test our model, we chose design industries to be our research population because in this business sectors, most services are customized, therefore, customer interaction orientation is highly important; and our research propositions will be put in a more stringent scrutiny. We conducted a survey on marketing or general managers of Taiwanese design companies. Marketing or general managers were selected due to their understanding of customer management and strategic orientation of the firms, as well as their capabilities to respond to our survey questions. We used the directory of design industries compiled by Economic Ministry of Taiwan as our sampling frame, which includes six categories of design houses: industrial design, visual communication design, multimedia design, interior and space design, fashion design, and integrative design services. We sent out 486 questionnaires, after two rounds of follow up mails and telephone calls reminding, we received 105 responses, yielding a response rate of 21.70%. After eliminating three invalid cases that have too many missing values, a total of 101 usable cases were employed in the subsequent analysis. Among these 101 firms, 16.8% is in the industrial design houses, 21.80% comes from visual communication design houses, 9.90% belongs to multimedia design houses, 20.80% is in the interior and space design sectors, 3.00% comes from fashion design houses, and 21.80% comes from the integrative design service houses. The sixty-four percent of the sampled firms have fewer than 10 employees and 11.9% of sample firms have more than 51 employees; and others are in-between. As for the capital assets of the firms, 29.70% is below 1 million New Taiwan (NT) dollars, 27.70% is between 1.1 and 3 million NT dollars, and 13.90% is between 3.01 and 5 million NT dollars, 14.90% is between 5.01 and 10 million NT dollars, and 13.8% exceeds 10 million NT dollars.

3.2 Measures

The measures in this study were developed according to previous studies and modified according to the in-depth interviews with five industrial practitioners. All of the scale items were anchored at a 7-point Likert’s scale (1 = strongly disagree; 7 = strongly agree) except for the measure of the extent of customer initiated contacts, which we used a ratio scale ranging from 0 to 100 points. The measurement of customer interaction orientation has fifteen items developed on the basis of Ramani and Kumar’s (2008) research to assess four components of customer interaction orientation. Those four components are (1) CC: a firm’s belief in the customer concept (3 items), (2) IRC: a firm’s interaction response capacity (4 items), (3) CE: a firm’s customer empowerment practices (3 items), and (4) CVM: a firm’s customer value management practices (3 items). The measurement of organization learning were adopted from the research of Sinkula, Baker, and Noordewier (1997), which includes three dimensions, commitment to learn (4 items), share of visions (3 items), and open mind set (2 item). For the measurements of CBRP and CBPP, we followed the measurements of Ramani and Kumar (2008). Measure of CBRP includes three items to assess customer satisfaction, customer ownership and word-of-mouth; while measure of CBPP includes three items to assess the effectiveness of customer profitability identification, customer acquisition and
maintenance, and customer profitability enhancement. We adopted the measurement of organization performance developed by Roberto Sbragia (1984), who measured the success of projects (4 items), impacts of the projects to the whole organization (3 items), and the past year organizational performance relative to competitors. Due to the formative nature of the three dimensions of organizational performance construct, we computed mean scores of the indicators from the three dimensions, and used three mean scores to represent the organizational performance.

3.3 Data analysis methods

According to Anderson and Gerbing (1988), construct validity was assessed first by using confirmatory factor analysis (CFA), and then, a structural model which lambdas and errors of each construct are allowed (Hair et al., 2006) were further estimated to test our hypotheses. All models were evaluated by utilizing AMOS 5.0 (Arbuckle, 2003). Moderating effect testing was analyzed by moderated regression analysis.

4 Results

Table 1 presents the descriptive statistics of each construct, and the reliabilities for all variables are satisfactory.

4.1 Measurement models

Since customer interaction orientation and organizational learning are second-order constructs, and each has several dimensions with reflective indicators, we conducted CFA of these hierarchical models. The second-order CFA model of interaction orientation fit was deemed to be acceptable on the basis of a battery of fit indexes ($\chi^2$/d.f. = 94.16/61 = 1.54; comparative fit index [CFI] = .92; goodness-of-fit index [GFI] = .87; root mean square error of approximation [RMSEA] = .074). The set of fit indexes reported is consistent with Hu and Bentler’s (1999) recommendations. The path coefficients between the indicators and their respective first-order factor were mostly significant at the $\alpha = .05$ level except for one item of the customer concept. We deleted that item, and re-analyzed the model. All the fit indexes were still good, and all the indicators of first-order factors were significant. In addition, all the path coefficients between the second-order construct (INTOR) and its four dimensions (CC, IRC, CE, and CVM) were significant at $\alpha = .05$ level (see Table 2).

For the measurement of organizational learning, we also run a second-order confirmatory factor analysis. The results revealed that the overall fit of the measurement

<table>
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<th>Variables</th>
<th>No. of items</th>
<th>Mean</th>
<th>S.D.</th>
<th>Alph</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Customer interaction orientation</td>
<td>13</td>
<td>5.65</td>
<td>0.65</td>
<td>.75</td>
</tr>
<tr>
<td>2. Organizational learning</td>
<td>9</td>
<td>5.69</td>
<td>0.78</td>
<td>.86</td>
</tr>
<tr>
<td>3. CBRP</td>
<td>3</td>
<td>5.5</td>
<td>0.97</td>
<td>.77</td>
</tr>
<tr>
<td>4. CBPP</td>
<td>3</td>
<td>5.31</td>
<td>1.05</td>
<td>.75</td>
</tr>
<tr>
<td>5. Organizational performance</td>
<td>10</td>
<td>5.26</td>
<td>0.96</td>
<td>.90</td>
</tr>
</tbody>
</table>
The model was mostly satisfactory ($\chi^2$/d.f. = 2.46; comparative fit index [CFI] = .92; goodness-of-fit index [GFI] = .88) except that root mean square error of approximation is somewhat higher ($\text{RMSEA} = .121$). All the path coefficients between the second-order construct and its four dimensions were significant at $\alpha = .05$ level (see Table 2). We then conducted a combined measurement model analysis with all five research constructs joint for a CFA. The fit index were good ($\chi^2$/d.f. = 187.19/137 = 1.37; comparative fit index [CFI] = .97; goodness-of-fit index [GFI] = .84; root mean square error of approximation [RMSEA] = .061). Further, composite reliability and averaged variance extracted were acceptable for all latent variables, ranging from 0.72 to 0.89. In addition, all model constructs exhibited discriminant validity according to Joreskog and Sorbom (1984) suggestion. That is, all the correlation coefficients $\phi$’s between the constructs were in ranges that each of its own 95% confidence interval does not include 1.

### Table 2. Standard $\lambda$ and t values for research constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Indicators/dimensions</th>
<th>Standardize $\lambda$</th>
<th>t values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction orientation</td>
<td>IO01(CC)</td>
<td>0.39</td>
<td>3.63</td>
</tr>
<tr>
<td></td>
<td>IO02(IRC)</td>
<td>0.61</td>
<td>6.08</td>
</tr>
<tr>
<td></td>
<td>IO03(CE)</td>
<td>0.61</td>
<td>5.97</td>
</tr>
<tr>
<td></td>
<td>IO04(CVM)</td>
<td>0.63</td>
<td>6.24</td>
</tr>
<tr>
<td>Organizational learning</td>
<td>OL01</td>
<td>0.54</td>
<td>5.37</td>
</tr>
<tr>
<td></td>
<td>OL02</td>
<td>0.77</td>
<td>8.29</td>
</tr>
<tr>
<td></td>
<td>OL03</td>
<td>0.71</td>
<td>7.54</td>
</tr>
<tr>
<td>CBRP</td>
<td>CBRP01</td>
<td>0.78</td>
<td>8.54</td>
</tr>
<tr>
<td></td>
<td>CBRP02</td>
<td>0.85</td>
<td>9.51</td>
</tr>
<tr>
<td></td>
<td>CBRP03</td>
<td>0.50</td>
<td>4.92</td>
</tr>
<tr>
<td>CBPP</td>
<td>CBPP01</td>
<td>0.87</td>
<td>10.13</td>
</tr>
<tr>
<td></td>
<td>CBPP02</td>
<td>0.80</td>
<td>9.08</td>
</tr>
<tr>
<td></td>
<td>CBPP03</td>
<td>0.56</td>
<td>5.76</td>
</tr>
<tr>
<td>Organizational performance</td>
<td>OO01</td>
<td>0.69</td>
<td>7.33</td>
</tr>
<tr>
<td></td>
<td>OO02</td>
<td>0.72</td>
<td>7.77</td>
</tr>
<tr>
<td></td>
<td>OO03</td>
<td>0.58</td>
<td>5.92</td>
</tr>
</tbody>
</table>

### 4.2 Structural models

We performed a structural model to test our proposed model and hypotheses. Figure 1 presents the research diagram. Table 3 shows the path coefficients and related statistics of the structural model. The fit values are satisfactory ($\chi^2$/d.f. = 141.54/99 = 1.43; comparative fit index [CFI] = .97; goodness-of-fit index [GFI] = .85; root mean square error of approximation [RMSEA] = .066). As Table 3 presents, customer interaction orientation has significant positive effects on organizational learning ($\beta = 0.86$, $p<0.001$), and organizational learning has positive effects on customer-based relational performance (CBRP) ($\beta = 0.79$, $p<0.001$) and customer-based profitability performance (CBPP) ($\beta = 0.83$, $p<0.001$). CBPP has significant positive effect on organizational performance ($\beta = 0.67$, $p<0.001$) and CBRP also has significant effect on organizational performance ($\beta = 0.25$, $p<0.05$). Hence, H1, H2, H3, H5 and H6 are all supported. Next, we examined the
moderating effects of customer initiated contacts on the interaction orientation-organizational learning relationship using moderator regression analysis. To avoid multicollinearity problem, we used mean-centered variables as inputs of the regression analysis according to Cronbach’s (1987) suggestions. The results were presented in Table 4, the moderator model (Model 3) performs better than main effects only models (i.e., Model 1 and Model 2). The interaction term, IO*CI is significant ($\beta = -0.241, p=0.003$). The result shows that the higher the level of customer-initiated contact, the weaker the relationship between the customer interaction orientation and organizational learning. Thus, it provides evidence for supporting H4.

The result shows that the higher the level of customer-initiated contact, the weaker the relationship between the customer interaction orientation and organizational learning. Thus, it provides evidence for supporting H4.

![Diagram](https://via.placeholder.com/150)

**Figure I: The Research Diagram**

<table>
<thead>
<tr>
<th>Path</th>
<th>Standardized $\beta$</th>
<th>T Values</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction orientation $\rightarrow$ Organizational learning</td>
<td>0.91</td>
<td>5.00</td>
<td>H1 supported</td>
</tr>
<tr>
<td>Organizational learning $\rightarrow$ CBRP</td>
<td>0.79</td>
<td>4.66**</td>
<td>H2 supported</td>
</tr>
<tr>
<td>Organizational learning $\rightarrow$ CBPP</td>
<td>0.83</td>
<td>5.02**</td>
<td>H3 supported</td>
</tr>
<tr>
<td>CBRP $\rightarrow$ Organizational performance</td>
<td>0.25</td>
<td>1.69+</td>
<td>H5 supported</td>
</tr>
<tr>
<td>CBPP $\rightarrow$ Organizational performance</td>
<td>0.67</td>
<td>3.90**</td>
<td>H6 supported</td>
</tr>
</tbody>
</table>

Note: ** denotes significant at $\alpha=0.001$.  + denotes significant at $\alpha=0.05$ (one-tailed)

### 4.3 Rival models

We also conducted a rival model analysis to examine the mediating effects of organizational learning on interaction orientation and organizational performance. The result shows that the competing model that incorporates both direct path (from interaction orientation to organizational performance) and indirect paths (via organizational learning and customer-based performances) fits data better than our research model. The change of $\chi^2$ (df=1) value is 9.04, significant at $\alpha=0.05$ level. Most of the hypotheses were reconfirmed in the competing model except the relationship between CBRP and
organizational performance was not significant anymore, a result similar to that of Ramani and Kumar’s (2008). The result shows that organizational learning is a partial mediator between the relationships of interaction orientation and organizational performances.

**Table 4.** Moderator regression analysis (Dependent variable= organizational learning)

<table>
<thead>
<tr>
<th>Models/independent variables</th>
<th>Standardized Coefficients ($\beta$)</th>
<th>T values</th>
<th>p-values</th>
<th>R²</th>
<th>F-values (df)</th>
<th>R² Changes</th>
<th>P values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: IO</td>
<td>0.603</td>
<td>7.530</td>
<td>0.000</td>
<td>0.364</td>
<td>F₁,99=56.696</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Model 2: IO CI</td>
<td>0.588 0.088</td>
<td>7.243 1.086</td>
<td>0.000 0.280</td>
<td>0.372</td>
<td>F₂,98=28.988</td>
<td>0.008</td>
<td>0.38</td>
</tr>
<tr>
<td>Model 3: IO CI IO*CI</td>
<td>0.549 0.063 -0.241</td>
<td>6.950 0.806 -3.072</td>
<td>0.000 0.422 0.003**</td>
<td>0.427</td>
<td>F₃,97=24.135</td>
<td>0.056</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

Note: IO: Interaction orientation, CI: Customer initiated contacts, ** **denotes significant at $\alpha=0.001$.

**5 Discussion**

This study examined the relationships among customer interaction orientation, organizational learning, customer-based performances, and aggregated organizational performance. Moderating effect of customer initiated contacts on interaction orientation-organizational learning relationship was also examined. Our findings partially confirm the results obtained by Ramani and Kumar (2008). Yet, we found that customer-based relationship performance (CBRP) exerts a significant and positive effect on organizational performance, while this relationship in Ramani and Kumar’s (2008) research was not significant. We speculate the reasons of difference are due to the research samples. Unlike the sample firms in the Ramani and Kumar’s (2008), our sample firms were from design houses, most of the services provided are customized, therefore, CBRP is highly important to organizational performance. In Ramani and Kumar’s (2008) research, they found that customer-initiated-contacts (CIC) strengthen the effect of customer interaction orientation-customer based performances, yet, we found that CIC weakens the effect of interaction orientation on organizational learning. Another special contribution of this research lies in showing that organizational learning is a partial mediating factor between interaction orientation and organizational performances.

**6 Managerial implications**

According to our findings, a number of managerial implications are addressed. First, our results showed that customer interaction orientation is important to both customer-level performance and organizational performance. Therefore, the more a firm pays attention to its individual customer, adopts customer concept, strengthens capacity to respond to customer dynamically, implements customer-empowerment programs and customer value management, the higher satisfaction, loyalty, and better words-of-mouth its customers would have. Consequently, higher degree of customer ownership and better business profitability will result in. Second, organizational learning plays a partial
mediating role on the interaction orientation—organizational performance relationship, which demonstrates the importance of organizational learning. An organization, be it a business firm or a non-profit institute, when equipped with better organizational learning systems, can better interpret information, share its meanings, and transform them into organizational memory, common visions and commitments. Then this organization could better translate its interaction orientation to the customer-level performance and organizational performance. Third, the present research echoes the importance of conversing culture in the building of knowledge city. Customer interaction orientation advocates two-way communication with a firm’s stakeholders, adopts four components which includes cultural and belief system, dynamic responding capability, value management practices and customer empowerment system, is more comprehensive than the extant propositions, and could shed more light on the management of conversing within cities.

7 Limitations and future research

Several limitations need to be acknowledged in this study, and future research directions will be suggested to refine our knowledge in this area. First, we empirically validated our model with the representative manager’s responses from each of our sample firms. Those managers were either marketing or general managers, therefore, are quite qualified to respond to our survey. Previous organizational research often applied this approach, yet it leaves some problems unresolved (e.g., Matsuno, Mentzer and Özsomer, 2002). Single key informant may not have adequate and comprehensive viewpoints to represent the perspectives of the whole firms. Future research is recommended to collect empirical data from multiple sources to avoid potential common method bias. Second, subjective measures of organizational performance were used in this study. Although the subject measures are highly correlated with the objective measures (Dess and Robinson, 1984), the objective data of performance indicators, such as the rate of customer retention, customer contribution, and ROA/ROE can provide concrete evidences of the effects of interaction orientation and organizational learning. We suggest future research could verify the hypotheses with objective performance data. Third, we tested our research model with firms in design industries, most of them are B2B companies, and have high probability to emphasize one-to-one marketing. We think this is a more stringent test because if we can verify the research hypotheses with relatively smaller differences of customer interaction orientation in our sample, we should be able to confirm the relationships when bigger differences are present. Yet, this proposition needs to be tested in other industries. Finally, it takes time for the effects of customer interaction and organizational leaning on organizational performances to be fully revealed; we suggest that longitudinal research be conducted and the difference between short-term and long-term effects be compared.

References

Arbuckle, J. L., (2003), Amos 5.0 [computer software], Smallwaters, Chicago.


The geography of Melbourne’s knowledge economy

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Structured Abstract

Purpose – This paper makes a contribution to local economic development planning focusing on the Knowledge Economy workforce. It does this by describing the results of an exploratory analysis of commuting patterns for five subsectors of the Knowledge Economy. Metropolitan Melbourne is used as the case study and the primary data are taken from the 2006 ABS Census. It is argued that taking the time to investigate different permutations of the Knowledge Economy workforce reveals preferences for residential and work locations. In turn, this can point to opportunities to influence job distribution and transport use. In Melbourne’s case this can help shift the City towards a polycentric structure. The Knowledge Economy is an industry sector in which people can and do work outside of established employment nodes (including, for example, working at home). The more we understand existing patterns, the better positioned we are to shape their evolution. This has important implications for the way our cities’ economies and transport systems function.

Design/methodology/approach – The approach used in this analysis makes use of the large database manipulation capacity that is now commonly available. Starting with some simple premises that there will be distinctive spatial distribution patterns to the Knowledge Economy, we first assembled and then categorised the Knowledge Economy workforce by job location and place of residence. The Australian Bureau of Statistics place of work data from the 2006 Census was used for this. These boundaries place some restrictions on developing economically meaningful geographical spaces, but they do provide a large enough sample set to generate useful findings. Preliminary statistical analysis and GIS mapping were used to both numerically and visually identify unique distribution patterns.

Originality/value – This methodology looks at the spatial distribution of Knowledge Economy jobs and workers broken down by location and industry of employment subsector. By taking the time to look at and model specific locations and sectors, rather than in the aggregate, we can build a more useful evidence base for metropolitan planning, local economic development and transport planning. In turn this can improve policy interventions designed to address social and economic polarisation that can grow to undermine a city’s efficiency. In Melbourne’s case, there is scope to improve policy intervention to encourage the development of a polycentric urban form.

Practical implications – This work is useful for local economic development and through this, transport planning. Closer analysis and modelling will improve our understanding of how different components of the Knowledge Economy workforce cluster and disperse: both relative to other subsectors and to the rest of the economy. As this sector of the
economy may have above average potential for localised employment, fostering these patterns can enhance local economies; reduce the total metropolitan commuting traffic load; and, by implication, reduce pressure on transport infrastructure. There are also additional economic and social benefits in the dispersion of highly skilled, white collar jobs. This first step in the analysis is exploratory, largely involving the assembly of and preliminary evaluation of the data. Ultimately, the aim is to build a systems-based understanding of the Knowledge Economy workforce. This understanding can then be used to guide policy interventions that will help guide the evolution of an urban economic system that is more efficient, more polycentric and fundamentally more sustainable.

**Keywords** – commuting, employment self-containment, geography, Melbourne, Clustering

**Paper type** – Practical Paper

1 **Introduction**

Many statistical and geographical dimensions of the Knowledge Economy and its workforce warrant close examination. Much is well covered in the literature, particularly: the workforce’s composition; the sector’s functional role; and productivity issues, most notably in relation to agglomeration economies (e.g. Glaeser, 2010; Overman & Puga, 2009). My own contribution relates to a question that I try to ask in much of the work I undertake. That is, what planning and policy interventions will enable more people to live and work in closer proximity? This is generally seen as a desirable outcome as it reduces pressure on transport systems and addresses some of the concerns associated with the creation of dormitory suburbs, or the economic polarisation associated with high-income, high-skill inner city economies and low-income, low-skill outer metropolitan areas.

To answer this requires careful scrutiny of demographic, geographical and economic parameters so that local economic development strategies are well thought through. These will then have greater potential for improving the local employment self-containment (ESC) ratio

Fortunately there is a large and accessible database that indicates where people live and work in Australia. With some effort these data can be evaluated, albeit with limits to the spatial accuracy. As most researchers in Australia know, Australian Bureau of Statistics (ABS) Census data at the level of the Statistical Local Area (SLA) can be used to map both the employment and residential distribution of the workforce. These data can be broken down into ‘subsets’, including components of the Knowledge Economy. The patterns of commuter movement in these subsets can then be examined.

1.1 **The Knowledge Economy subsectors**

Using the 2006 ABS Census data for Melbourne, the Knowledge Economy workforce of some 244,000 people is segmented into five subsets:

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1 This refers to the proportion of people in the labour force whose jobs are located in the same defined region as their place of residence. Due to ABS collection procedures, SLAs are the most commonly used geographical area for this metric. Note that employment self containment can also refer to the proportion of local jobs taken up by local residents (defined here as ESC- jobs).

2 The scale at which place of work data is available does place some restrictions on the analysis. SLA boundaries do not necessarily conform to areas that are meaningful in an economic sense.

3 With minor exceptions these groupings align with the ABS industry groups. A sixth subset encompassing the health sector was considered but rejected as it would require aggregation of both
1. Telecommunications, IT and Media (around 31,000 jobs or 13% of the metropolitan Knowledge Economy workforce is identified as IT/Media)
2. Finance and Banking (111,000 or 45% Finance)
3. R&D and Higher Education (71,000 or 29% R&D/Higher Ed)
4. Design-related industries (e.g. architecture) (27,000 or 11% Design)
5. Cultural Industries (e.g. performing arts) (6,000 or 2% Cultural Industries).

The objective of this categorisation is to explore some of the geographical relationships between the location of workers and jobs in different parts of the Knowledge Economy and, from this, further examine particular elements of the commuting patterns. The subsets were selected on the basis of assumptions about distinctive geographical patterns.

Simply as a descriptive effort, this work can be useful for reminding us that employment self-containment is subject to a range of influences and can vary within industry sectors. More detailed statistical and spatial analysis can contribute to building a systemic understanding of the Knowledge Economy and the movement of people in the city. By helping to define the way in which subsets of this workforce spatially interact with one another and with the rest of the economy we can eventually gain a clearer conception of how the Knowledge Economy functions within the urban setting, the major drivers of this and, therefore, how to plan for it.

1.2 Who is a Knowledge Economy worker

In this exercise, data on industry sectors have been used to define the Knowledge Economy. The ABS categorises industries using a 4-level hierarchical classification structure called the Australian and New Zealand Standard Industrial Classification (ANZSIC\(^4\)). The most detailed level of industry classification is comprised of 717 specific industry classes, 79 of which were included in the Knowledge Economy category.

An alternative, commonly used approach is to define Knowledge Economy workers, rather than the Knowledge Economy sectors. This is done using occupational classifications, rather than industry of employment. The ABS has a 5-level hierarchical classification system that can be used for this (Australian Standard Classification of Occupations, or ASCO). In many respects defining the Knowledge Economy by a person’s function, rather than their industry of employment is easier and, arguably more accurate. However, the intention of this study was to explore the locational distribution of subsectors of the Knowledge Economy industry. In this case, the presence of Knowledge Economy activities is being defined by the output of economic activity, not necessarily the function of individuals contributing to it. This can only be fully achieved by using the ANZSIC, rather than ASCO, codes. Moreover, using high-detail industry classes made it possible to exclude most people who may be working in a Knowledge Economy enterprise (for example, R&D), but who may be performing other duties, such as general office work. Where there was some ambiguity about the likely function, the ABS classification manual (ABS, 2006a) was referred to for clarification.

It is true that the two approaches generate different data compilations. Testing of Victorian data found an overall 4.5% variation in the total number of Knowledge industry and occupational data to differentiate Knowledge Economy from other health sector workers. A complete list of the four-digit industry classifications is included in Appendix 1.

\(^4\) The 2006 revision of this classification system is used in this analysis.
Economy workers between the two classification methods. However, most of the differences occur in primary and secondary industries (e.g. agricultural research being carried out on a farm). This is obviously not an issue in an analysis of metropolitan Melbourne. That said, as noted earlier, further effort would make it possible to extract those health sector workers who form part of the Knowledge Economy into another subset. In the current analysis, while health researchers are included (in R&D/Higher Ed), occupations such as surgeon and psychiatrist are not. Using a cross-tabulation of occupation and industry to more accurately define the Knowledge Economy by both sector and function may be a worthwhile, if time consuming, task as it is likely to reveal subtle differences in the spatial patterns described in this paper. On the other hand, it is not the intention of the work that this paper is part of to describe what the Knowledge Economy is and it can be argued that this is a somewhat fruitless endeavour. Knowledge imbues most economic activities, so the boundaries of the Knowledge Economy workforce are always going to be fuzzy. It is arguably just as effective to assume we are focusing on ‘white-collar’ jobs.

2 Background

According to 2006 Census data, Metropolitan Melbourne is an employment sink (Figure 1). While a little over 10,000 people commute to work outside of Melbourne, more than 40,000 commute in. More labour force participants work in the metropolitan area than live there and overall metropolitan ESC is 98%. At the more commonly used scale, around 22% of all workers in the metropolitan area live in the same SLA as they work (ABS, 2006). Research that aggregated SLAs into larger groupings has found that most commuting occurs within a number of large intra-metropolitan regions that make up the greater urban area (O’Connor & Healy, 2002).

Figure 1. Melbourne metropolitan statistical region (Data Source: ABS, 2006)

Defined here using the ABS Metropolitan Statistical Region. It covers an area of around 7,600 square kilometres in an arc around Port Phillip Bay. See Appendix 2 for a description of the comparative analysis of the Knowledge Economy workforce by state.
These intra-metropolitan economic regions bear some resemblance (physically, if not in economic function) to Hoyt’s (1939) original sectoral model of city development: with commuting zones mostly radiating out in a wedge shape from the inner urban area. This speaks to the concept of ESC, where most metropolitan residents live and work in a relatively spatially contiguous area.

2.1 Employment self-containment

The concept of employment self-containment (ESC) as a measure of local economic health has an extensive research history (e.g., Trendle & Siu, 2007; Yigitcanlar et al., 2007; Coombes, 1986). It is also a metric regularly used in economic and other planning work. This includes the larger developers and local or state government using it as a performance indicator for the impact of local employment generation strategies. Being more than a collection of dormitory suburbs is seen as desirable by some local governments, more so if the jobs are white collar. In theory at least, it is also an objective of several Australian state governments, not least for traffic management reasons.

However at the aggregate level to which they are usually applied, ESC targets have limited effectiveness as a planning tool. Statistical analysis of the relationship between ESC and a substantial number of geographical and demographic parameters reveals a high degree of variability with respect to location within the metropolitan area; age; income; occupation; duration of residency; and industry of employment. In previous work I regressed ESC for all SLAs in Australia against geographical data (e.g. location and size of SLA), combined with almost 200 different demographic variables. This highlighted strong correlations and collinearities. Examples of statistically significant positive correlations include length of residency, income, specific educational backgrounds and selected industries of employment. So, for example, owners of small businesses are more likely to live and work locally, as are 15-19 year olds; graduates in architecture (more so than people working as architects); those who live some distance from a train station; and artists.

This analysis only touches the surface of what is a complex set of relationships needing more investigation. Local economic development plans are often based on anecdotal evidence, ‘best practice’, but inappropriate, replication of ideas or intuition. The way to increase its impact is by having a better understanding of how (and how much) metrics such as ESC can vary in response to a mix of different factors and, in turn, how these factors can interact. This applies no less to the Knowledge Economy workforce than to any other sector of the economy. In fact, it may even be particularly relevant to the Knowledge Economy and increasingly important if this sector continues to grow. In order to make policy interventions more effective, a far more sophisticated understanding of the dynamic nature of the geography of the Knowledge Economy is required.

2.2 Influences on the location of the Knowledge Economy

The assertion that there are measurable, and potentially manageable, influences on the spatial distribution of the Knowledge Economy has its theoretical roots (or at least the seed) in the research literature on the origins of contemporary gentrification. There are two major schools of thought on the underlying process. Firstly, that inner urban gentrification was the result of consumer-led demand for different housing products (Zukin, 1982). Secondly that it was driven by capital-led reinvestment in under-performing inner urban property (e.g. Smith, 1992). Both perspectives lend tacit support
to the argument that there is no endogenous economic reason for the Knowledge Economy to be tied to the inner urban area. Moreover, apart from a cultural shift towards a preference for living in the inner city, neither has the Knowledge Economy workforce (i.e. the gentrification cohort) any ‘need’ to live there. It may only have been the imperatives of property investment (from consumers or producers) that have led the Knowledge Economy to many of its locational outcomes.

This is not to say that Knowledge Economy jobs do not need to cluster, just that there is ambiguous evidence that economic functionality dictates that they need to cluster in the inner urban areas. For example, Searle and Pritchard’s (2005) study of Sydney’s Information Technology and Telecommunications sector concludes that the sector’s clustering is as much an effect of the entire city’s economic functionality as it is the localisation economies of the sector itself.

By the same token, however, the literature also notes that Knowledge Economy clustering is spatially linked to high amenity and housing, transport and services tailored to the characteristics of the Knowledge Economy workforce (e.g. Baum et al, 2007; JVSN, 2001). A visual examination of the concentration of Knowledge Economy jobs and workers (by place of residence) in metropolitan Melbourne appears to confirm this. There is a notably stronger positive correlation between proximity to the central city and the concentration of Knowledge Economy workers (by place of residence) than there is between proximity and the location of Knowledge Economy jobs (Figure 2).

Figure 2. Proximity to CBD and knowledge economy place of residence and work (Data Source: ABS, 2006)

This visual confirmation of Baum’s (et al, 2007) findings suggests it is reasonable to conclude that the Knowledge Economy is not necessarily spatially tied to the inner urban area. Instead, it is more likely associated with a set of conditions (most obviously including the presence of a university campus) conducive to Knowledge Economy

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6 Measured ‘as the crow flies’ from the centroids of each SLA to the CBD. See Appendix 3.
workers. These conditions - which most obviously (and often) include the presence of a university campus - are more often than not found in the central city.

With this in mind, economic development strategies that target components of the Knowledge Economy may have substantial scope to attract these jobs to other parts of the city if (a specified selection of) these conditions can be replicated. In fact, we find that there are several small clusters of Knowledge Economy jobs in suburban areas of Melbourne, as will be explored later.

3 The research premise

This analysis began with the hypothesis that there would be distinctive geographical (spatial) dimensions to the Knowledge Economy workforce and, moreover, these would vary between subsets of the sector. This first assumption was an extension of previous work that investigated the commuting patterns of creative industry workers. Based on this assumption, the expectations were that:

1. While overall ESC for the Knowledge Economy is likely to be similar to that of the whole workforce (they do, after all, make up a sizeable proportion of Melbourne’s jobs), characteristics of it will differ. Descriptive statistics confirm this. By investigating disaggregated components of the workforce (e.g. by subsector of the Knowledge Economy, or by geographical subregion).

2. Given the assumed link between Knowledge Economy jobs and proximity to the CBD, as well as the range of other determining factors, the proportion of jobs in each SLA that are in the Knowledge Economy is not likely to be normally distributed across the 79 SLAs of the metropolitan area. Geographical clustering, as well as some anomalous outliers will result in a more complex distribution. In turn, key factors such as clustering will be a response to various influences including everything from historical precedent to the agglomeration of complementary skills (Johnson et al., 2006).

3. For various reasons, Knowledge Economy jobs will cluster in and around the CBD. This clustering will have an impact on self-containment due to the limited availability of housing in these areas. To accurately understand the commuting patterns consideration will need to be given to residents in SLAs that are adjacent to these clusters.

4. At the same time, given the relative affluence of parts of the Knowledge Economy workforce, many people will be willing to commute some distance to these jobs. This assumption is based on job search theory (Trundle & Siu, 2007).

7 See Appendix 3.
5. IT, telecommunications and media will maintain proximity to the Finance sector (see Table 1).

Table 1. Selected inter-industry flows (2005-6) (Date source: ABS, catalogue no. 5209.0.55.001)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Part of...</th>
<th>Highest Inter/Intra-Industry Flow To...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication services</td>
<td>IT &amp; Media</td>
<td>Legal, accounting, marketing and business management services</td>
</tr>
<tr>
<td>Banking</td>
<td>Finance</td>
<td>Legal, accounting, marketing and business management services</td>
</tr>
<tr>
<td>Non-bank finance</td>
<td>Finance</td>
<td>Banking</td>
</tr>
<tr>
<td>Insurance</td>
<td>Finance</td>
<td>Legal, accounting, marketing and business management services</td>
</tr>
<tr>
<td>Services to finance, investment</td>
<td>Finance</td>
<td>Services to finance, investment and insurance</td>
</tr>
<tr>
<td>Scientific research, technical</td>
<td>R&amp;D/HIGHER EDUCATION</td>
<td>Scientific research, technical and computer services</td>
</tr>
<tr>
<td>&amp; computer services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal, accounting, marketing</td>
<td>Finance</td>
<td>Legal, accounting, marketing and business management services</td>
</tr>
<tr>
<td>&amp; business management services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other business services</td>
<td>Finance</td>
<td>Legal, accounting, marketing and business management services</td>
</tr>
<tr>
<td>Education</td>
<td>R&amp;D/HIGHER EDUCATION</td>
<td>Education</td>
</tr>
<tr>
<td>Motion picture, radio &amp; television services</td>
<td>Cultural Industries</td>
<td>Motion picture, radio and television services</td>
</tr>
<tr>
<td>Libraries, museums and the arts</td>
<td>Cultural Industries</td>
<td>Libraries, museums and the arts</td>
</tr>
</tbody>
</table>

6. Finance-related jobs will be concentrated in the CBD and, therefore, ESC for them will be lower than other subsectors of the Knowledge Economy due to the relatively low number of residential dwellings in the CBD.

7. Given that they also have a local service role in the metropolitan economy, both Media and Finance jobs will be more widely distributed than R&D/Higher Education, Design and Cultural Industries jobs.

8. R&D/HIGHER EDUCATION jobs are likely to demonstrate a high degree of clustering adjacent to universities and established research/high technology areas. Conversely, job search and human capital theory suggests that these workers will live in a more distributed pattern.

Design and Cultural Industries will show sign of clustering together around, but not in, the CBD. Additionally, there should be some difference between the job locations of the design related, commercial industries and the creative arts jobs. Our previous research has also shown that Cultural Industries workers are more likely to live in proximity to their place of work.

These claims are based on interpretations of historical and cultural trends, for example, the preference for the cultural industries workers to locate in vacated inner urban industrial areas – a very well documented phenomenon. They are also based on a brief review of Australian national accounts data. This has several notable features including high inter-industry flows between IT/Media and Finance, contrasted with the self-contained nature of the Cultural Industries and R&D/HIGHER EDUCATION (Table 1).

3.1 Preliminary evidence

The first step in the analysis was to organise and evaluate the available data to ensure there was prima facie evidence for continuing the investigation. When Census data for employment by place of work and residence is disaggregated to extract Knowledge

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8 Unpublished research for various clients found that, with the exception of farmers, cultural industry workers were more likely to live and work in the same SLA than any other sector of the workforce (Geografia, 2009).
Economy workers, we find that the assumptions outlined above generally hold, albeit with some caveats. Firstly, there is, in fact, a small difference between overall ESC ratios for the Knowledge Economy workforce (18.2%) compared to the rest of the economy (22.6%). This suggests that either more Knowledge Economy workers live further from their place of work and/or Knowledge Economy jobs cluster more in concentrated employment nodes with little available housing. Looking further we find that average SLA-level ESC for Knowledge Economy jobs is 45.7%, compared with 31.7% for the rest of the workforce. As it turns out, it is the low ESC of the finance sector working in the CBD that explains the slightly lower overall figure. It is by looking at the ESC ratios for individual SLAs that we see the interesting variations. Analysis of this suggests that Knowledge Economy jobs and the workforce cluster in a statistically significantly different way to the rest of the economy. In fact, as Columns 1 and 2 of Table 2 show, most Knowledge Economy jobs are found in and around the CBD (Melbourne Inner) and the workers live around these jobs, concentrating in the eastern suburbs (e.g. Glen Eira Caulfield). When accounting for relative labour market size, we also see distinctive clusters of jobs by Knowledge Economy subsector (Columns 3 and 4). For example, R&D/Higher Education jobs do, indeed, cluster around (but not in) the CBD and towards the south east around the Australian Synchrotron near the Monash University Campus.

Table 2. Concentration of knowledge economy jobs in metropolitan Melbourne

<table>
<thead>
<tr>
<th>Industry of Employment</th>
<th>(1) Most Jobs</th>
<th>(2) Number</th>
<th>(3) Local Concentration</th>
<th>(4) Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All KE Workers</td>
<td>Melbourne (Inner)</td>
<td>66,378 Melbourne (Inner)</td>
<td>43.0%</td>
<td></td>
</tr>
<tr>
<td>IT/Media</td>
<td>Melbourne (Inner)</td>
<td>5,323 Yarra (Richmond)</td>
<td>7.5%</td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>Melbourne (Inner)</td>
<td>48,119 Melbourne (Inner)</td>
<td>31.4%</td>
<td></td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>Melbourne (Remainder)</td>
<td>14,267 Monash (South-West)</td>
<td>18.6%</td>
<td></td>
</tr>
<tr>
<td>Design Related</td>
<td>Melbourne (Inner)</td>
<td>3,688 Stonnington (Prahran)</td>
<td>5.9%</td>
<td></td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>Melbourne (Southbank-Docklands)</td>
<td>1,017 Melbourne (Southbank-Docklands)</td>
<td>2.7%</td>
<td></td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

From this first step, it was possible to identify five distinctive geographical clusters: each a collection of contiguous SLAs (Figure 3). In formulating them, consideration was given to both the similarity in workforce profile and physical connectivity. The key

---

9 This analysis found several features unique to the finance sector, most probably due to a combination of the job characteristics and demographic features of the workforce. Determining to what extent this sector should be treated separately will be one element in future modelling work.
criterion is that the Knowledge Economy accounts for at least 20% of the local jobs. Anyone familiar with the economic geography of metropolitan Melbourne will not find the existence of these clusters surprising. They also are more-or-less aligned with 7 of the 10 State Government Specialised Activity Centres (Figure 4). The clusters are:

1. ‘The Hoddle Grid’. This is the original CBD grid as defined by surveyor Robert Hoddle in the 1830s. Its Knowledge Economy activity is dominated by finance sector workers.

2. ‘The Edge’. Surrounding the CBD is a typical mix of former docks and working class suburbs now dominated by Knowledge Economy workers, particularly creative industry workers in places such as Fitzroy, South and North Melbourne. The ‘Edge’ also incorporates the Parkville Bioscience Precinct - including the University of Melbourne’s main campus - and the Alfred Hospital.

3. ‘The Knowledge Corner’. To the east of the CBD and inner circle incorporating the suburbs of Prahran, Richmond and Hawthorn is a mix of high (and some low) income households and businesses with a diverse range of Knowledge Economy activities, particularly IT/Media and Design.

4. ‘Synchrotronia’. Centred on the Australian Synchrotron and Monash University’s Clayton campus is a R&D/Higer Education cluster 20 kilometres to the southeast of the CBD.

5. ‘Northern Campus’. La Trobe University’s Bundoora campus and several health-related commercial/research precincts are at the centre of a growing R&D/Higer Education cluster around 14 kilometres to the north of the CBD. Although the SLA for this area does not quite meet the ‘20%’ criteria, it was included on the basis that it defines an important emergent R&D hub.

Further analysis of the manner in which these clusters formed could be carried out, taking as a starting point Baum’s (*et al.*, 2007) categorisation of four spatial forms. For example, ‘The Edge’ could be associated with Baum’s ‘Production District’. However, for the purposes of this paper, the basic classifications outlined here are sufficient.

**Figure 3. Location of knowledge economy clusters (Data Source: ABS, 2006)**

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10 This cut off was selected simply because the Knowledge Economy accounts for around 20% of all employment in the metropolitan area.
Seven of the ten Specialised Activity Centres identified by the State Government as high technology research and commercial precincts are adjacent to the Knowledge Economy clusters used in this analysis. Data Source: ABS, 2006, DPCD, 2010

Combined these clusters account for around 34% of all jobs in the metropolitan area and over two thirds of all Knowledge Economy jobs; all of this in no more than 2% of the total land area of the Melbourne Statistical Region (Table 3).

<table>
<thead>
<tr>
<th>Knowledge Economy Clusters</th>
<th>Total Jobs</th>
<th>KE Jobs</th>
<th>IT/Media</th>
<th>Finance</th>
<th>R&amp;D/Higher Ed</th>
<th>Design</th>
<th>Cultural Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Hoddle Grid</td>
<td>153,395</td>
<td>66,378</td>
<td>5,323</td>
<td>48,119</td>
<td>8,915</td>
<td>3,688</td>
<td>333</td>
</tr>
<tr>
<td>The Edge</td>
<td>243,389</td>
<td>68,330</td>
<td>10,147</td>
<td>23,187</td>
<td>24,994</td>
<td>7,272</td>
<td>2,730</td>
</tr>
<tr>
<td>The Knowledge Corner</td>
<td>70,511</td>
<td>18,127</td>
<td>3,398</td>
<td>7,401</td>
<td>3,860</td>
<td>3,108</td>
<td>360</td>
</tr>
<tr>
<td>Synchrotronia</td>
<td>33,965</td>
<td>7,604</td>
<td>412</td>
<td>601</td>
<td>6,310</td>
<td>239</td>
<td>42</td>
</tr>
<tr>
<td>Northern Campus</td>
<td>28,828</td>
<td>4,098</td>
<td>244</td>
<td>827</td>
<td>2,744</td>
<td>220</td>
<td>63</td>
</tr>
<tr>
<td>Rest of Metropolitan Area</td>
<td>1,014,970</td>
<td>80,448</td>
<td>11,259</td>
<td>30,398</td>
<td>24,443</td>
<td>12,151</td>
<td>2,197</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,545,058</strong></td>
<td><strong>244,985</strong></td>
<td><strong>30,783</strong></td>
<td><strong>110,533</strong></td>
<td><strong>71,266</strong></td>
<td><strong>26,678</strong></td>
<td><strong>5,725</strong></td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

With the clusters identified, the next step was to compare ESC ratios in these five clusters for both Knowledge Economy (KE) jobs and non-KE jobs (Figure 5) and for KE and non-KE residents (Figure 6) \(^{11}\). There are several notable patterns in these data, including the concentration of Knowledge Economy workers living and working in the inner urban area.

\(^{11}\) As noted earlier, ‘job’ employment self-containment refers to the proportion of jobs filled by people living in the same SLA as the job is located. ‘Resident’ employment self-containment is the proportion of residents working in the same SLA as they live.
As noted earlier, across the metropolitan area, the Knowledge Economy has a slightly lower overall ESC ratio. The metropolitan-scale, however, conceals the markedly higher ratios in the key Knowledge Economy clusters. Additionally, correlations between central city proximity and ESC for Knowledge Economy and non-Knowledge Economy are statistically significantly different. Why this may be the case has not been examined, but may be worth further analysis.

**Figure 5.** Employment self-containment by cluster - jobs (2006) (Data Source: ABS, Census 2006)

**Figure 6.** Employment self-containment by cluster - residents (2006) (Data Source: ABS, Census 2006)
4 Commuting patterns of Knowledge Economy workers

Figures 7 to 12 show the commuter zones for the five clusters, separately and combined. In this case, ‘commuter zone’ is used to refer to the place of residence for 80% of the Knowledge Economy workforce.

Again, the key point to note is the overall high concentration of the workforce in the inner urban area, as one would expect. However, Figures 9 to 11 clearly show divergent patterns as the residential commuter zones focus around the respective clusters. Again, though, this is generally what would be expected. That is, on balance, people will tend to live in proximity to where they work (or, alternatively, work close to where they live).

Figure 7. Knowledge economy commuter zones

All five clusters are shaded in black. The grey areas represent the place of residence of 80% of the knowledge economy workforce for these clusters. For all Figures 6 to 11, darker grey represents areas where higher absolute numbers of commuters live (totalling 50% of the Knowledge Economy workforce). Lighter grey accounts for the next 30% of workers. Data Source: ABS, Census 2006
Figure 8. Hoddle grid commuters

Figure 9. The edge commuters
Figure 10. Knowledge corner commuters

Figure 11. Synchrotronia commuters
The Knowledge Economy clusters, CADs and Melbourne’s polycentric urban form

Analysis of the manner in which people live in proximity to their place of work goes back some years. Most usefully, O’Connor and Healy’s (2002) efforts described the regional nature of metropolitan Melbourne’s commuting patterns. Rather than a single, amorphous metropolitan area, Melbourne can be viewed as a group of several ‘sub-regional’ economies within which most commuting occurs. More recent Australia-wide analysis by Mitchell and Watts (2010) showed that this is a nationally consistent pattern and, for the most part, all Australian metropolitan areas can be broken up into ‘Functional Economic Regions’. An interesting study of commute patterns in the UK also confirmed the anecdotal assumption that London is a “polycentric structure composed of simple flow patterns organised around a limited number of activity centres arranged in a hierarchical way.” (Roth et al, 2010: 1).

The body of evidence on this is such that it is fair to say that Melbourne is a system of inter-connected, but relatively self-contained, employment zones. These zones can be defined by, amongst other things, commuting patterns and employment self-containment. Obviously the dominance of the CBD as an employment node must be factored in this, as should the concentration of certain industries in purpose built locations (e.g. industrial parks), historical antecedents and existing transport networks. In fact, a large number of parameters influence this structure, which points to the need for a systems-based model to understand it.

Reconfiguring the metropolitan form in this manner can be a useful underpinning for strategic planning initiatives such as the Victorian Government’s Activity Centres policy. This specifies six Central Activities Districts (CADs) in metropolitan Melbourne, along
with 20 ‘Principal Activity Centres’ and almost 100 ‘Major Activity Centres. This is a hierarchical classification of nodes of employment and other activity and is a feature of the Network City urban planning model. As noted earlier, the hierarchy also includes ‘Specialised Activity Centres’ that align with the Knowledge Economy clusters used in this research (DPCD, 2010). Figure 13 overlays the location of the CADs on O’Connor and Healy’s customised regions. It suggests how the metropolitan area could evolve into a polycentric, relatively self-contained form.

While there are traces of a polycentric structure to the metropolitan economy, there are still enormous challenges to successfully developing these CADs into self-sustaining mixed-use nodes. This is particularly obvious when one considers the disconnect between where the high-income, high skilled, Knowledge Economy jobs and workers are and where the CADs are.

![Figure 13. Melbourne’s employment regions and CADs](image)

---

**Figure 13. Melbourne’s employment regions and CADs**

*O’Connor and Healy’s (2002) 10 sub-regions of metropolitan Melbourne (different shaded areas) are overlaid with the location of the seven Central Activities Districts (indicated by stars). These make up part of the network of concentrated development nodes in the State Government’s Activity Centres policy (DPCD, 2010). While some of the inner CADs are roughly contiguous with Knowledge Economy clusters (e.g. CBD, Box Hill and Footscray), the majority are some distance away.*

This analysis is the first part of an effort to better understand how a City’s metropolitan form evolves and, on the basis that it is a desirable outcome the aim is to make a contribution to the emergence of viable CADs: if not in the current arrangement, then in some form that encourages the polycentric urban form. The goal is to build a dynamic model based on a more detailed examination of financial, employment, land use and demographic data. This will factor in the self-reinforcing and countervailing relationships and decision-making processes that lead to locational outcomes for
Knowledge Economy jobs and its workforce. There is certainly sufficient information - such as economic signals – to do this. It is merely a case of first building a conceptual model and then formalising it. This, though, is a topic for another occasion.

For now, it is clear that the sub-regional nature of metropolitan areas also applies to the Knowledge Economy. What remains to be seen is whether there are significant differences between the subsectors of the Knowledge Economy. This is what we will turn to next.

4.2 Employment self-containment, commuting zones and Knowledge Economy subsectors

Breaking down the Knowledge Economy into the five subsectors described in the Introduction allows us to explore the differences in the commuting and ESC ratios. The data are provided in full in Tables 4 to 11 (Note: Table 9 is an aggregation of all five clusters and Tables 10 and 11 summarise key elements of the preceding tables).

Disaggregating the data in this way disentangles the overwhelming effect of location on ESC and shows how the ratios change according to industry of employment. From this we can eventually make some comment on the merit of industry-specific planning policy designed to encourage ESC.

<table>
<thead>
<tr>
<th>Table 4. Hoddle grid and surrounds employment self containment (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Hoddle Grid</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Total K Economy</td>
</tr>
<tr>
<td>IT/Media</td>
</tr>
<tr>
<td>Finance</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
</tr>
<tr>
<td>Design Related</td>
</tr>
<tr>
<td>Cultural Industries</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

<table>
<thead>
<tr>
<th>Table 5. The edge and surrounds employment self containment (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Edge</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Total K Economy</td>
</tr>
<tr>
<td>IT/Media</td>
</tr>
<tr>
<td>Finance</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
</tr>
<tr>
<td>Design Related</td>
</tr>
<tr>
<td>Cultural Industries</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

<table>
<thead>
<tr>
<th>Table 6. Knowledge corner and surrounds employment self containment (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Corner</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Total K Economy</td>
</tr>
<tr>
<td>IT/Media</td>
</tr>
<tr>
<td>Finance</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
</tr>
<tr>
<td>Design Related</td>
</tr>
<tr>
<td>Cultural Industries</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006
### Table 7. Synchrotronia and surrounds employment self containment (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Synchrotronia Residents (Core SLAs)</th>
<th>Synchrotronia Local Jobs (Core SLAs)</th>
<th>Synchrotronia Residents (Adjacent SLAs)</th>
<th>Synchrotronia Local Jobs (Adjacent SLAs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total K Economy</td>
<td>23.4%</td>
<td>10.0%</td>
<td>5.4%</td>
<td>20.5%</td>
</tr>
<tr>
<td>IT/Media</td>
<td>13.9%</td>
<td>10.3%</td>
<td>2.3%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Finance</td>
<td>8.0%</td>
<td>16.5%</td>
<td>0.8%</td>
<td>16.1%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>40.9%</td>
<td>5.6%</td>
<td>14.7%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Design Related</td>
<td>18.4%</td>
<td>21.0%</td>
<td>1.0%</td>
<td>13.0%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>52.9%</td>
<td>45.2%</td>
<td>1.0%</td>
<td>14.9%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

### Table 8. Northern campus and surrounds employment self containment (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Northern Campus Residents (Core SLAs)</th>
<th>Northern Campus Local Jobs (Core SLAs)</th>
<th>Northern Campus Residents (Adjacent SLAs)</th>
<th>Northern Campus Local Jobs (Adjacent SLAs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total K Economy</td>
<td>18.5%</td>
<td>19.0%</td>
<td>5.6%</td>
<td>39.3%</td>
</tr>
<tr>
<td>IT/Media</td>
<td>14.9%</td>
<td>32.0%</td>
<td>1.8%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Finance</td>
<td>10.1%</td>
<td>23.2%</td>
<td>2.6%</td>
<td>38.5%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>29.3%</td>
<td>14.2%</td>
<td>12.4%</td>
<td>42.5%</td>
</tr>
<tr>
<td>Design Related</td>
<td>22.6%</td>
<td>36.4%</td>
<td>2.1%</td>
<td>27.5%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>38.4%</td>
<td>60.3%</td>
<td>9.7%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

### Table 9. All clusters and surrounds employment self containment (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>All Clusters Residents (Core SLAs)</th>
<th>All Clusters Local Jobs (Core SLAs)</th>
<th>All Clusters Residents (Adjacent SLAs)</th>
<th>All Clusters Local Jobs (Adjacent SLAs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total K Economy</td>
<td>22.3%</td>
<td>23.0%</td>
<td>30.8%</td>
<td>20.8%</td>
</tr>
<tr>
<td>IT/Media</td>
<td>14.9%</td>
<td>32.6%</td>
<td>20.2%</td>
<td>25.3%</td>
</tr>
<tr>
<td>Finance</td>
<td>15.2%</td>
<td>4.4%</td>
<td>24.3%</td>
<td>16.4%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>26.8%</td>
<td>9.8%</td>
<td>28.4%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Design Related</td>
<td>30.9%</td>
<td>15.4%</td>
<td>26.1%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>44.0%</td>
<td>24.8%</td>
<td>30.9%</td>
<td>32.7%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

### Table 10. Employment self-containment - core and adjacent residents (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>The Hoddle Grid Residents</th>
<th>The Edge Residents</th>
<th>Knowledge Corner Residents</th>
<th>Synchrotronia Residents</th>
<th>Northern Campus Residents</th>
<th>All Clusters Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total K Economy</td>
<td>36.4%</td>
<td>30.6%</td>
<td>10.9%</td>
<td>7.2%</td>
<td>7.2%</td>
<td>19.1%</td>
</tr>
<tr>
<td>IT/Media</td>
<td>23.6%</td>
<td>34.5%</td>
<td>14.8%</td>
<td>3.3%</td>
<td>3.5%</td>
<td>20.3%</td>
</tr>
<tr>
<td>Finance</td>
<td>59.2%</td>
<td>20.7%</td>
<td>8.6%</td>
<td>14.0%</td>
<td>3.6%</td>
<td>16.4%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>18.6%</td>
<td>38.2%</td>
<td>8.4%</td>
<td>18.0%</td>
<td>14.4%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Design Related</td>
<td>23.9%</td>
<td>34.4%</td>
<td>17.0%</td>
<td>2.0%</td>
<td>4.3%</td>
<td>20.5%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>9.6%</td>
<td>50.9%</td>
<td>12.5%</td>
<td>4.0%</td>
<td>4.8%</td>
<td>25.6%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

### Table 11. Employment self-containment - core and adjacent local jobs (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>The Hoddle Grid Local Jobs</th>
<th>The Edge Local Jobs</th>
<th>Knowledge Corner Local Jobs</th>
<th>Synchrotronia Local Jobs</th>
<th>Northern Campus Local Jobs</th>
<th>All Clusters Local Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total K Economy</td>
<td>15.1%</td>
<td>34.8%</td>
<td>40.6%</td>
<td>30.5%</td>
<td>58.3%</td>
<td>27.9%</td>
</tr>
<tr>
<td>IT/Media</td>
<td>17.1%</td>
<td>40.0%</td>
<td>41.1%</td>
<td>20.1%</td>
<td>57.4%</td>
<td>33.9%</td>
</tr>
<tr>
<td>Finance</td>
<td>14.1%</td>
<td>28.5%</td>
<td>35.3%</td>
<td>32.6%</td>
<td>61.7%</td>
<td>20.8%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>16.7%</td>
<td>34.6%</td>
<td>42.8%</td>
<td>30.0%</td>
<td>56.7%</td>
<td>32.2%</td>
</tr>
<tr>
<td>Design Related</td>
<td>21.2%</td>
<td>42.1%</td>
<td>45.7%</td>
<td>36.0%</td>
<td>63.6%</td>
<td>37.8%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>31.2%</td>
<td>57.6%</td>
<td>76.9%</td>
<td>59.5%</td>
<td>69.8%</td>
<td>57.3%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006
Some general observations to make are:

Cluster Employment Profiles

1. Three of the five clusters have very clear Knowledge Economy characteristics:
   a. The Hoddle Grid is predominantly Finance.
   b. Synchrotronia has a R&D/Higher Education focus.
   c. Although not a major employer, the Northern Campus is also a R&D/Higher Education Cluster.

2. As would be expected in inner urban areas, the Edge and the Knowledge Corner have a mix of Knowledge Economy employment by industry subsector. If we control for actual industry size, however, we can see that the Edge is the dominant Cultural Industries cluster and the Knowledge Corner is the dominant IT/Media and Design-related cluster.

Core Area Employment Self-Containment

3. All five clusters have an overall (residential) ESC ratio of around 19% for the Knowledge Economy workforce (Figure 14).

4. As is to be expected, residents in the Hoddle Grid (the CBD) are more than twice as likely to be working in the same SLA as those living and working in the other four clusters.

5. By the same token, the Hoddle Grid residents make up a far smaller proportion of total Knowledge Economy jobs found in the cluster. By this measure, the Northern Campus cluster has the highest proportion of jobs filled by locals.

6. Partial correlations of place of residence and work (controlling for distance from the central city and local labour market size) confirm that the R&D/Higher Education workforce is the most likely to live and work in the same SLA.

Core and/or Adjacent Area Employment Self-Containment

7. The Edge has the highest proportion of workers commuting in from adjacent SLAs.

8. By merging the commuter zone to include the core SLA and all adjacent ones\(^\text{12}\), we find that the Edge and the Hoddle Grid have the greatest degree of (residential) ESC for the Knowledge Economy. Again, though, a much smaller proportion of available jobs are taken up by local residents (Figure 15).

9. By contrast, a far higher proportion of Knowledge Economy jobs are filled by locals in the clusters further afield. However, this contrasts with the fact that most people living adjacent to Synchrotronia and Northern Campus do not work in these sectors.

10. As a rule of thumb it is reasonable to conclude that Design-related or Cultural Industries workers will either live and work in the same SLA, or commute some distance in to work (i.e. not from adjacent SLAs). For R&D/Higher Education workers, a similar picture emerges: they will live and work quite locally, or commute from elsewhere in the City.

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\(\text{12}\) This is done on the basis that, in many cases, SLA boundaries do not create a useful or consistently comparable area of analysis.
Figure 14. Employment self-containment by cluster - core SLA only (2006) (Data Source: ABS, Census 2006)

Figure 15. Employment self-containment by cluster - core and adjacent SLAs (2006) (Data Source: ABS, Census 2006)
4.2 The relationship between industry of employment and self-containment

The next step in the analysis was to look more closely at whether there was any discernible relationship between industry subsector and its ESC ratio. Figure 16 shows average ESC by industry subsector for the five clusters combined. The striking feature is the high proportion of Cultural Industries and Design-related jobs that are taken up by local residents, contrasted with the relatively consistent ratio of local residents working locally. This pattern is the same for all five clusters (Figure 17), and strongest within the core SLAs of the clusters. That is, Design-related and Cultural Industry workers are highly likely to live in the same SLA as they work, but much less likely to live in adjoining SLAs. This is in contrast to the other three subsectors, where the reverse is generally the case.

Job search theory would suggest that these differences will be due to the lower income levels in Design and Cultural Industries resulting in reduced willingness to commute (Trundle & Siu, 2007), as well as reduced capacity to secure housing in neighbouring SLAs (these jobs are, after all, concentrated near some of the more expensive residential real estate in Melbourne). That said, previous research has also shown that after controlling for income, we still find these subsectors with higher levels of ESC (Geografia, 2009).

As a word of caution, it should be noted that in analysing the Cultural Industries we are dealing with relatively small numbers of jobs and these conclusions should be treated as exploratory. When we take into account adjacent SLAs, it is R&D/Higher Education workers who are more likely to live and work locally. Given that they make up almost one third of the Knowledge Economy workforce (compared with 2% and 13% for Cultural Industries and Design respectively), or over 71,000 jobs, they can have a substantial impact on commuting.

![Figure 16. Employment self-containment by industry subsector (2006) (Data Source: ABS, Census 2006)](image-url)
Looking at the data in this format also shows that most locally resident Knowledge Economy workers will work in the locally specific subsector, but still account for a fairly low proportion of the jobs available. For example, the Hoddle Grid has a very high proportion of residents who work in the local Finance sector (73%, which is 42 times the job-related ESC). Equally, Synchrotronia’s residents who work in the Knowledge Economy, mostly do so in R&D/Higher Education (41%, which is almost 5 times the job-related ESC).

Figures 18 and 19 illustrate this point for the Knowledge Corner (a Design-related cluster) and Synchrotronia (R&D/Higher Education). They show the difference between how many residents work in the primary Knowledge Economy subsector and how many jobs they account for. All this is saying is that the economic characteristics of a job cluster attract people to live in the area accordingly. However, it also indicates that there is capacity to increase this, given how few of these jobs are taken up by local residents.
Figure 18. Knowledge corner employment self-containment residents and jobs (2006) (Data Source: ABS, Census 2006)

Figure 19. Synchrotronia employment self-containment residents and jobs (2006) (Data Source: ABS, Census 2006)
4.3 How do they commute?

This research is just a descriptive first step and there are many ways in which the data can be organised and investigated. For example, one subgroup of the people living and working locally comprises those who work from home. This is of particular relevance to the Knowledge Economy given the presumed ease with which many can work out of home offices or studios, or run mobile businesses. We undergraduates of the early 90s were told that the proportion of people working from home, or telecommuters, would increase significantly in the years to come. In fact, between the last two Censuses, the proportion declined (ABS, 2001; ABS, 2006). However, in the Knowledge Economy, working from home is understandably more common, for example as a first step in establishing a small Knowledge Economy business that will eventually set up an office in commercial premises. Consequently, where they live and what sector of the economy they work in has important implications for local area planning.

A brief examination of this data show that, again Cultural Industries and Design-related workers stand out from the rest of the Knowledge Economy, with significantly higher proportions of people working from home (Table 12). This partly explains the high proportion of these workers living and working in the same SLA (e.g. Table 5); and is understandable given the high proportion who are likely to be self-employed.

Table 12. Working from home by knowledge economy subsector (2006)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Total Number</th>
<th>Working from Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT/Media</td>
<td>2,249</td>
<td>6.8%</td>
</tr>
<tr>
<td>Finance</td>
<td>6,226</td>
<td>5.4%</td>
</tr>
<tr>
<td>R&amp;D/Higher Education</td>
<td>5,961</td>
<td>7.9%</td>
</tr>
<tr>
<td>Design Related</td>
<td>3,605</td>
<td>12.9%</td>
</tr>
<tr>
<td>Cultural Industries</td>
<td>1,567</td>
<td>23.3%</td>
</tr>
<tr>
<td>Other Industries</td>
<td>42,027</td>
<td>2.9%</td>
</tr>
<tr>
<td>All Industries</td>
<td>61,635</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

In terms of location, it is true that the highest work from home rates (even for Knowledge Economy workers) is in the outer suburbs. For example, 35% of the resident Knowledge Economy workforce in Lilydale - 40 kilometres to the east of the CBD - works from home. As stressed earlier, though, the numbers we are dealing with here are quite small (usually fewer than 100 people). When only looking at those suburbs with more than 100 Knowledge Economy workers, we find that working from home is most evident in the middle ring suburbs. This matches the concentration of Knowledge Economy workers by place of residence and is particularly high where there are concentrations of Design-related and Cultural Industries workers (Figure 20).

13 Plausible reasons for this are another, interesting story and likely related to the changing nature of females workforce participation.
Figure 20. Knowledge economy working from home (2006)

The shading in Figure 20 highlights suburbs in metropolitan Melbourne in which the proportion of Knowledge Economy workers working from home is higher than the metropolitan average for non-Knowledge Economy workers (2.97%). Note that only those SLAs with more than 100 Knowledge Economy workers are included. Data Source: ABS, Census 2006.

In general Knowledge Economy workers in metropolitan Melbourne are at least twice as likely to work from home as other workers, reducing commuter traffic (although not necessarily private vehicle use) by around 12,000 people a day. Although the overall numbers of people working from home may have declined in Australia, there are groups in the workforce who will embrace this work practice. This will present an opportunity for local economic development planning, particularly in mixed use commercial-residential zones. It is also worth noting where the concentrations of self-employed and/or work-from-home small Knowledge Economy businesses are.
4.4 Summary

From this exploratory analysis we can conclude that, firstly, there are some distinctive patterns to the spatial relationships between jobs and the place of residence of Knowledge Economy workers in clusters around the metropolitan area. Secondly, within the Knowledge Economy these patterns vary both according to location and the subsector of workforce. From a planning perspective, the most significant patterns are:

1. Overall Knowledge Economy commuter patterns in metropolitan Melbourne reflect the same ‘sub-regionalised’ pattern we see for the entire workforce. We can take from this that there is merit in building a model of the decision-making processes that lead to the Knowledge Economy locational outcomes. It would help to develop better-targeted policies that stimulate Knowledge Economy activity in Melbourne’s CADs or similar suburban nodes in order to encourage the development of a polycentric urban form.

2. Knowledge Economy jobs cluster in a pattern that defines specific locations by subsectors of the workforce. The exception to this is in the SLAs immediately adjacent to the CBD where there is a more diverse mix of jobs.

3. As the inter-industry flow data suggest, IT/Media and Finance do tend to group, in this case, in the inner city clusters. R&D/Higher Education and Cultural Industries are more self-contained: either through distinctive clustering or higher levels of ESC irrespective of whether the SLA is part of an identified cluster.

4. Knowledge Economy workers’ preference to live closer to the central city may be a stronger driver of the geography of the Knowledge Economy than the economic necessity for Knowledge Economy jobs to be located there.

5. In the two outlying clusters, a high proportion of available Knowledge Economy jobs are taken up by people living in (and to a lesser extent around) the relevant SLAs. However, the sum of these local jobs is significantly less than the locally resident Knowledge Economy workforce. That is, Knowledge Economy workers living adjacent to these clusters are travelling elsewhere for work (primarily to the inner urban area). The converse is true for the three inner urban clusters. This is perhaps the most interesting finding if one is considering the goal of developing a polycentric urban form to Melbourne.

6. Following on from this, we can say that Design-related, Cultural or R&D/Higher Education workers live and work in the same SLA more so than other Knowledge Economy workers. However, they are also more likely not to live in adjacent SLAs to their place of work than the other two industry subsectors.

7. Finally, after examining one element of the commuting patterns in a little more detail, it was found that Knowledge Economy workers are more than twice as likely to work from home as other workers. When looking only at Design-related or Cultural Industries, this disparity increases ten-fold: a sizeable portion of the population who take living and working locally seriously.

5 Conclusion

At the outset, several assumptions were made about the geographical distribution of Knowledge Economy jobs and workers. For the most part these assumptions have been borne out. That is, the Knowledge Economy workforce reflects the overall sub-regional structure of the metropolitan economy. Additionally, within the Knowledge Economy there are, indeed, distinctive distribution and commuting patterns. This includes the concentration of Finance workers in the CBD; the proximity of IT/Media and Finance
jobs; the limited geographical association between R&D/Higher Education jobs and other Knowledge Economy jobs; and the high ESC ratios (at the SLA-level) of Design-related and Cultural Industries.

These different patterns suggest that off-the-shelf local economic development plans with a blanket ESC target and associated transport objectives are unlikely to succeed unless thought is given to the location and the type of work. The effort must work towards a better understanding of the myriad of influences on locational outcomes, particularly those drivers with indirect, but potentially substantial effects. An approach that is based on a conventional analysis of the factors involved in locational outcomes will not provide a sufficiently robust model upon which to develop policy. This undoubtedly applies to the rest of the workforce, as much as the Knowledge Economy.

Nonetheless, any analysis must start with some basics, as is the case here, which revealed some interesting features. For example, people in the Design-related and Cultural Industries often live in closer proximity to their place of work than other Knowledge Economy workers. This is largely irrespective of where the jobs are located in the metropolitan area. That makes them a modest, but potentially efficient contributor to ESC targets, as well as regular users of local transport networks. R&D/Higher Education workers also reveal a preference for living in the same SLA as their place of work. However, they appear less inclined to do so in adjacent SLAs. This finding holds even when decomposing the clusters into their constituent SLAs (e.g. the Edge Cluster, which is made up of five SLAs, one of which encompasses the Parkville Medical and Bioscience Specialised Activity Centre).

While the sector has clearly attracted some R&D/Higher Education workers to live locally, these residents take up a relatively small proportion of the jobs that are available in the local area. Meantime, the majority of R&D/Higher Education workers living in adjacent SLAs are commuting elsewhere for work. Why this is the case deserves further examination, particularly with respect to the two outer clusters (Synchrotronia and Northern Campus), where attracting Knowledge Economy workers to both live and work in the area would be an ideal outcome. Understanding what is driving the current situation may lead to a substantial improvement in the effectiveness of employment generation strategies.

Finally, the preference for Knowledge Economy workers to live in and around the central city area appears to be a stronger driver of the locational outcomes of Knowledge Economy activities than the economic needs of the sector itself. Earlier research appears to confirm this (e.g. Searle and Pritchard, 2005); as does the relative concentrations of workers by job location and place of residence as shown in Figure 2. Again, this points to a topic for further research, as well as a potential opportunity to influence commuting patterns.

As noted at the outset, this is just an exploratory examination. There are numerous ways in which the data can be organised: different scales; alternative industry subsets; and occupation breakdowns: and this is just the first step. In order to understand the dynamic interaction of these elements and of the planning policies designed to influence them, it needs to be explored through far more sophisticated modelling techniques than the static, linear statistical analysis used here. This is something that already commenced in relation to the functionality of the Knowledge Economy (e.g. Etzkowitz and Leydesdorff, 2000). We have also commenced some investigation into the demographic and economic influences on the geography of the sector. At the least this will contribute to the general body of research on the Knowledge Economy. The real aim, however, is to
develop a truly systemic understanding of the factors that influence work, residential and commuting decisions. Moreover, by being able to reliably model the impact of proposed planning and policy interventions, it is hoped that more effective strategies, including local economic development and transport plans, will be identified. The ultimate goal is to contribute to the evolution of a metropolis that can be more efficient, more equitable and more sustainable.

References


**Appendix 1. Defining the knowledge economy**

**Table A1. Knowledge economy industries of employment**

<table>
<thead>
<tr>
<th>Industry Subsector</th>
<th>Industry of Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IT/Media</strong></td>
<td>Information Media and Telecommunications, nfd</td>
</tr>
<tr>
<td></td>
<td>Publishing (except Internet and Music Publishing), nfd</td>
</tr>
<tr>
<td></td>
<td>Newspaper, Periodical, Book and Directory Publishing, nfd</td>
</tr>
<tr>
<td></td>
<td>Newspaper Publishing</td>
</tr>
<tr>
<td></td>
<td>Magazine and Other Periodical Publishing</td>
</tr>
<tr>
<td></td>
<td>Book Publishing</td>
</tr>
<tr>
<td></td>
<td>Directory and Mailing List Publishing</td>
</tr>
<tr>
<td></td>
<td>Other Publishing (except Software, Music and Internet)</td>
</tr>
<tr>
<td></td>
<td>Software Publishing</td>
</tr>
<tr>
<td></td>
<td>Motion Picture and Sound Recording Activities, nfd</td>
</tr>
<tr>
<td></td>
<td>Motion Picture and Video Activities, nfd</td>
</tr>
<tr>
<td></td>
<td>Motion Picture and Video Production</td>
</tr>
<tr>
<td></td>
<td>Post-production Services and Other Motion Picture and Video Activities</td>
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<td>Sound Recording and Music Publishing, nfd</td>
</tr>
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<td>Music Publishing</td>
</tr>
<tr>
<td></td>
<td>Music and Other Sound Recording Activities</td>
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<td></td>
<td>Broadcasting (except Internet), nfd</td>
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<td>Radio Broadcasting</td>
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<tr>
<td></td>
<td>Television Broadcasting, nfd</td>
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<td>Free-to-Air Television Broadcasting</td>
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<td>Cable and Other Subscription Broadcasting</td>
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<td>Internet Publishing and Broadcasting</td>
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<td>Telecommunications Services, nfd</td>
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<td>Internet Service Providers, Web Search Portals and Data Processing Services, nfd</td>
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<td>Data Processing, Web Hosting and Electronic Information Storage Services, nfd</td>
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<td>Libraries and Archives</td>
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<td>Other Information Services</td>
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<td>Advertising Services</td>
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<td>Financial Asset Broking Services</td>
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<td></td>
<td>Other Auxiliary Finance and Investment Services</td>
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</tbody>
</table>
Appendix 2. Knowledge economy by state

The long-term intention of this work is to develop a dynamic model of job locations and commute patterns that can be used across Australia. Obviously the first step in this is to test for any large-scale differences at the state level. A multiple comparison test (Kruskal-Wallis) was undertaken and revealed some significant differences between the proportions of Knowledge Economy workers and the ratios between place of residence and place of work within SLAs at the 5% level. For the most part this was in the comparisons between the ACT and the rest of Australia (Table A2).
Table A2. Differences in proportion of KE-non-KE workers

<table>
<thead>
<tr>
<th></th>
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</table>

Appendix 3. Location of the knowledge economy

Basic statistical tests were carried out to confirm the fundamental assumptions in this study. While not strictly necessary (the body of research in this field has confirmed these conclusions), it was done merely as a precautionary step. The first test was to confirm that there was non-normal distribution of Knowledge Economy jobs across the 79 metropolitan SLAs. This was done using the Kolmogorov-Smirnov Test.

There are likely to be many variables that will have direct and indirect impacts on the distribution and concentration of Knowledge Economy workers and the development of a probabilistic dynamic systems model that can simulate this is a long-term research objective. In the meantime, one of the more obvious parameters to measure is relationship between proximity to the CBD with the locational concentrations of Knowledge Economy workers (by place of residence). Splitting the 79 SLAs into those less than 3km from the Hoddle Grid (an arbitrarily chosen distance for the sake of this test) and those greater than 3km revealed differences in the means and sample distributions (of proportion of Knowledge Economy jobs).

Moreover, the relationship between increasing distance from the CBD and proportion of Knowledge Economy jobs has a high degree of statistically significant negative correlation (-0.775). When controlling for the concentration of jobs, as well as the high proportion of Knowledge Economy jobs, partial correlations are modestly lower (Table A3).
By contrast, the correlation between Knowledge Economy job location and proximity to the CBD is lower and varies significantly (changing sign) when controlling for total job concentration (Table A4). The hypothesis that can be drawn from this (which, at the least, needs more analysis), is that Knowledge Economy workers are choosing to live closer to the central city for reasons other than proximity to the concentration of relevant jobs. Conversely, Knowledge Economy jobs appear less spatially tied.

### Table A3. Partial correlations knowledge economy place of residence

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>Distance_H oddle</th>
<th>Correlation</th>
<th>Distance_H oddle</th>
<th>PercentPOR KE</th>
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<tr>
<td>PercentPOR KE</td>
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<td>0.456</td>
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<td>0.456</td>
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<td>Significance (2-tailed)</td>
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### Table A4. Partial correlations knowledge economy place of work

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<th>Control Variables</th>
<th>Distance_H oddle</th>
<th>Correlation</th>
<th>Distance_H oddle</th>
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<th>Local_Jobs</th>
<th>PercentPOR KE</th>
</tr>
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<td>none*</td>
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<td>Significance (2-tailed)</td>
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<td>0.456</td>
<td>0.557</td>
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<td></td>
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<td>Significance (2-tailed)</td>
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</table>

### Appendix 4. Clustering of the knowledge economy

To ensure there were differences across the workforce, SLA-level ESC ratios for the Knowledge Economy and the rest of the labour market were compared. Figure A1 shows some divergence between the two, in some cases over 50% variation across outer, middle and inner suburban areas; numbers that clearly require further examination. As Table A5 shows, the data are non-normally distributed. Data were either transformed for analysis, or non-parametric tests were used.

1087
Figure A1. Comparative employment self-containment for all SLAs (2006)

Note that SLAs are ordered from highest to lowest employment self-containment figures.
Data Source: ABS, Census 2006

Table A5. Summary statistics employment self-containment knowledge economy and rest of workforce

<table>
<thead>
<tr>
<th></th>
<th>ESC_NonKE</th>
<th>ESC_Knowledge_Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>N Missing</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>.3173</td>
<td>.4567</td>
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<tr>
<td>Median</td>
<td>.2800</td>
<td>.4400</td>
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<tr>
<td>Mode</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.17040</td>
<td>.22845</td>
</tr>
<tr>
<td>Variance</td>
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<td>.052</td>
</tr>
<tr>
<td>Skewness</td>
<td>.658</td>
<td>.055</td>
</tr>
<tr>
<td>Std. Error of Skewness</td>
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<td>.271</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-.123</td>
<td>-.896</td>
</tr>
<tr>
<td>Std. Error of Kurtosis</td>
<td>.535</td>
<td>.535</td>
</tr>
<tr>
<td>Percentiles</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.2800</td>
<td>.4400</td>
</tr>
<tr>
<td>75</td>
<td>.4300</td>
<td>.6300</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

An overview of the two datasets shows some variation in the spread of ESC ratios. Due to the nature of the data distributions, a non-parametric test was used (rather than a paired sample T-Test) to compare ESC by SLA for the Knowledge Economy (KE) and non-KE sectors (Table A6). The results indicate the variation is unlikely to be due to chance. After normalising the data paired sample T-Tests were used to reveal high correlations between the different ratios. Low significance values indicate the variation is statistically significant when considering individual SLAs (Tables A7 and A8).
Table A6. Wilcoxon signed ranks test knowledge economy and rest of workforce

<table>
<thead>
<tr>
<th>ESC.KE</th>
<th>ESC.nonKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-7.355*</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.000</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

Table A7. Paired sample correlations of normalised ESC data

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>79</td>
<td>.932</td>
<td>.000</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

Table A8. Paired sample T-test of normalised ESC data

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
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<tbody>
<tr>
<td>Pair 1</td>
<td>-1333</td>
<td>.11563</td>
<td>.01333</td>
<td>-18531</td>
<td>-11342</td>
<td>76</td>
<td>.006</td>
</tr>
</tbody>
</table>

Data Source: ABS, Census 2006

Finally, some basic maps were generated to confirm both the concentration of Knowledge Economy jobs (Figure A4) and the existence of self-contained Knowledge Economy clusters outside of the CBD (Figure A5). This provided the evidence for the assertion that Knowledge Economy jobs had distinctively different location and commuter patterns to the rest of the economy.

Figure A4. Proportion of knowledge economy jobs by SLA (2006) (Data Source: ABS, Census 2006)
Figure A5. Knowledge economy employment self-containment by SLA (2006) (Data Source: ABS, Census 2006)
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Museum Victoria youth initiative

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Abstract

‘Victoria is a thriving multicultural society. Our population hails from over 230 nations, speaks 180 languages and dialects and follows more than 116 religions.’ (Pike, B. Ministerial forward, Education for Global and Multicultural Citizenship.)

The Immigration Museum was formed in 1998 as a response to a changing Victorian population. As a flagship cultural organisation, the Immigration Museum has worked with more than 75 different communities since opening, to develop festival and exhibitions that connect with who we are today in Victoria and Australia. Over the past twelve years the Immigration Museum has been recognised as a leader in Multicultural Education Programs responding to both state frameworks such as the Victorian Education Learning Standards and federal initiatives such as Values Education. The state government’s Education for Global and Multicultural Citizenship – A strategy for Victorian Government Schools, 2009-2013 provides a renewed context for these education programs. As such the Immigration Museum’s role and mission continues to be crystallised through innovative programs that address issues around global citizenship and contribute to a better understanding of our increasingly diverse community.

‘An inter-culturally literate person possesses the skills, knowledge, understanding and attitudes required to form relationships and collaborate with others across cultures. They value, respect and explore cultural difference, critically reflect upon varied cultural traditions (including their own) and participate fully in cross-cultural interactions. They are able to communicate effectively in context both familiar and unfamiliar.’ (DEECD, 2009)

Keywords - youth, multicultural society, learning communities

Paper type – Practical Paper

1 Purpose

The purpose of this paper is to profile Museum Victoria’s pedagogical approach to learning and teaching within a cultural context and identify new ways of engaging in a more complex multicultural environment. Consideration will be given to the development, identified objectives and outcomes of several projects within the Youth Initiative program. By exploring the different methodologies adopted by each project and considering this within the broader context of the initiative itself, a holistic approach to learning, teaching and engaging young people within a Museum context will be evident.
Victoria is a thriving multicultural society. Our population hails from over 230 nations, speaks 180 languages and dialects and follows more than 116 religions. (Pike, B. (2009) Ministerial forward, Education for Global and Multicultural Citizenship. Department of Education and Early Childhood Development)

The Immigration Museum was formed in 1998 as a response to a changing Victorian population. As a flagship cultural organisation, the Immigration Museum has worked with more than 75 different communities since opening, to develop festival and exhibitions that connect with who we are today in Victoria and Australia. Over the past twelve years the Immigration Museum has been recognised as a leader in Multicultural Education Programs responding to both state frameworks such as the Victorian Education Learning Standards and federal initiatives such as Values Education. The state government’s Education for Global and Multicultural Citizenship – A strategy for Victorian Government Schools, 2009-2013 provides a renewed context for these education programs.

Multicultural Education is a whole school process that prepares all students for their roles and responsibilities in an interdependent world. It places students at the centre of all school practices that promote multi-perspectives and an appreciation of cultural and linguistic diversity within a democratic society. (Education for Global and Multicultural Citizenship – A Strategy for Victorian Government Schools, (2009 – 2013))

Similarly, the Museum is developing online initiatives that embrace tools in social media, new media and art targeting the youth market more broadly whilst still maintaining a strong pedagogical approach to learning within the Museum. As such the Immigration Museum’s role and mission continues to be crystallised through innovative programs that address issues around global citizenship and contribute to a better understanding of our increasingly diverse community.

‘An inter-culturally literate person possesses the skills, knowledge, understanding and attitudes required to form relationships and collaborate with others across cultures. They value, respect and explore cultural difference, critically reflect upon varied cultural traditions (including their own) and participate fully in cross-cultural interactions. They are able to communicate effectively in context both familiar and unfamiliar.’ (Education for Global and Multicultural Citizenship – A Strategy for Victorian Government Schools, (2009 – 2013))

2 Method

‘Claims to social agency- the ability to influence and affect society, may not be new, but in recent years these are taking on a new form and a new confidence…..Here, the social impact of the Museum is linked to outcomes such as the creation of cultural identity or the engendering of a sense of place and belonging’ (Sandell, R (2002) Museums, society, inequality. Routledge, London)

The Youth Initiative focuses on working with adolescents and young adults using Museum spaces and experiences to facilitate a deeper understanding of what it means to be part of a culturally diverse community. Best practice teaching and learning methodologies provide an innovative approach to engaging youth. These projects with a strong pedagogical approach have supported teacher professional learning (Talking Faiths) integrated multicultural learning (Hands on History) and Learning through digital and social media (Talking Difference, Narratives across Culture).

Some participants engage in action research, using Immigration Museum exhibitions, collections and other resources. Others utilise online learning tools developed to assist in the learning process. Whilst the online space is used to encourage dialogue and discourse
around identified themes or topics. Multimedia tools including social media platforms have been adopted to provide a space for uploading videos, narrative and imagery. Programs are designed to facilitate experiential and active engagement through positive interaction. These learning models use a life stages framework identifying primary, secondary and tertiary sectors. It is intended these models of learning are shared with education practitioners and ultimately influence curriculum and teaching practice both online and in the classroom.

Research ‘…..museums can play a significant role in national life through contributing to state educational provision and through shaping and strengthening self - identities and increasing inter - cultural knowledge…..’  (University of Leicester (2010) www.le.ac.uk/museumsstudies/research)

*Hands on History* is an action research project schools can develop in partnership with the Immigration Museum, using the Museum’s online, onsite and outreach resources.

The project aims to give secondary school students access to the resources of the Museum over an extended period of time including staff, knowledge and experience. The project fosters creativity, enquiry based learning, team work and leadership skills allowing the students to determine their own project brief and manage the project from start to finish. Students are provided with work experience engaging with staff and developing skills whilst contributing in a practical way to the Museums work. This manner of participation engenders an understanding of the Museum as a practical community resource. Exposing regional young people and their communities to a metropolitan Museum whilst providing skill development culminating in a creative outcome, an Exhibition is a core focus of the project.

By adopting community development practice and engagement, young people are afforded the resources and knowledge to actively contribute to their own community building. By researching, developing stories and sharing these stories through exhibition, young people become more empowered to consider their place in the world and their ability to influence the community within which they live. In addition, they are asked to consider the Museum’s role in social change. Research conducted by the Australian Museum, indicates that young people are predominately preoccupied with three things;

1. developing their sense of personal identity (not so much understanding the nations’ identity)
2. developing their relationships (sharing views with friends and partners)
3. building on skills and talents (current works, techniques, advances and designs)

If this is considered in light of another finding within the report, that young people generally ‘don't feel a part of museums and feel that programs are done to them not with them’ then it can be argued that any engagement, if it is to be successful, needs to be practical, personally relevant and provide skill advancement.( Australian Museum (2009) http://australianmuseum.net.au/Young-People-and-Museums)

‘One of the functions of education is the promotion among the young is the sense of human rights, justice, equity and tolerance of difference which can lead to social cohesion and peace.’(Engebretson, K.(2009) In your shoes)

Talking Faiths is a collaborative project that engages faith communities, schools and young people to explore interfaith issues through a multicultural perspective. It is supported by the programs, exhibitions and online materials of the Immigration Museum. The online project aimed at schools and community learning initiates and facilitates
multicultural and interfaith discussions supported by the multicultural context of the Immigration Museum. The online component features the documentation of two school based interfaith dialogue projects, Building Bridges and Socratic Circles. These projects provide a rich education resource for teachers, students and interfaith community more broadly.

The project aims to introduce and support intercultural and interfaith dialogue in the community increasing interest and understanding using migration stories as a bridge to interfaith dialogue. The documenting of the process as experienced by participants themselves not only provides a valuable resource but remains a legacy of the project.

The online kit provide the tools to initiate, facilitate and guide multicultural and interfaith discussion, using the Immigration Museum and two interfaith dialogue models as stimulus and context reference.

This project was developed by Public programs at the Immigration Museum in partnership with the Melbourne Interfaith and Intercultural Cluster, Socratic Circles and the Building Bridges through Interfaith Dialogue Project and is linked to the Victorian Government strategy: Education for Global and Multicultural Citizenship – a Strategy for Victorian Government Schools, 2009-2013. This government strategy is intended to provide support to schools to ensure they have the capacity to equip all students with the skills, knowledge and attitudes needed to prosper and thrive in a world of global mobility and cultural, political and economic connectivity.

Religious diversity is inherent in multicultural societies and if we are to build respectful societies it is important for communities to develop the means by which we can come to an appreciation and understanding of the many belief systems that are part of our multicultural world. (Molloy, J. Talking Faith- seeking student perspectives on belief and identity in a multicultural society. (2009)

‘The issue to be explored in the 21st century is how to give expression to cultural identity within a framework of cultural diversity.’ (UNESCO (2000))

_Narratives Across Culture_ is a Victoria University partnership aimed at ESL students within the TAFE sector and final year Liberal Arts students within the Higher Education sector. All student participants are immersed in a series of workshops at the Immigration Museum. The creative focus of the project is the exploration of the theme ‘Stories of the Diaspora’. Students examine the role that migration and refugee stories play in everyday life and the relationship between these stories and the broader culture. As small teams of the TAFE and Higher Education students work with one another to script and create short multimedia films the collaboration between the students and the Immigration Museum pushes the students to think about how to engage audiences with such a complex subject matter. The project aims to engage students directly with the Museum as a Active cultural learning centre. (Museum Victoria (2010)


The success of this project has raised questions around the importance of learning in around Museums. A research partnership, between the Museum, Deakin and Victoria Universities has formed to consider an approach to learning and the development of curriculum through the engagement of CALD students whilst fostering intercultural dialogue. As part of Learning and Teaching through Public Spaces, a series of stages will be conducted including testing pre and post visit subject material, the development of materials to support learning and teaching about Museums and ultimately the inclusion of developed material as an approved and registered TAFE course in 2012.

In addition to Learning and Teaching through Public Spaces, the Museum and Deakin University are also partnered in an Applied Community Project.
part of a new associate degree in Arts, Business and Science. It is intended the course be delivered to regional and rural TAFEs.

‘Museums have long been considered safe places for dangerous/uncomfortable conversations to take place. Web 2.0 technologies create the opportunity for such conversations to happen within and without the physical space of the museum’s buildings.’ (VicHealth Grant application (2009) Talking Difference)

Talking Difference is a multi-platform online new media project designed to facilitate dialogue around cultural difference and to promote diversity. The project facilitates the creation of new works in film, sound, images and text which engage with cultural difference and promote themes of diversity and anti-discrimination. The works are accessible online along with a space for dialogue and creative engagement exploring these themes.

The project aims to build connections and relationships with artists and communities that reflect Victoria’s diversity whilst creating digital content that can be presented by Museum Victoria that is authentic and seeks to engage audiences with the issues raised. Establishing an online experience to enable inter-cultural and inter-generational dialogue and exchange and demonstrating leadership in best practice cultural programming and social and community networking is a strong objective of the project.

Talking Difference is divided into three stages: Creative Engagement, Outreach and Online Participation.

The first stage of the project will focus on Community Engagement identifying up to 13 young people from CALD/Indigenous backgrounds who will form a pilot team. The team will meet monthly to participate and contribute to dialogue around cultural diversity and difference. Participants are also given a basic introduction to film making, story design and development and digital media skills by a film maker. In addition to attending the workshops each participant is provided with their own FLIP HD camera. This has provided each participant with an incentive to continue to create work outside the workshops themselves. This ‘extended’ dialogue ensures that the opportunity for broader conversations around the themes of the project are occurring and provide the project with a depth otherwise difficult to obtain. In addition, a new media artist/film maker has been appointed as a fellow to the project. The fellows project will produce a series of interviews conducted with a diverse range of participants. The interviews will address issues relating to displacement, difference and sense of identity. This component of the project relies on working collaborations with the communities themselves.

The second stage of the project will facilitate the presentation of material and creative engagement with the key themes of the project in regional and outer suburban locations. ‘Temporary Media Sites’ or pods will be set up in regional and outer-suburban areas to provide resources for participation to record anything from quick responses to media prompts to conversations between strangers. These sites will also be set up in a variety of other locations including festivals and cultural centres.

The final stage of the project will be centred on developing and working with a community of online users. The online environment will showcase user generated content, curated content as well as act as a host to external satellite websites. These satellite sites will interlink with other community partner sites thus providing a number of entry points for the Talking Difference platform.

Talking Difference is one of 16 projects funded for three years under the VicHealth Promoting Diversity through the Arts program (PDA). Projects funded by PDA aim to reduce race-based discrimination and support diversity by engaging people in creative processes and communicating these key messages to a wider audience.
3 Value

‘A Museum is no longer only measured by its internal possessions such as collections, endowments, staff and facilities but by an external consideration of the benefits it provides to the individual and communities it seeks to serve.’ (Witcomb, A (2003) A place for all of us?)

Empowering young people to be actively involved in their learning has long been regarded challenging. Identifying techniques that explore several approaches to engagement thus providing an increased opportunity is being explored. Museum Victoria adopts a three pronged approach and tailors learning to online, onsite and offsite forums. Providing young people with an opportunity to explore Museums more actively through the use of internal resources including objects, narratives and multimedia increases its value as well as providing an opportunity for creating a new generation of Museum goers.

4 Evaluation

A series of evaluations have been undertaken to ascertain the impact of learning methods, content and project outcomes for each program. For example, the Talking Faiths project feedback reinforced the premise that in order to successfully engage with young people, both the content and method of delivery must be personally relevant and outcome driven. Over 50% of respondents cited ‘making new friends’ as the best part of the participating in the project. 29% of participants cited ‘learning about another culture’ whilst almost 21% indicated having a practical outcome like ‘creating an artwork’ as the most important. Feedback from young people participating in Hands on History cited similar responses to student interaction and connection. There is strong support for activities that allow students to interact with students from other schools.

What these initial findings indicate is that young people are happy to contribute to dialogue and participate in activities that engage them in multicultural learnings if facilitated in a practical way. Connecting with other young people is clearly of high importance, finding a common thread that links each to the other whilst still maintaining a strong sense of identity is important. Being provided with an opportunity that they otherwise may not have experienced is highlighted as a success of the project itself.

TAFE and Higher Education students engaged in creating short films or digital stories as part of Narratives across culture project provided feedback indicating the importance of connecting with the Museum. Being exposed to stories of migration and identifying for the first time, in many instances, their own stories of migration was a profound learning. This new context provided students with a foundation for storytelling and a new found appreciation of the migrant experience.

The Talking Difference Blog has been set up to make visible the progress of the project. In a period of twelve weeks, the sit received 1100 of page views for an average viewing time of 1 minute 13 seconds ultimately suggesting visitors are reading content. Given the site has not been promoted or advertised, these figures are indicative of visitors who have found the site unprompted.

5 Practical implications

This paper has considered the development of a number of projects within the Youth Initiative. The principle of inclusion underpins the Museum’s approach to online, offsite and onsite programming and is aligned to the Museum’s strategic direction Inspiring Experiences: Engagement and Learning. The primary focus of this strategy is to;
Engage all Victorians through innovative exhibitions, online experiences and stimulating programs at our venues and throughout the State, to increase understanding of Victoria’s place in the world.

Collaborate with diverse communities to develop programs that promote social cohesion and actively foster access.

Position Museum Victoria as a learning specialist, building on our strengths in areas such as science literacy, values education and early childhood development. (Museum Victoria, 2010) Museum Victoria Strategic Directions

The Museum’s onsite programming in education, festivals and exhibitions is well recognised as a core offering. This has and will continue to attract a particular demographic. 49% of independent visitors are from the Metropolitan Melbourne area, especially from Inner Melbourne. 9% of visitors are from Regional Victoria, 16% are from interstate and 35% are from overseas.

Outreach programming targets audiences that may otherwise not visit a Museum. Forays into online development continue to present and are providing new opportunities for engagement. Each of these methods of delivery provides a strength in and of itself. However, tailoring methods to specifically engage youth will normally involve a combination of onsite, offsite and online.

Development will continue in areas of professional learning for teachers both established and pre-service, practical application of online resources as evidenced through Hands on History and Talking Faiths supported by the innovative use of digital and social media as shown through Talking Difference and Narratives across culture. Research and initial evaluation suggests that a multifaceted inclusionary approach to practical, personally relevant programming will have a higher rate of success when engaging young people.

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UNESCO (2000)
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Museum Victoria,(2010) Museum Victoria Strategic Directions
Local action to support knowledge-based urban development: learning from Melbourne’s north

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Abstract
The purpose of this paper is to elaborate on a conceptual toolkit to support understanding and offer assistance to community leaders and policymakers to plan Knowledge Cities based around existing efforts to support learning in localised settings. We start with a conceptual framework that was applied to a regional development program in the Northern metropolitan region of Melbourne, Australia. In setting out the key features of a learning region, we show how the framework supports the identification of policy gaps and program needs, drawing on case data from Melbourne’s North. Despite the limitations exposed by the study, the analysis reveals that there can be significant local action to support learning that contributes to the broader goals of Knowledge Cities that leverages but is not entirely reliant on external support. We conceptualise this local action using Wenger’s (2002) ‘infrastructures of learning’ framework. Whilst conceptually useful for researchers, we recognise the limitations of this approach for policy and program planning in the absence of detailed case data. We thus conclude the paper by highlighting a network-mapping tool that may assist in the identification of local infrastructures of learning in the absence of detailed case data.

Keywords – urban development, learning regions, conceptual toolkit, communities of practice, learning infrastructures

Paper type – Academic Research Paper / Practical Paper

1 Introduction
The combination of post-industrial urbanisation, coupled with the transition from material-based to knowledge-based production has given rise to new policy and research communities centred around the concepts of ‘Knowledge Cities’ and ‘Learning Regions’. While interest in these fields is growing rapidly, there is little consensus on appropriate conceptual frameworks for distinguishing the value of these phenomena from conventional urban planning and development (Carrillo 2006). Drawing on Carrillo (2006; 2009), we conceptualise the defining feature of Knowledge Cities as following from the realisation that conventional economic growth theory fails to account for the most distinctive dimensions of knowledge-based urban development; that is deliberate
and informed societal transformation based on the capacity to learn and adapt to new challenges. This implies that Knowledge Cities need to be viewed in the widest possible terms. To facilitate their development, policymakers require holistic strategies that reflect social norms and relationships, as well as economic objectives. Putnam (2001) and Fukuyama (1995), among others, describe these elements as the social glue on which stable liberal democracies depend for economic growth. As a corollary, there is a ‘possibility of a particularly resilient form of urban development secured in a network of connections anchored at local, national, and global coordinates’ (Yigitcanlar 2007:5). Many scholars of knowledge-based development emphasise the importance of networks and clusters for fostering innovation (e.g. Lamboy 2006). The latter term, popularised by Porter (1990) was originally used to describe the spatial agglomeration of firms in specialised industries, but has since evolved to represent networks spanning multiple industries, sectors and regions (Belussi & Sammarra 2010). It consistently refers to interconnected organisations, offering valuable opportunities for learning. Numerous urban and regional authorities have pursued policies designed to enhance innovation through the establishment of spatially defined networks and clusters. Most such strategies focus on enhancing cooperation between local industries, education institutions and government authorities, but some aim to promote high-tech clusters (Lamboy 2006). The current fashion is to foster the growth of the ‘creative class’ (Florida 2003). The City of Melbourne 2010 plan exemplifies these trends. It outlines the city’s goals to become a Knowledge City by promoting education services, culture and creativity, becoming the ICT capital of Australia, and a gateway for biotechnology in the Asia Pacific, among other things (Cited in K. Ergazakis et al. 2004:12-13).

Many urban centres have become self-proclaimed Knowledge Cities based on these sorts of strategies. As yet, however, there is no coherent framework or unified methodology for guiding the design and implementation of successful Knowledge Cities (K. Ergazakis et al. 2006:3). Instead, there are on offer numerous conceptual frameworks that are intended to describe their characteristics and propose useful pathways to Knowledge City formation, based on comparative studies of major urban centres (e.g. Charles 2007, E. Ergazakis et al. 2009; K. Ergazakis et al. 2004, 2006). In this paper, we take a different approach. We elaborate on a conceptual toolkit that supports understanding and offers assistance to community leaders and policymakers to better target policy and program support for learning in localised settings. Drawing on an empirical investigation of a regional economic development program in the northern metropolitan region of Melbourne, we argue that greater understanding of how locally-embedded actors are linking and coordinating their activities to learn and adapt to change is needed to ensure that future efforts better address local needs and leverage local knowledge.

2 Case study

2.1 Research context

The empirical investigation that we focus on in this paper was framed by a larger international research project called, ‘City Regions Intelligent Territories; Inclusiveness, Competitiveness and Learning’ (CRITICAL). The CRITICAL Project was funded by the European Commission's Fifth Framework Programme for Research and Development, which covered a three-year period beginning in February 2003. It aimed to build understanding of learning processes within major urban centres by examining a range of
formal and informal networks within which learning and knowledge development took place. One of the networks studied by the CRITICAL Project was an industry network based in the Northern metropolitan region of Melbourne, Australia. Our research grows from work undertaken in that context.

2.2 Theoretical framework

The CRITICAL project adopted Etienne Wenger’s concept of the ‘community of practice’ (CoP) to identify formal and informal networks that function as potential sites of learning. A community of practice is broadly understood as ‘a group of people who share a concern, a set of problems, or a passion about a topic, deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Wenger et al. 2002:4). Wenger (1998) describes the structure of a CoP as consisting of three interrelated concepts: ‘mutual engagement’, ‘joint enterprise’ and ‘shared repertoire’ (Wenger 1998:72-73). Mutual engagement refers to the social norms and relationships that bind members together. Joint enterprise refers to their shared understanding of these norms and relationships. Shared repertoire refers to communal resources that members use in pursuit of their joint enterprise. All of these concepts hinge on the negotiation of meaning among members, which in Wenger’s model consists of two interrelated concepts: ‘reification’ and ‘participation’. Reification is essential for mutual understanding. It involves taking abstract understandings and turning them into concrete forms, such as documents. Participation involves translating and recontextualising shared understandings through practice. Crucially, Wenger describes the relationship between reification and participation as a dialectical one; he calls their successful interaction the ‘alignment’ of members’ understandings and actions with their joint enterprise.

The CRITICAL Project placed strong priority on reification as a defining feature of the potential for learning in networks. This often played out with some tension in relation to participation in line with Wenger’s theory. Importantly however, networks that were identified as communities of practice by the CRITICAL project consistently exhibited strong communal ownership as well as a shared repertoire of ‘routines, words, tools ways of doing things, stories, gestures, symbols, genres, actions or concepts that the community has adapted in the course of its existence’ (Wenger 1998:83). Participants in these communities of practice, expressed a clear sense of belonging to a joint enterprise that provided opportunities for learning through cooperation with participants from different organisations and sectors, but this was not necessarily expressed as a ‘warm fuzzy’ experience as the term ‘community’ might suggest. On the contrary, communities of practice were often found among project partners from different organisations and sectors where the negotiation of meaning was often a conflictual process.

2.3 Methods

The starting point for our study was an examination of the industry network in Melbourne’s North. The communities of practice framework revealed numerous joint projects in which members of the industry network partnered with other locally-embedded actors outside the network. This led to an understanding of a regional economic development program in which the industry network played a central role in conjunction with another organisation. The first phase of our study thus involved an extensive literature review and examination of archives and documentation from organisations involved in the regional economic development program. Interviews were held with representatives of these organisations and relevant outsider groups in 2007-
2008. The interviews were open ended and sought to understand the participants’ experience of learning in the industry network and where other communities of practice might exist. A conceptual framework developed in the CRITICAL project was then used to categorise the data collected to assess the extent to which the Northern metropolitan region could be considered a learning region.

3 The northern metropolitan region of Melbourne

There is a rich history of regional economic development efforts in the Northern metropolitan region of Melbourne dating back more than 20 years. Our focus is on projects initiated between 2002-2008 by Northlink/NIETL and the Northern Area Consultative Committee (NACC which has since been replaced by the Northern Melbourne Regional Development Australia Committee or NMRDA). NorthLink/NIETL is a ‘regional partnership of industry, education and government established for the purposes of economic development, regional marketing and promotion of Melbourne’s North’ (NorthLink/NIETL 2010). Its key focus is on supporting manufacturing and business development as an industry network of small-to-medium enterprises (SMEs), which it combines with a broader regional development role. The NACC was a federally funded regional development program that was operational from 1993-2009. Its charter changed over that period, moving from developing employment opportunities to a broader regional planning and development focus. The current federally funded NMRDA initiative has continuity with the broader goals of the NACC.

Northlink/NIETL and the NACC produced numerous publications over the course of the regional economic development program. Most notably, they produced an economic development plan in 2002, entitled ‘Growing Melbourne’s North’. In 2009, the plan was updated and renamed, ‘Melbourne’s North – the New Knowledge Economy’. The new report describes the region as characterised by diversity. It has a resident population from a broad range of cultural, educational and ethnic backgrounds, and old and new suburbs offering different levels of amenity. “Inner areas are moving rapidly towards a knowledge economy and creative development at the same time as manufacturing, logistics and warehousing activities continue to develop in the outer parts of the region” (NIEIR 2009:v). The largest employing industry is a declining manufacturing sector, followed by retail; health and community services; construction; and property and business services (ABS 2006 cited in NMRDA 2010). The inner areas of the region have faced challenges in ‘developing an environment for new employment options to flourish and managing future residential densities’ and the outer growth areas have faced challenges with ‘high susceptibility to change and economic stress as a result of higher unemployment, low skill levels and managing the rural interface with Melbourne’ (Shepherd 2003:14).

The current regional economic development plan identifies as key, opportunities for:

- increased advanced manufacturing and development of industry clusters;
- greater integration between tertiary institutions and business for R&D;
- attracting more knowledge intensive industries;
- up-skilling and retraining of workers;
- strategic development of Activity Centres and Central Activity Districts;
- increasing the number of business incubators; and the
- development of quality and sustainable communities and workplaces built to the highest design and environmental standards (NIEIR 2009).
4 The learning region in Melbourne’s north

4.1 Conceptual framework

The challenges faced by Melbourne’s North highlight the need for federal and state government policies and programs to assist the region to learn and adapt to change. The extent to which the existing policy framework supported the region in this way was assessed using a conceptual framework developed by Charles (2006) in the CRITICAL Project. In this framework, the ideal Knowledge City / Learning Region is conceptualised as a combination of four pillars or subsystems of learning (See figure 1). Crucially, the four subsystems overlap and some actors are involved in more than one area. Indeed, ‘bridge builders’ or interlocutors are considered vital for learning to take place (Charles 2006:21). This underscores one of the major limitations of the framework, which like many conceptual tools that are intended to describe the key characteristics or set out pathways to Knowledge City formation: it fails to assist in the identification of bridge builders that support learning between categories. We will return to this point after we elaborate on our application of the framework to our study of Melbourne’s North.

<table>
<thead>
<tr>
<th>1. The Learning Cooperative</th>
<th>Development of learning and skills improvement among citizens and local labour force</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The Learning Cluster</td>
<td>Promotion of clustering of local small to medium enterprises (SMEs) and support agencies</td>
</tr>
<tr>
<td>3. The Learning District</td>
<td>Formation of strategic alliances among local R&amp;D establishments</td>
</tr>
<tr>
<td>4. The Learning Network</td>
<td>Co-ordination of urban development activities</td>
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</tbody>
</table>

Figure 1. The four pillars of learning

4.1.1 The Learning Cooperative

It is in the category of the Learning Co-operative that we found the northern metropolitan region of Melbourne had the strongest performance. This was largely due to the strong presence of education institutions in the region, and their willingness to work with local industry partners to address skills shortages through their involvement in the regional economic development program. NorthLink/NIETL and the NACC were highly effective at marshalling support from education institutions to leverage state and federal government programs to improve learning and skills development among residents. They also initiated and funded numerous projects, partnering with education institutions that provided in-kind support. There was widespread support for vocational education and training programs that targeted specific community groups, with access and equity being a clear priority. This was framed by consideration of employment opportunities, industry needs, the imperative to be competitive in the global marketplace.

NorthLink/NEITL and the NACC played an important role in taking advantage of state-funded programs to support this focus, with the Local Learning and Employment Network (LLEN) initiative being particularly well aligned with local priorities. The state government established the LLEN initiative in 2001 with the aim to improve education, training and employment options for young people aged 10-19 years and to foster the creation of sustainable relationships, partnerships and brokerage of initiatives with and
across local education providers, industry and community (DEECD 2010). Our research found considerable crossover in the membership and projects of the three LLENs in Melbourne’s North and the regional development program of Northlink/NEITL and NACC. There were formal connections through board and committee membership and joint projects, as well as less formal connections through networks and participation in projects and events.

Notable crossover projects include an initiative led by the NACC that brought TAFE and undergraduate courses into community centres targeting unemployed and disadvantaged learners, which was supported through partnerships with local companies and philanthropic organisations that fitted the centres with computers to assist learners seeking employment, and parents interested in supporting their children’s learning (Career Connections, 2006). Another project saw postgraduate business and marketing students from LaTrobe University working with local enterprises on real-world problems. With funding from the Australian Greenhouse Office, NorthLink/NIETL developed a joint project with RMIT University through which students advised local businesses on ways to reduce their greenhouse gas emissions, identified the costs associated with implementing changes and the payback period (Greenhouse Office 2006). Meanwhile, the NACC led the development of funding proposals for a social enterprise to provide training and employment to people with disabilities; a community facility and access programs for migrant groups; coordination of aged care employment for ethnic communities; and projects aimed at improving indigenous employment outcomes (DOTARS 2006).

Also evident was strong support for developing pathways. Here, the NACC played a leading role in partnership with RMIT University and the local government of the City of Whittlesea in engaging local partners in an exemplar project, the Whittlesea Youth Commitment. This project brought together community organisations, local enterprises, and the Dusseldorp Skills Forum to ensure that early school leavers in that local government area were supported with pathways to vocational education, training or employment (DSF 2009). The Dusseldorp Skills Forum, a national body very active and respected in the discussion on training, skills development and young people first proposed the Youth Commitment model for Australia in 1999 (Speirings, 1999). The Whittlesea Youth Commitment was nationally recognised for its success, both in terms of its model of operations and in sustaining community engagement (Kellock 2001). Also initiated by the NACC and NorthLink/NIETL in partnership with RMIT University and Northern Metropolitan TAFE was the Northern Stainless Steel Skills Development Group. It was made up of representatives of local industry and education institutions and sought to address local skills shortages in that industry sector through the promotion of careers and provision of training programs in partnership with TAFE. The two lead organisations in the regional economic development program also provided machinery, in-kind and dollar support for the Northern Technology Education Centre at Northlands Secondary College (NACC 2004).

Northlands Secondary College enjoyed strong support from the NACC and NorthLINK/NIETL to provide technical training and become a Technology Education Centre for the region. Its priority was to offer ‘engineering, manufacturing, auto electro technology, furnishing and horticulture courses, with equipment provided by industry sponsors’ and to be the ‘lead in a cluster working in partnership with the Department of Education to establish a senior campus for secondary students seeking specialist maths/science training’ (Northlands Secondary College 2006). Another example of this collaborative approach to supporting skills development and career pathways was
the federally-funded Northern Schools VET cluster, which was also supported by NACC and NorthLINK/NIETL. It aided synergies between different organisations and sectors by coordinating the development of secondary school programs that sought to match the needs of the region, ‘enable greater choice for students and reduce duplication in schools’ (Career Connections 2006).

4.1.2 The Learning Cluster

We found some elements of the Learning Cluster in the northern metropolitan region of Melbourne, but the bulk of SME networking activity centred on Northlink/NEITL's membership base and was highly generalised in nature. NORTHlink/NIETL promoted SME networking across industry sectors through regular breakfasts and tours for its 2,000 odd members. Representation at these events was fairly consistent, with anywhere from 80 to 160 members attending breakfasts, and tours typically booked out within three weeks of their announcement. Members also participated in state and federal industry programs, which featured prominently at breakfasts where programs were often promoted using local enterprises as case studies (NORTH Link/NIETL 2006). The industry network also ran a federally funded Trade Start program for members. By 2007, 115 companies had achieved their export targets through the program, which was awarded additional resources and renewed funding contracts.

At the time of this research, a food manufacturing cluster was in the early stages of development in the region. There are also some examples of past ‘clustering’ initiatives such as an automotive project which focused on implementation of quality systems for suppliers to the automotive industry. This suggests that more targeted support is needed to build local SME capacity for innovation, potentially by strengthening the as yet limited opportunities for clustering by industry sector.

4.1.3 The Learning District

Despite strong university engagement with industry partners outside the region, we found little evidence of a Learning District in Melbourne’s North. A key barrier to university interest in building equivalent patterns of linkages with local industry partners was the predominance of SMEs in the region and the lack of head offices of larger companies. Importantly, however, NorthLink/NIETL exerted little influence over this category of the learning region, which also helps to explain the region’s lack lustre performance.

The two universities based in the region – RMIT and LaTrobe – each have a history of successful industry engagement through research and consultancy projects. However, relevant activity in Melbourne’s North consisted primarily of teaching and learning activities and community outreach programs where students provided the resource or universities provided in-kind support. NorthLink/NIETL brokered many such projects, which ranged from postgraduate students undertaking research with local enterprises, to larger projects like the ‘Greenhouse Challenge Plus Support’ discussed in the Learning Cooperative section. Some projects involved local government, such as the Whittlesea Chinese herb garden project, where RMIT provided research support and Northern TAFE provided horticulture expertise to assess the feasibility of growing Chinese herbs. Both universities supported a NORTHLink/NIETL and NACC bid for funding to establish two business incubators in the region, but these were general business incubators with no specific technology focus. LaTrobe University has a business incubator and technology park on campus, which does provide technology and commercialisation support to industry, but lacks a local focus.
4.1.4 The Learning Network

We found strong evidence of a vibrant Learning Network in Melbourne’s North. This centred on NORTHlink/NIETL and the NACC, which each supported a wide range of networks that linked different organisations and sectors through the regional economic development program. For example, the NACC established the Economic Development Working Group, which included senior officials from all seven local government areas in Melbourne’s North. This strengthened the linkages between the local governments, which in turn resulted in new support for collaborative projects. The Working Group produced two other outcomes of note. The first was a research project taken up by NORTHLink/NIETL, which sought to identify factors limiting the supply of commercial office space. The findings were presented to local government authorities to inform new planning and zoning policies (Australian Research Group & SGS, 2007). The second was a cultural tourism project, which promoted cultural attractions in the region (NACC 2006). NORTHLink/NIETL and the NACC also initiated biannual briefings to local members of parliament to support better understanding of the region as a whole.

Complementing these initiatives were efforts by the two lead organisations to promote advocacy through the provision of research reports and project documentation to the local media. However, neither organisation had the capacity to build a substantive online presence to disseminate this information or support community engagement. As a corollary, the Learning Network in Melbourne’s North was decidedly local and spatially bounded. It was not engaged with other regions across the city, let alone beyond this.

5 Supporting learning

Our analysis indicates that the nascent learning region in Melbourne’s North depended a great deal on state and federal government programs, but it was not entirely dependent on them. State and federal government programs were enhanced by the substantial support for learning provided by NorthLink/NIETL and the NACC. These organisations were able to generate significant outcomes though their role as bridge builders between different categories of learning, despite the obvious limitations of the region’s performance in each area that our study exposed.

In conceptualising the support for learning that these organisations provided, we return to Wenger who theorises that it is possible to ‘cultivate’ communities of practice (2002). In his model, communities of practice require a soft ‘infrastructure’ which enables people to ‘engage, imagine and align’ their practice (1998:237). Engagement can be supported by physical and virtual spaces, ways of belonging and opportunities to apply skills, develop tools and generate memory or history of the group (Wenger 1998:237). Imagination can be supported by ‘orientation in space and time, opportunities for reflection and exploration’ (Wenger 1998:238). Alignment can be supported by ‘leadership, coordination, information transmission and such things as contracts, due process and policy’ (Wenger 1998:238) We contend that NorthLink/NIETL and the NACC, provided this ‘soft infrastructure’ by utilising their local knowledge, position and networks to initiate projects, recruit partners, manage implementation and provide administrative support (See Table 1).

Projects grew out of spaces created by the lead organisations to generate interest and recruit potential partners in the regional economic development program. They supported imagination through research projects intended to identify opportunities and challenges in the region, solve problems and adapt to changes. They supported alignment through a shared model for projects aligned to their economic development plan. They also played an important brokering role by developing proposals, drawing up legal contracts and

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accepting and managing funds on behalf of other locally embedded actors. They produced publications to communicate project activity and to demonstrate capability in the region. These local actions allowed for cooperation at different levels and degrees and supported the collaborative exploration and ‘envisioning possible futures’ by local government agencies, education institutions, industry representatives and community groups in the region.

Table I. Infrastructures of learning

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Definition</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>- Physical and virtual spaces</td>
<td>- Public forums and open meetings engaging mixed audiences and targeted stakeholders e.g. networks across sectors</td>
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<td></td>
<td>- Joint tasks</td>
<td>- Forums/meetings organised with different stakeholders at venues throughout the region</td>
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<td></td>
<td>- Availability of help</td>
<td>- Working groups/meetings with meeting spaces, administrative support organised</td>
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<td></td>
<td>- Boundary encounters: ways of belonging to different degrees, e.g. casual encounters</td>
<td>- Options to participate in project working groups, management committees, forums, events or other general network activities</td>
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<tr>
<td></td>
<td>- Problems that engage energy, creativity and inventiveness,</td>
<td>- Professional development and training</td>
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<td></td>
<td>- Reflective</td>
<td>- Induction of new members</td>
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<td></td>
<td>- Repositories of information, documentation</td>
<td>- Current issues presented to local stakeholders</td>
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<tr>
<td></td>
<td></td>
<td>- Issues researched and documented with attention to local data and impact</td>
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<tr>
<td></td>
<td></td>
<td>- Presentation of government policy, background materials by relevant stakeholders</td>
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<tr>
<td></td>
<td></td>
<td>- Media and communications strategies</td>
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<td></td>
<td></td>
<td>- Regional Strategic Plans</td>
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<td></td>
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<td>- Regional publications</td>
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<td></td>
<td></td>
<td>- Contacts databases</td>
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<td></td>
<td></td>
<td>- Conference papers, presentations, launches, events</td>
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<td></td>
<td></td>
<td>- Outcomes from projects, e.g. common exit form for early school leavers</td>
</tr>
<tr>
<td>Imagination</td>
<td>- Location in space, time</td>
<td>- Policy context of Australia and Victoria</td>
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<td></td>
<td>- Reflection</td>
<td>- Regional data and local level statistics</td>
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<td></td>
<td>- Exploration</td>
<td>- Mindful of stakeholder organisational planning and operational cycles, e.g. school year/financial year</td>
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<td></td>
<td></td>
<td>- History of action documented, explained and celebrated</td>
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<td></td>
<td></td>
<td>- Discussion of issues to develop new projects</td>
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<td></td>
<td></td>
<td>- Events to mark success or new activity</td>
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<tr>
<td></td>
<td></td>
<td>- Strategic planning through working groups and project teams</td>
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<td></td>
<td></td>
<td>- Expos, breakfasts, tours, events with speakers</td>
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<tr>
<td>Alignment</td>
<td>- Common focus</td>
<td>- Leadership in context of regional development</td>
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<td></td>
<td>- Leadership</td>
<td>- Engagement of stakeholders and project champions</td>
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<td></td>
<td>- Sources of inspiration</td>
<td>- Distributed leadership by supporting project champions</td>
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<td></td>
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<td>- Cross representation on boards</td>
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<tr>
<td>Infrastructure</td>
<td>Definition</td>
<td>Examples</td>
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<td>---------------</td>
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<td>--------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td>- Standards and methods</td>
<td>- Management of stakeholders and partnerships</td>
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<td></td>
<td>- Processes, plans</td>
<td>- Explicit model for projects and project management</td>
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<td></td>
<td>- Communication</td>
<td>- Strategic plans, project work plans</td>
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<td></td>
<td>- Brokers</td>
<td>- Local media, PR, presentations</td>
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<td></td>
<td></td>
<td>- Cross network support and activities</td>
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<td></td>
<td>- Policies, contracts, due processes</td>
<td>- Formal roles established in projects</td>
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<td></td>
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<td>- Meeting minutes</td>
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<td></td>
<td></td>
<td>- Contracts with funding bodies,</td>
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<td></td>
<td></td>
<td>- Financial and other administrative relationships</td>
</tr>
</tbody>
</table>

6 Envisioning infrastructures of learning

The centrality of NORTHLink/NIETL and the NACC in supporting the infrastructures of learning in Melbourne’s North was a key finding of our study. The education institutions also played a significant role, as is well documented in much research on knowledge-based urban development. Different roles however, highlight the need for practical tools to assist community leaders and policymakers in the identification of local focal points for learning to prevent insufficient support and/or duplication, particularly by state and federal governments when it comes to policy and program planning and development.

One such tool that could be useful in this context is a software program developed by the Amsterdam-based Govcom.org Foundation, called the ‘IssueCrawler’, which locates and visualises networks on the Web (http://www.issuecrawler.net). The application was originally designed to assist NGOs to identify networks of organisations that aggregate around a particular policy issue. It offers numerous relevant functions for community leaders and policymakers to plan Knowledge Cities based around existing efforts to support learning in localised settings, including the ability to identify a specific organisation’s overall network, its centrality within a particular network, or the cluster it finds itself in. It can also show how a particular network has evolved over time, which groups have become more central and which less so, and whether the network has shifted geographically and/or in terms of focus.

The IssueCrawler is a much more powerful tool than conventional ‘cluster mapping’ programs, which map spatial agglomerations of interconnected firms, universities and R&D establishments that arise out of linkages across industries, using employment statics from relevant public agencies (See the European Cluster Observatory of the Stockholm School of Economics: http://www.clusterobservatory.eu; and the Cluster Mapping Project of Harvard Business School: http://data.isc.hbs.edu/cmp-nj/index.jsp). It communicates relationships between interconnected organisations by visualising hyperlinks from specified organisations’ websites. Theoretically, it could enable the visualisation of organisations with links to the 2009 economic development plan, ‘Melbourne’s North – the New Knowledge Economy’. However, NORTHLink/NIETL and the NACC made poor use of the Web to demonstrate the capability of the region, and the report is not posted on any site where it would be possible to track these connections.

Interestingly, from a starting point of NorthLink/NIETL and the NACC, the IssueCrawler produces a network map of government sites (See Figure 2). The map thus depicts funding and information sources as the prominent network nodes in Melbourne’s North, as organisations are sorted by the popularity of their websites. This may simply
confirm the fact that many of the organisations in the region are regular seekers of funds and information from government, and possibly, given that the search was initiated from NorthLink/NIETL and the NACC, that these organisations have supported the effective leveraging of government programs by local industry. It is of course a significant finding that neither the NACC nor NorthLINK NIETL appear in the IssueCrawler map despite their central role in supporting learning in Melbourne’s North, often independently of government funding. It lends further weight to our finding that the Learning Network category of the learning region was decidedly local and spatially bounded.

![Inter-organisational networks in Melbourne’s north](image)

**Figure 2.** Inter-organisational networks in Melbourne’s north


7 Conclusion

Building on the work of the CRITICAL project, this paper has outlined a conceptual toolkit to support understanding and offer assistance to community leaders and policymakers to plan Knowledge Cities based around existing efforts to support learning in localised settings. The toolkit relies on ‘communities of practice’ to conceptualise and analyse learning in localised settings, which can take a variety of forms. In our study of the northern metropolitan region of Melbourne, communities of practice were most often found among project partners in the regional economic development program of NorthLink/NEITL and the NACC. The next element of the toolkit is a conceptual framework developed by Charles (2006), which facilitates the categorisation of project activity in terms of its contribution to learning. In our case study, this analysis revealed that there can be significant local action that contributes to the broader goals of
Knowledge Cities, which leverages but is not entirely dependent on external support, which was lacking in some areas. The final element of the toolkit includes the facilities of engagement, imagination and alignment conceptualised by Wenger. In our case study, this theory assisted in the identification of NorthLink/NEITL and the NACC as the principal bridge builders between different categories of learning in Melbourne’s North.

NorthLink/NEITL and the NACC engaged locally embedded actors from different organisations and sectors, encouraged them to imagine possible futures, and aligned their perspectives and actions with a shared repertoire of tools, processes and documents, including an economic development plan. The centrality of their role underscores the need for greater understanding of how locally-embedded actors are linking and coordinating their activities to learn and adapt to change in order to ensure that future policies and programs better address local needs and leverage local knowledge. Education institutions clearly make an important contribution to this effort, but our analysis suggests that R&D support should be closely examined and not assumed. In highlighting network-mapping software, we sought to offer an efficient way of identifying local focal points for learning, but effectiveness depends on Web presence. This raises interesting questions for policy and program planning and development in terms of how learning is fostered and knowledge is shared and disseminated in localised settings. While much of the research on knowledge-based urban development explores these questions in iconic ‘Knowledge Cities’, which are naturally complex and differ greatly, a great depth of knowledge is required to understand learning even in small localised areas of cities, as was demonstrated in this paper.

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Knowledge in the city: yours, mine – ours. Museum Victoria and the role of creative cultural infrastructure in the life of Melbourne, knowledge city

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Structured Abstract

Purpose - The purpose of the paper is to discuss ways in which museums and other cultural organisations have a key role to play in developing and enhancing the Knowledge City, illustrating this with particular reference to Museum Victoria, Australia’s largest public museum organisation.

Design / methodology / approach - The history of Museum Victoria in the life of Melbourne is illustrative of the key role cultural institutions can and do play in supporting learning, knowledge and civic pride among the citizens of the Knowledge City.

A large and multi-faceted museum such as Museum Victoria, which comprises three very different museums (Immigration Museum, Melbourne Museum and Scienceworks), Melbourne’s IMAX Theatre and the World Heritage-listed Royal Exhibition Building, does this in many ways. The paper discusses the contribution made through formal partnerships with other knowledge institutions; strong relationships with government stakeholders; accessibility to a broad range of the citizens of Melbourne, a Knowledge City; engagement with Melbourne’s diverse community; caring for heritage and stories which contribute to and nurture shared identity through knowledge / learning; and maintaining iconic buildings which make a statement and generate civic pride.

Originality / value - Museum Victoria’s institutional networked model is unique in Australasia and unusual across the world. Its burgeoning role in the life of Melbourne, the State of Victoria and nationally bears witness to the value of the constant reinvigoration of this cultural organisation within a city which, as with cities the world over, is in an unceasing state of flux, transformation and reinvention.

Much of the discussion of the ‘Knowledge Cities’ concept covers, appropriately, knowledge industries, knowledge management and the formal education sector. This paper extends that discussion to encompass the city’s cultural life and consider its importance in opening opportunities for Melbourne’s citizens and visitors alike to participate in the development of knowledge, collectively and individually.

Practical implications - A number of thinkers have contributed to the public discourse on the place of cultural organisations in the Knowledge City, among them Yigitcanlar, O’Connor and Westerman (2008) and Dvir (2004, 2005). This paper contributes a practitioner’s perspective with a view to increasing understanding of the breadth of the
role of contemporary, creative cultural institutions such as Museum Victoria and of the factors which support its contribution to Melbourne, Knowledge City.

Keywords - museums, social media, creativity, learning communities, culture

Paper type - Practical Paper

1 Introduction

Melbourne, the city we experience today, was built on gold. Not long after the 1837 official foundation of the port settlement, gold was discovered inland in 1851. At the height of the gold rush which followed, Melbourne was among the world’s richest cities.

It was also in 1851 that the Colony of Victoria separated from the Colony of New South Wales. The new self-governing colony’s extraordinary wealth enabled the establishment of world-class knowledge institutions, viewed as an essential part of a civilised society. A number of these institutions trace their foundations to an extraordinary decade: the 1850s. These institutions expressed the strong commitment of the governing fathers of this new colony to education for all. Not, it must be said, solely ‘education for education’s sake’ but as a means of engendering civic pride, attempting to tame the extremes of a frontier colony and contain the upheaval of rapid expansion engendered by the arrival of gold-seekers from all over the world. Whatever the mix of motivations, it is remarkable that within five years of its establishment as Victoria’s capital city, Melbourne boasted a Museum of Natural History (predecessor of Museum Victoria), a free public library: the Melbourne Public Library, now the State Library of Victoria, a university (the University of Melbourne) and a significant daily newspaper, The Age. Perhaps just as remarkably, each of these institutions remains in existence today.

In voting to establish a museum of natural history, the new Colony’s parliament recorded the benefits to the world of science of increasing ‘public knowledge on a question in which the whole civilised world was interested by collecting together facts and illustrations connected with the natural history of this colony’. The Museum of Natural History opened in March 1854 and its first director, Professor Frederick McCoy stated that ‘under proper direction, and as managed in modern times, museums become the most ready and effectual means of communicating knowledge and practical experience’.

Today, Melbourne is the home of a family of museums which comprise Australia’s largest museum organisation, Museum Victoria - the contemporary manifestation of and successor to this 1854 Museum of Natural History. Occupying landmark buildings: Scienceworks in Melbourne’s West, an Immigration Museum in the central business district and the iconic Melbourne Museum located in the World Heritage-listed Carlton Gardens, the museums intersect uniquely with adults and families from the general community, student groups, universities and all levels of government. Museum Victoria undertakes high-quality research on historical and contemporary issues in the fields of science, history and technology, and indigeneous cultures. This research, based on a collection of more than 16 million objects, informs the presentation of award-winning exhibitions and innovative programs. Throughout the 2009-10 fiscal year Museum Victoria’s three Melbourne-based museums welcomed 1,738,527 visitors.1

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1 A Day in Pompeii (Melbourne Museum), Star Wars: Science meets Imagination (Scienceworks), Salvador Dali: Liquid Desire (National Gallery of Victoria), John Brack (National Gallery of Victoria).
2 Cultural institutions and the Knowledge City concept

In their discussion of the principles underpinning a knowledge city and in its portrayal of distinguishing characteristics and processes, Yigitcanlar, O’Connor and Westerman (2008) use Melbourne to illustrate their case. They note that it is “recognised that Melbourne has a strong economic and cultural foundation from which knowledge and creativity may be generated” and explore whether developing a knowledge city occurs when a city is *reshaped* into a knowledge centre or whether it is part of the “continuing organic growth of the city”.

In their summary review of the literature about the knowledge city concept, Yigitcanlar et al. (2008) provide the example of Barcelona City and its 2003 ‘Strategic Plan of the Cultural Sector’. “The city embraces diversity and culture to provide civic spaces for activities of the community collectiveness and associations and that foster face-to-face relations. (p.64)” In describing the implementation of knowledge city elements and factors in Melbourne, the authors include government policies which drive innovation and creativity, acknowledge the role of special events and identify significant and substantial cultural and creative infrastructure investments of the last decade. Melbourne’s status as the multicultural heart of Australia is also noted, and it is no accident that one of the world’s handful of museums dedicated to the theme of immigration is located in central Melbourne.

In 2009, four significant exhibitions showed concurrently across the Melbourne’s public museums and art galleries with total attendance around 955,000, a striking number in a city with a population of 4 million that demonstrates a great appetite for culture as part of the lived experience of citizens. The role of special events in this success demonstrates the value of the *Melbourne Winter Masterpiece* brand which supports the hosting of major exhibitions such as *A Day in Pompeii* (Melbourne Museum, 2009, attracted 332,679 visitors) and a forthcoming ancient civilisations blockbuster exhibition to be held in 2011.

The role of museums and like cultural institutions in Knowledge Cities is multifaceted. Museums encapsulate and offer time, place, community, learning and urban identity, hold knowledge and identity, tell stories, share learning, innovate and create, offer safe and accessible places, care for iconic buildings which signify place and provide spaces described by Gurian (2006) as “congregant spaces. (p.90)” in which citizens can interact (whether independently or cooperatively) in safe, respectful places which foster a sense of responsibility to a collective whole and toward individual strangers and which serve as a ‘town square’, providing a ‘fitting safe place for the discussion of unsafe ideas’.

3 Museum Victoria in this Knowledge City

Writers and thinkers on the knowledge city concept and the development of knowledge cities identify a number of key factors which have a bearing on the contribution of museums and cultural institutions. These are referenced both implicitly and explicitly in my discussion of the ways in which Museum Victoria develops and enhances the Knowledge City. Let me set the scene with the Statement of Purpose of Museum Victoria’s Strategic Plan 2008-2013 (Museum Victoria, 2008):

“We will reach out to an increasingly diverse audience through our collection and associated knowledge, using innovative programs that engage and fascinate. We will contribute to our communities’ understanding of the world...We will shape the future as a networked museum that fosters creativity. (p.1)”

Strategic directions propel us to deliver Great Places and Spaces, Research and Collections: Knowledge and Connections, Inspiring Experiences: Engagement and
Learning, Innovative People: Creative Museum, Visibility and Reputation and Environmental Responsibility. As an exemplar of the participants/co-creators/hosts of Dvir’s (2005) ‘Knowledge Moments’ in a hypothetical Knowledge City, or indeed an ‘urban innovation engine’, Museum Victoria engages with the city and its multifaceted knowledge creation and development in a number of ways.

Dvir (2005) explores the personal experience of and benefits to a citizen in a Knowledge City and relates the concept to daily life in his work analysing the Knowledge City from an individual perspective. He frames the Knowledge City as “a milieu which triggers and enables an intensive, ongoing, rich, diverse and complex flow of Knowledge Moments (p.2)”. Each of these Moments is “a conversation between people in a particular place, using structured or unstructured processes aimed at explicit or implicit purpose”. Dvir suggests that a Knowledge City actively engages with its institutions to transform them into “knowledge creation places (p.2)”.

Museum Victoria, along with other lively and distinctive Melbourne cultural organisations such as the Australian Centre for the Moving Image, the State Library of Victoria and the National Gallery of Victoria occupy the transformative space which enables the creativity, the connection, the exploration and engagement of Knowledge Moments in those who come into contact with them. This includes, increasingly, the online world where social networking is providing ever-expanding opportunities for the community to make contact and to generate Knowledge Moments. In 2009-10, the 110,000 pages of Museum Victoria’s websites were visited 8,654,273 times, and a video of a Museum Victoria marine scientists’ discovery of a coconut-carrying octopus was viewed 1,184,012 times. A recent count showed that Phar Lap, Australia’s most famous racehorse, had 4,887 friends on Facebook with another 1,431 on the waiting list.

4 Collaborative Partnerships

Museum Victoria is involved in many strong relationships, both formal and informal, with public, private, philanthropic, academic and community partners (see appendix). Formal partnerships with knowledge institutions such as research relationships with universities exemplify a commitment to pursuing collaborative partnerships that advance knowledge and support innovation in established and emerging areas of research and collecting. Museum Victoria is currently involved as a partner in 11 Australian Research Council Linkage Grants. These cover subject matter as diverse as the evolution of Australia’s biodiversity during the Mesozoic; period and adaptations to climatic change during the Age of Dinosaurs; research into narrative forms of museological data and presentation of information using interactive technology; and development of a database of anthropological collections from some 30 Australian and overseas institutions, providing new perspectives on Aboriginal society in Central Australia.

Partnerships with agencies working to enhance Victoria’s social inclusion and community wellbeing support and enhance Melbourne’s strengths as a multicultural, inclusive city – one of the characteristics noted in the literature as key in the development of Knowledge Cities. This work can be seen through partnerships in the project Talking Faiths, a collaborative project that supports intercultural and interfaith dialogue in communities and schools, using migration stories as bridges to increase interest and understanding; and Talking Difference, an online media project designed to facilitate dialogue about cultural difference and to promote diversity. An ‘Active Minds’ program provides financial and program support for school-aged students and their families to visit our museums.
5 A Museum for all Victorians

Museum Victoria aspires to be a museum of which all Victorians can be proud, to engage all Victorians by providing a program of innovative exhibitions, online experiences and stimulating programs at our venues and throughout the State, thereby increasing the community’s understanding of Victoria’s place in the world. Our museums are proudly in the public domain, accessible to a broad range of the citizens of a Knowledge City such as Melbourne. Adults and children visit in groups, often as families – a visitor survey earlier in 2010 found that 80% of visitors made their museum visit in a group. A third of the visitors surveyed were in an intergenerational group comprising adults and children, sharing an informal learning experience in a safe place, receiving and offering ideas as participants in public discourse. Others visit in students groups to engage with curricula-related exhibitions and programs in a supportive informal environment. Through funding partnerships (see Appendix), events hosted at museum venues and engagement with museums to support delivery of shared objectives, representatives of all levels of government participate in museum activities and services.

6 Museums as learning places in the Knowledge City

Dvir’s ‘Knowledge Moments’ engender learning, through which knowledge builds in an individual. ‘Learning’ describes the accumulation of understanding and inspiration arising from the dimensions of place, process, people and implicit or explicit purpose. Learning plays such an integral role in the expectation and experience of our visitors that, in carrying out audience research, we no longer ask whether they came to our museums expecting to learn something – this is so obvious to our visitors that the question has little meaning to them, and certainly no differential value to the museum in understanding motivations and expectations. This does not prevent us, however, from evaluating how effectively we are supporting lifelong learning among our visitors.

To provide just one example, an exhibition at Melbourne Museum The Mind: Enter the Labyrinth, explores the workings of the human mind by entering a world of emotions, thoughts, memories and dreams, encouraging the visitor to step into the shoes of those that see the world from different perspectives, question their attitudes to normality and discover the ways in which drugs and disorders affect our minds. The exhibition opened in 2007 and in line with standard practice was evaluated shortly after. The results demonstrate just how embedded learning is in the museum visitor experience. The following responses are to an open-ended question asked of visitors to The Mind exhibition:

<table>
<thead>
<tr>
<th>As a result of my visit to The Mind Exhibition</th>
<th>agree</th>
<th>disagree</th>
<th>can’t say</th>
</tr>
</thead>
<tbody>
<tr>
<td>I learnt about new things today</td>
<td>90%</td>
<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>I learnt more about things I already knew</td>
<td>89%</td>
<td>10%</td>
<td>1%</td>
</tr>
<tr>
<td>I am now curious to find out more</td>
<td>62%</td>
<td>31%</td>
<td>7%</td>
</tr>
<tr>
<td>I enjoyed what I learnt today</td>
<td>97%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>what I saw today made me remember things I knew</td>
<td>79%</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>I was made to think of the importance of the mind</td>
<td>90%</td>
<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>I will share what I learnt today with others</td>
<td>82%</td>
<td>15%</td>
<td>3%</td>
</tr>
<tr>
<td>I know that what I learnt today will be useful to me</td>
<td>77%</td>
<td>18%</td>
<td>5%</td>
</tr>
<tr>
<td>I understand things from a different or new perspective</td>
<td>77%</td>
<td>21%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Key messages identified in planning the exhibition were:
- We are always learning new things about our incredibly complex brain and mind.
- Mental health conditions can touch everybody.
- We can make choices that directly affect our mental health.

The evaluation shows a strong correlation with these learning objectives, indicating that the informal learning and knowledge-building opportunity provided to visitors works very effectively.

Visits to museums have long been included in the excursion activities of schools. Effective advocacy on the part of the cultural sector has achieved increasing recognition of the importance of learning experiences outside kindergartens, schools and tertiary institutions. For example, the November 2009 Victorian Early Years Learning and Development Framework (Department of Education and Early Childhood, 2010) advances all children’s learning and development from birth to eight years. The important role of the cultural sector is acknowledged with the inclusion of cultural organisations (including libraries, museums, botanic gardens, galleries and zoos) as early childhood services supporting learning and development. Further, among the ‘early childhood professional roles’ are

“Cultural organisations such as libraries, museums, zoos, galleries and botanic gardens employ early childhood professionals to design and deliver programs to support learning and development for children and families. Early childhood services and schools work with cultural organisations through on-site, online and outreach programs (p. 41)”.

Museum Victoria’s impressive record in attracting students and teachers to curriculum-related programs and exhibitions shows an increasing level of engagement with this key learning audience. In 2009-10 a remarkable 414,390 education visits were made to Museum Victoria venues. In addition, teacher development activities and online projects such as a Biodiversity Snapshots Web 2.0 mobile technologies project enhanced the role played by Museum Victoria in the education sector. Among the critical success factors in building broad and deep connections with school audiences are:

- strong links between Museum Victoria’s knowledge base, based on the collection and extensive, expert research in the key areas of curatorial focus (natural history, history and technology and indigenous cultures), and the Victorian curriculum;
- skilled Museum staff who are actively engaged in building and maintaining strong relationships with individual teachers and teacher professional organisations; and
- a focus on provision of excellent customer service to teachers and their students, developed from understanding needs and expectations as derived from research of this audience group.

7 Engaging with Diversity

Museum Victoria presents a wide range of programs and activities which engage with a diverse community. Victoria is a place of significant cultural diversity, at the time of the most recent census (2006) 24% of Victorians were born overseas in more than 230 countries; current estimates are that more than 130 languages are spoken within the community. Melbourne’s internationally-respected Immigration Museum, one of a
handful of such museums in the world, tells the stories of individual experiences of immigration. These offer powerful narratives which engage visitors and deliver on the essence of the Immigration Museum: Moving Stories. Bunjilaka, Victoria’s Aboriginal Cultural Centre at Melbourne Museum, was planned in collaboration with Aboriginal people including the traditional owners of Melbourne. Bunjilaka is a focal point for the presentation and celebration of Aboriginal culture and its survival. Aboriginal people are not passively represented within the museum, rather they are actively involved in the telling of their stories.

In support of its commitment to broad access and effective delivery of activities and programs to the diverse communities of Melbourne and of Victoria, Museum Victoria developed a Community Engagement Framework in 2009. This Framework sets out the Museum’s commitment to ensuring that the greatest number of people is able to access its knowledge, resources and experiences. It makes visible the Museum’s multifaceted community engagement activities that occur across the whole organisation – from research to collection development, exhibitions and programs.

**Museum Victoria’s Framework of Engagement**

In a variation on the ‘knowledge triangle’ which depicts the interaction between research, innovation and education as primary drivers of a knowledge-based society, Museum Victoria developed its Framework of Engagement to illustrate its multilayered approach to community engagement occurring across the organisation:

The ‘engagement triangle’ depicts engagement on two dimensions: breadth (number of people involved) and depth (level of personal participation or engagement). At the top of the inverted triangle sits the broad community, for example the people of Victoria; at a more deeply engaged level are specific communities, that is any group of individuals with a common cultural background, language, religion, special interest, place or issue eg. low income.

In all its public-facing operations, Museum Victoria addresses community engagement activities.

- Reputation: communication and public relations with local and global community
- Visitation: local and global visitors to our museums, website and outreach programs
- Participation: partnerships with specific local communities
- Co-authorship and co-management: partnerships with specific local communities that involve shared authorship or management of a project.
Specific communities with which Museum Victoria works are identified through corporate planning processes. The following brief description of some of these activities is illustrative of the nature and range of partnerships with communities which build knowledge, connections and understanding:

7.1 Culturally and linguistically diverse (CALD) communities

The Community Connections program of exhibitions and cultural festivals at the Immigration Museum targets culturally and linguistically diverse communities, many reaching into the ‘co-curation’ dimension of deep engagement. Museum staff work with a self-selected community to showcase their stories, re-connecting community members with their cultural heritage and forging powerful new links within communities. Community festivals celebrate cultural diversity both for both the host and the broader community, engendering a sense of pride and inclusion.

7.2 Disadvantaged communities

Disadvantage in Victoria occurs for a range of reasons. The Australian Government’s Social Inclusion Board’s identified the genesis of social exclusion and disadvantage when people are lacking in resources, opportunities and/or capabilities such that they are unable to participate in learning, working or engaging activities and are unable to influence the decisions affecting them.

There are a number of ways in which Museum Victoria supports access to learning, employment and engagement opportunities for those who face barriers to participation through social disadvantage. This occurs at the fundamental level of removing financial barriers to visiting museums, as entry is free for children and concession card holders and an Active Minds program facilitates school visits from disadvantaged communities to Museum venues. A 450-person strong volunteer program engages a wide range of community members across all Museum Victoria’s front and back-of-house activities; this and targeted vocational education programs support pre-employment development.

As the State’s museum, Museum Victoria engages people living regionally as well as in the capital city. Museum Victoria’s Discovery Program, a mobile outreach and kit loan service, provides access to the Museum’s collection for people who may find it difficult to visit our museums for reasons that include age, geographical distance and imprisonment.

7.3 Indigenous communities

Bunjilaka, the Aboriginal Centre at Melbourne Museum, empowers Aboriginal people to interpret their own cultural heritage for both Indigenous and non-Indigenous people. A redevelopment of the main long term exhibition within Bunjilaka is currently in preparation and entails an extensive, reiterative consultation process with Aboriginal communities across Victoria and throughout metropolitan Melbourne. This work is complemented by other developments in the areas of cultural heritage agreements, repatriation, targeted education programs working with both Koorie and non-Aboriginal students, and employment.

7.4 People with a disability

As a key cultural agency of the State, Museum Victoria plays an important role in providing access and reducing barriers to people with a disability. For example, all exhibition designs are audited to ensure accessibility for all abilities, including aspects
such as tests of label legibility, use of captioned videos and well laid-out spaces supporting the use of mobility aids. As the fully accessible venue for The Other Film Festival, Melbourne Museum supports a unique program which showcases the best of contemporary cinema exploring the experiences of people with a disability.

8 Conclusion

In speaking of the significance of creativity and cultural infrastructure in the Knowledge City, Yigitcanlar et al. (2008) refer to development policies designed to attract investment and encourage economic growth. The authors note that these policies focus primarily on “creating a high level of social amenity and development of communities and consider creativity and culture as the providers of dynamic socio-cultural activities and infrastructure”. Fostering creative energy and drawing in innovative knowledge workers is associated with cultural elements of the city. While strategic planning frameworks guided Melbourne’s emergence as a Knowledge City, the strong contribution made by its economic and cultural foundations have also been critical.

Museum Victoria, a large networked public museum organisation, is unique in Australasia and unusual across the world. Established in the earliest days of white settlement, its burgeoning role in the life of Melbourne, the State of Victoria and nationally bears witness to the value of the constant reinvigoration of a cultural organisation within a city which, as with cities the world over, is in an unceasing state of flux, transformation and reinvention.

Throughout this paper, discussion of the ‘Knowledge Cities’ concept has been instrumental in considering the city’s cultural life and its importance in providing opportunities for Melbourne’s citizens and visitors alike to participate in the development of knowledge, collectively and individually. The practitioner’s perspective offered by this paper aims to contribute to the public discourse on the place of cultural organisations in the Knowledge City and achieve an increased understanding of the breadth of the role of contemporary, creative cultural institutions such as Museum Victoria and the factors which support its contribution to Melbourne, Knowledge City.

References


References

Appendix

**ANNUAL REPORT 2009-2010**

**SUPPORTERS**

Museum Victoria undertakes various corporate and philanthropic partnerships. These partnerships greatly contribute towards the ongoing growth of Museum Victoria.

**Partners**

- 774 ABC Radio
- Agility Management Pty Ltd
- AGL Energy Ltd
- Arts Queensland
- Arts Victoria
- Australia Council for the Arts
- Australian Academy of Technological Sciences and Engineering
- Australian Multicultural Foundation
- Avant Card
- BASF
- BP Oil Australia Limited
- BOSE
- Catholic Education Office
- Channel Seven Melbourne
- City of Melbourne
- City of Milan
- City University of Hong Kong
- City West Water
- Clear Design
- Commonwealth Bank Group
- Community Support Fund
- Consumer Affairs Victoria
- Connex Melbourne
- Dame Elisabeth Murdoch AC DBE
- Department of Education and Early Childhood Development
- Department of Education, Employment and Workplace Relations
- Department of Innovation, Industry and Regional Development
- Department of Innovation, Industry, Science and Research
- Department of Planning and Community Development
- Department of the Environment, Water, Heritage and the Arts
- Destination Melbourne
- Dow Chemicals
- Environment Protection Authority
- French Teachers Association of Victoria
- Game Audio Australia
- Grossi Florentino
- Hobsons Bay City Council
- Herald and Weekly Times
- Heritage Victoria
Ilbijerri Aboriginal Theatre Company
JCDexaux
Macedon Ranges Inc
Melbourne Airport
Melbourne Metropolitan Waste Management Group
Melbourne Port Corporation
Melbourne’s Child
Metlink Victoria Pty Ltd
Mobil Oil Australia Pty Ltd
Mr Richard and Mrs Catherine Price
National Geographic Channel
National Science Week Coordinating Committee (VIC)
Nestle Peters Ice Cream
Network Ten
Palace Cinemas
Peter Rowland Catering
Playgroup Victoria
Prime Media Group Limited
Qantas Airways
Redtribe
Rugs Carpets By Design
San Diego - Visual Arts
Schweppes Australia Pty Ltd
Science in Public
Singapore Airlines
Sofitel Melbourne on Collins
SPI AusNet
State Government of Victoria
Sustainability Victoria
Tattersall’s
The Age
The Curriculum Corporation
The Grollo Family
The Harold Mitchell Foundation
The Ian Potter Foundation
The Jack Brockhoff Foundation
The Myer Foundation
The Onbass Foundation
The Sidney Myer Fund
The University of Melbourne
Tourism Victoria
University of California
VicHealth
Victorian Managed Insurance Fund
Victoria University
Victorian Multicultural Commission
Vline Passenger Pty Ltd
Yarra Trams
Yulgilbar Foundation
Zero One Animation
ZKM Centre for Art and Media

Research Supporters
Museum Victoria undertakes an extensive research program with generous support from various funding organisations:
Aboriginal Affairs Victoria
Arthur Rylah Institute for Environmental Research
Arts Victoria
Atlas of Living Australia
Australian Academy of Science
Australian Antarctic Division
Australian Biological Resources Study
Australian Institute of Aboriginal and Torres Strait Islander Studies
Australian National University
Australian Research Council
Census of Marine Life
Commonwealth Environment Research Facilities Program
Cooperative Research Centre for National Plant Biosecurity
CSIRO Entomology
CSIRO Marine and Atmospheric Research
Department of Agriculture, Fisheries and Forestry
Department of Employment, Economic Development and Innovation, Queensland
Department of the Environment, Water, Heritage and the Arts
Department of Primary Industries and Fisheries, Queensland
Department of Sustainability and Environment, Victoria
Field Naturalists Club of Victoria
Freemasons Victoria
Geological Society of Victoria
Harold Mitchell Foundation
Hugh Williamson Foundation
iCinema Centre – UNSW
International Council of Museums (ICOM) Australia
Kodak (Australasia) Pty Ltd
La Trobe University
Monash University
National Cultural Heritage Account
National Science Foundation
Natural Heritage Trust
Noble Numismatics Pty Ltd
Ocean Biogeographic Information System
Parks Victoria
Perpetual Trustees
Plant Health Australia
Product Integrity, Animal and Plant Health Division (DAFF)
Queensland University of Technology
RMIT University
The Australia Council
The Australian Centre, University of Melbourne
The Baker Foundation
The Hermon Slade Foundation
The Ian Potter Foundation
The Ian Potter Museum of Art at the University of Melbourne
The Menzies Foundation
The Miegunyah Press
The Myer Foundation
The Russell and Mab Grimwade Miegunyah Fund Committee
The Twycross Family
The University of Melbourne
University of New South Wales
University of Queensland
Victorian Managed Insurance Authority
Victorian National Parks Association
Women on Farms Gathering Heritage Group
Global commodity chains and the development of employment nodes and corridors in western Melbourne

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Abstract
Cites in advanced economies have been transformed by the substitution of locally produced for imported goods supported by knowledge intensive logistics services. Using the framework largely provided by the Global Commodity Chain paradigm, this paper examines the formation of employment nodes in manufacturing and transport sectors in the Western Region of Melbourne and by analysing journey to work data of travel between the nodes, it seeks to measure the extent to which employment corridors have been formed to link these nodes. While the dynamics of the nodes provides evidence of the substitution of a buyer driven transport commodity chain for a producer driven manufacturing commodity chain, the analysis suggests that an employment corridor making use of the Western Ring Road has yet to form. In doing so it contributes to the definition of the concept of an employment corridor.

Keywords – regional economics, employment corridors, global commodity chains

1 Introduction
This paper examines the development of employment nodes in the manufacturing and transport sectors in the Western Region of Melbourne and the extent to which employment corridors have been formed to link these nodes. It uses the journey to work data to examine the origin and destination of travel between the nodes. Transport hubs have formed at the intersection of major freeway links and adjacent to the principal metropolitan air and sea port substituting for some of the activities performed by the manufacturing sector at these locations. In doing so it documents the manner in which a large region within a major Australian city has been transformed by the substitution of locally based manufacturing by globally produced imported products which form part of a global supply chain supported by knowledge intensive logistics services.

By a relatively small and narrowing margin, Melbourne is Australia’s second largest city behind Sydney. Although the similarities between the two cities are greater than their differences, historically Melbourne has been Australia’s major manufacturing centre. It is also situated at the head of a rich agricultural hinterland and together these factors help explain why the Port Melbourne is Australia’s largest container port with 38% of the
traffic and the Melbourne Airport handles 30% of Australia’s air freight. While both these key transport facilities lie just outside the boundaries of the Western Region of Melbourne, as they are usually drawn, their proximity has a major bearing on economic activities within the region. The Western Region has traditionally been Melbourne’s principal manufacturing region so the movement of goods to and from the ports has always been an important regional activity. However the historical radial road and rail transport network has been overlaid with a cross connecting freeway system that provides rapid circular access through the Region at a distance of about 15 kilometres from the CBD, linking the two ports by a fast urban freeway. As a consequence the region has become a favoured location for distribution centres operated by the major consumer product chains as well as the major transport companies.

A number of employment nodes in or directly contiguous with the Western Region have become established. There are three with concentrations of transport and storage jobs – the Port of Melbourne, Melbourne Airport, both just outside the Region, and a wholesale and distribution centre straddling the junction of the Princes Freeway and the Western Ring Road. This latter area is also the centre of a high concentration of manufacturing jobs, as is an area in Hume to the north and immediately adjacent to the Western Region. The freeway system links the various manufacturing and transport nodes described above. This paper discusses the extent to which a spatial labour market is being created in the form of an employment corridor associated with access to the employment nodes via the freeway system.

These nodes and their inter connections form a small part of a much larger global network of trade and information flows. Globalisation has impacted on the two sectors, manufacturing and transport differentially. Manufacturing in the region has been adversely affected by the integration of Australian production centres in the global pattern of manufacturing now dominated by China and other Asian countries. On the other hand employment in the transport sector has been the beneficiary, both of the substitution of domestically produced goods for imported and locally assembled final products, and the application of information technology to the control and monitoring of the movement of goods. These technical advances in logistics have encouraged the development of large-scale centralised distribution centres. This transformation then forms part of the rise of Melbourne as a knowledge city and its decline as Australia’s major manufacturing centre.

These trends are informed by two apparently competing paradigms seeking to analyse transnational spatial relations, global commodity chains global (GCCs) and the World City Network (WCN) (Derudder and Witlox 2010). The GCC (Gereffi and Korzeniewicz 1994) literature and related concepts of global value chains (GVCs) (Gereffi et al 2005) and Global Production Networks (GPNs) (Coe et al 2004) which analyse the production, distribution and consumption of material goods has the greatest application to this analysis of employment nodes and corridors. The distinction between production and buyer-driven commodity chains (Gereffi1994) is of particular importance. However the insights provided by the WCN (Taylor 2004) literature on advanced corporate services appear to be less relevant.

The separation between the material transfer of goods and the location of advanced producer services is addressed in the seminal paper by O’Connor (1989) which demonstrated that while Melbourne was the larger port, Sydney had the greater share of port and trade related advanced services. While this paper is now dated, according to Taylor et al (2009) Sydney is ranked in the top 6 ‘world cities’ indicating that Sydney has grown to be a significant world centre for advanced producer services while Melbourne is not ranked. Jacobs et al (2010) also rank Sydney highly as a centre of port related
advanced producer services, while Melbourne is unranked. In general, Jacobs et al (2010) finds that there is at best a weak relationship between the location of port related services and commodity flow patterns in ports. This suggests that technological developments in information transfer and logistics has further reduced the importance of co-location of port related services and physical port throughput.

A key question then is whether the growth and development of employment nodes in this region are essentially at the discretion of command and control decisions made by the advanced producer service (APS) organisations located in alpha cities as ranked by the World City Network or more a product of the physical characteristics and pricing of land and key infrastructure facilities. If the trends detected by the WCN (Taylor 2010) of the rising influence of Sydney a ‘world city’ and declining role of Melbourne, then the WCN analysis may be highly germane to the outcomes for the regional employment nodes and corridors examined in this paper, particularly if the operations of the firms managing the processes within the nodes fall increasingly under the direction of APS firms.

However such an analysis appears to be rather simplistic. The control of processes undertaken by enterprises within the nodes is highly complex. Controlling enterprises range from large TNCs headquartered in foreign countries, to local logistics and retail firms. For this analysis the GCC framework has valuable explanatory power. The GCC approach permits a focus on system wide, spatially separated networks of labour and production processes (Brown et al 2010) and the manner in which such processes are governed (Smith 2002).

2 Production nodes and commodity chains

Commodity chains are networks of labour and production processes that result in a finished product. These inter-organisational networks focus on global flows between nodes in a particular commodity (Smith et al. 2002). Commodity chains may be divided into those which are production and buyer driven, depending on their governance structures (Gereffi 1994). Production commodity chains tend to be controlled by global enterprises that make investment and production decisions based on such factors as labour and other production costs, local incentives and transport costs. A decision made to include or exclude a particular production plant from a global supply chain is likely to have major implications for the economic activities in a particular node. Motor vehicle manufacturers are a good example of such producer driven commodity chains. Decisions by headquarters to source a car or car components from a particular plant can have major implications, not only for that plant, but potentially, for the prospects of a range of suppliers forming part of the node.

Buyer-driven commodity chains are controlled by large retailers, brand-named merchandisers and trading companies. Such chains are part of commodity chains involved in the production and distribution of consumer goods, such as clothing and electronics. Buyer-driven commodity chains reflect the primacy of large retailers in driving down the cost of their purchased products by taking advantage of low cost contract manufacturing and/or substituting imported for domestically-produced goods. With the decline of domestic manufacturing in many Western countries, including Australia, as manufacturing has moved offshore to low wage countries, especially China, the rise of buyer driven commodity chains and the decline of production commodity chains is highly related. Goods which were previously domestically produced are now imported from low cost sources overseas through commodity chains governed by domestic retailers.

On a global scale, all of the city of Melbourne represents a single node in the global cities network or commodity chains. In fact of course it is a complex urban form with a
patchwork of industry sector specialisations. Some of its subregions have been the beneficiaries of globalisation and the adoption of new productivity raising technologies and others more the victim of a global economic transformation which has concentrated large scale manufacturing activity in rapidly expanding Asian economies, such as China, leading to a decline in the more marginal traditional manufacturing centres, such as Melbourne. While it is beyond the scope of this paper to discuss the development of Melbourne as a knowledge city in detail (see Yigitcanlar et al 2008), at the risk of some oversimplification, the subregion to the east of the CBD, with concentrations of high growth services, such professional, technical and scientific services, has benefited from globalisation, while the old manufacturing subregion to the west has suffered significant job losses, even while it has experienced rapid population growth.

This has prompted the state planning authority (DPCD 2008) to seek a better understanding of the location and development of employment in the region. The most recent metropolitan planning document for Melbourne, A Planning Update, Melbourne @ 5 million (DPCD 2008) advocated the formation of ‘employment corridors’ between nodes of economic activity. The remainder of this paper seeks to examine the formation of employment nodes and their interaction with spatial labour markets to better understand journey to work flows within this subregion of Melbourne to test whether employment corridors are being formed.

3 Employment nodes

In some industries jobs are clustered around particular nodes, reflecting the need for proximity of complementary firms, infrastructure or to benefit from other so-called Marshallian agglomeration economies. Particular labour markets cluster around these nodes (Amin and Thrift 1992).

The location of employment nodes for the transport and manufacturing sectors was estimated from ABS business establishment data available at a post code level. This used data about establishment by employment size to estimate the number of employees in each industry sector for each postcode in the Western Region and the Hume LGA immediately adjacent to the north of the Western Region. The post code districts allowed finer grain analysis than ABS Statistical Local Area (SLAs)

Figures 1 and 2 shows respectively the distribution of manufacturing and transport jobs in the region. In manufacturing there are four concentrations – in the south converging on Laverton and Altona, to North around the Melbourne Airport and two areas to the east, Broadmeadows (north) and Coburg (south). The first three of these are linked by the Western Ring Road and are the focus of the subsequent analysis.

In Figure 2 two significant nodes are identifiable, each coinciding with two of the manufacturing nodes. One centred on Laverton in the south and the other coincident with the Melbourne Airport in the north.

The subsequent analysis is based on journey to work data which at its finest level of detail is available at the SLA level rather than post code district. The above analysis was used to select the relevant SLAs to form the boundaries of two nodes – one in the north, the other in the south.

1 The Western Region of Melbourne is sub region defined by the local government areas of Moonee Valley, Maribyrnong, Hobsons Bay, Brimbank, Wyndham and Melton.
The 2006 Census journey to work (JTW) origin-destination pair permits the identification of the number of jobs by location and the residential origin of these workers. The following sections examine employment in the two sectors, Manufacturing...
and Transport and Storage. As discussed, these two sectors are illuminating because the first represents the employment structure of the West in its historical role of manufacturing hub, while the second describes the new, globally connected service jobs that have proliferated since the trade-exposed Australian economy shifted to importation of consumer goods.

These industries are clustered in locations that reflect the West’s industrial development. For the Transport sector, development at the northern end of the corridor centres on the Craigieburn SLA, which includes both the Melbourne Airport and the Hume Highway gateway to regional Victoria, and is host to 8000 jobs (see Table 1). In the southern node, over 9000 transport and storage jobs are found in the SLAs of Wyndham–North, Sunshine and Altona. The Port of Melbourne represents a further transport node linked somewhat indirectly to the southern node via the West Gate Freeway and more directly to the northern node via City Link. Unfortunately for analytical purposes, the Port sits in the ‘Melbourne–Remainder’ SLA, so transport jobs in the SLA are not only at the Port and adjacent Dynon Road Rail Terminal, but also scattered about the inner city. Nevertheless, the large majority would be Port related. The total number of transport and storage jobs in this SLA in 2006 was 5413.

Table 1. Composition of transport nodes, 2006

<table>
<thead>
<tr>
<th>LGA /SLAs</th>
<th>Southern Node</th>
<th>Northern Node</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sunshine–Altona–Wyndham North</td>
<td>Craigieburn</td>
<td>Melbourne–Remainder</td>
</tr>
<tr>
<td>Jobs in node</td>
<td>9134</td>
<td>8005</td>
<td>5413</td>
</tr>
</tbody>
</table>


As indicated in the analysis of post code districts, the manufacturing nodes are more dispersed. The northern cluster spans Craigieburn and Broadmeadows to provide 18,200 jobs, while the southern cluster adds Maribyrnong to three transport SLAs to provide almost 24,000 jobs as shown in Table 2.

Table 2. Composition of manufacturing nodes, 2006

<table>
<thead>
<tr>
<th>LGA /SLAs</th>
<th>Southern Node</th>
<th>Northern Node</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sunshine, Altona, Wyndham North and Maribyrnong (C)</td>
<td>Craigieburn and Broadmeadows</td>
</tr>
<tr>
<td>Jobs in node</td>
<td>23,907</td>
<td>18,200</td>
</tr>
</tbody>
</table>


The manufacturing node includes transport (car manufacturing), textiles clothing and footwear (TCF), food and chemicals. TCF jobs which are concentrated in Maribyrnong, for instance, more than halved in the period 2001 to 2006 with the continuing impact of tariff reductions. On the other hand, the more diversified manufacturing activities located in Sunshine, which include food, metals, plastics and chemicals, managed to hold employment levels relatively steady over the period 1996 to 2006. Nonetheless employment levels in the manufacturing node fell from 24,759 in 2001 to 23,468 in 2006. In contrast, employment in the transport and storage node grew by almost 60 per cent from 7516 in 2001 to 11,940 in 2006. To a large degree, the goods flowing through the buyer-driven commodity chains have displaced those previously produced domestically. There has been substitution of imported goods for a range of previously manufactured goods, particularly in the TCF sector (ABS 2007c).
The significance of the employment nodes is the value added activity undertaken at each node. While there are no regional accounts available at the ‘node’ level, the trends in employment numbers is compounded by the trends in output per worker. While reliable data for regional productivity are not available, Figure 3 shows the trends in total factor productivity for manufacturing and transport for Australia. The productivity data, shown in Chart 4.1, indicates that while traditionally, transport jobs had low productivity compared with manufacturing jobs, this has changed with the progressive introduction of more sophisticated logistics technology. Transport companies, such as Linfox and Toll Holdings, both located in the region, have transformed themselves into full service logistics and distribution companies which include warehousing and inventory management as well as transport services. Accordingly, while the value of manufacturing conducted in the Western Region appears to be in long-term decline, not only are jobs in transport and storage increasing, but the industry is also experiencing above average productivity growth.

![Figure 3. Trends in labour productivity: manufacturing and transport and storage, Australia](source: ABS (2007c)).

Labour productivity for transport and storage has increased at an annual average rate of 2.3 per cent per annum compared with manufacturing which has grown at 1.9 per cent per annum. Reflecting this trend, wages and salaries per employee for transport and storage ($54,900) has recently (2007/08) overtaken that for manufacturing ($53,300). Value added per employee however remains lower in transport and storage than manufacturing, $94,000 compared with $101,000.

If these national figures are reflected in activities undertaken in the employment nodes, then the decline in manufacturing is being largely offset in value added terms by the rise of the transport sector. However some of the increased productivity in the transport sector may be being captured by the logistics companies located in the cities with concentrations of APS discussed earlier rather those working in the physical distribution centres.
4 Evidence for the development of employment corridors

This section which provides a review of evidence of the spatial distribution of employment in Western Melbourne and its relationship to the Western Ring Road, aims to contribute to the definition of an employment corridor in Western Melbourne.

Melbourne’s urban planning framework *Melbourne @ 5 Million* defined an employment corridor as ‘A corridor that contains and links a number of large employment precincts’ in a way that ‘improve(s) accessibility to jobs and services and reduce(s) congestion on the transport network’ DPCD (2008).

In this vision, the corridor acts as a ‘connector’ linking workers’ homes to business sites with a view to reducing the time and costs of journey to work. Better transport links will increase the range of jobs available to residents of outer Western suburbs, presumably by extending the distance they are able to travel per unit of travel time. Corridors make labour markets larger and alter the ‘shape’ of labour markets. For example, the Western Ring Road greatly increases the distance a worker can travel in 30 minutes at peak hour. Importantly, the corridors will improve circumferential public and private transport networks, which will contribute to *Melbourne @ 5 Million*’s intended shift from a mono-centric to a poly-centric urban form.

However, *Melbourne @ 5 Million* expands from the idea of connection, to later view corridors as: producing agglomeration and generating employment; and that they will ‘provide for substantial increases in employment, housing, education and other opportunities along each corridor and better link them through improved transport connectivity’ DPCD (2008). This assumes that the existence of the transport link will precipitate a spurt in public and private investment along its route, and accordingly a shift in land use. By bringing more jobs closer to where people live, corridor-based development will improve access to employment, with clear social and environmental benefits. In essence, the idea of transport corridors aims to stimulate a range of employment opportunities along the corridor.

4.1 Transport and storage

For transport and storage, the southern node had more than one third of its jobs filled by residents (3199) and 25.6 per cent (2336) from other parts of the Western Region (see Table 3). However, the northern node, largely the Melbourne Airport, had a residential workforce of only 612 (7.6 per cent). Its links with the Western Region are extremely important, with about 28 per cent of its jobs (2240) being filled by Western Region residents. The Port’s links with the West are also important with 37 per cent of jobs (2005) filled by workers living in the Western Region. Most significantly, of these, 1351 came from Laverton, Keilor, Sunshine, Altona (four top SLAs) and Melton. Each of these SLAs has ready access to the Western Ring Road/Princes Freeway.

<table>
<thead>
<tr>
<th>LGA /SLAs</th>
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<th>Northern Node</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sunshine–Altona–Wyndham North</td>
<td>Craigieburn</td>
<td>Melbourne–Remainder</td>
</tr>
<tr>
<td>Jobs in node</td>
<td>9134</td>
<td>8005</td>
<td>5413</td>
</tr>
<tr>
<td>Workers from:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within node</td>
<td>3199 (35.0%)</td>
<td>612 (7.6%)</td>
<td>122 (2.3%)</td>
</tr>
<tr>
<td>Other WMR</td>
<td>2336 (25.6%)</td>
<td>2240 (28.0%)</td>
<td>2005 (37.0%)</td>
</tr>
<tr>
<td>Other places</td>
<td>3599 (39.4%)</td>
<td>5153 (64.4%)</td>
<td>3286 (60.7%)</td>
</tr>
</tbody>
</table>

As indicated in Figure 4, those working in the northern node from the Western Region come from nearby Moonee Valley (888), Keilor (557) and Melton (458). A small number (337) however originate in the Southern node. The northern node also relies on the surrounding areas of Sunbury (604), Whittlesea (390), Broadmeadows (452), Preston (160) and Moreland North (226) to provide 1832 (23 per cent) of its employees. For the southern node, residents from each of Moonee Valley (259), Maribyrnong (285), Melton (994) and Keilor (602) fill significant numbers of jobs with the Western Ring Road providing particularly good access.

**Figure 4.** Transport ‘employment corridor’

### 4.2 Manufacturing

As shown in Table 4, the southern node draws its workforce primarily from within its own boundaries (42 per cent) and other parts of the Western region (29 per cent). In contrast, the northern node draws only 23.9 per cent (4354) of its workers from within the node and a further 22 per cent (4080) of its workers from the Western Region, with Keilor providing 1036 and the southern node 1290.

**Table 4.** Composition of manufacturing nodes, 2006

<table>
<thead>
<tr>
<th>LGA /SLAs</th>
<th>Southern Node</th>
<th>Northern Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunshine, Altona, Wyndham</td>
<td>23,907</td>
<td>18,200</td>
</tr>
<tr>
<td>Norths and Maribyrnong (C)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workers from:</th>
<th>Southern Node</th>
<th>Northern Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within node</td>
<td>10,060 (42.1%)</td>
<td>4354 (23.9%)</td>
</tr>
<tr>
<td>Other WMR</td>
<td>7016 (29.3%)</td>
<td>4080 (22.4%)</td>
</tr>
<tr>
<td>Other places</td>
<td>6831 (28.6%)</td>
<td>9766 (53.7%)</td>
</tr>
</tbody>
</table>

As shown in Figure 5, the northern node also draws workers from the surrounding areas, particularly Whittlesea (2622), but also Moreland (1409), Preston (752) and Sunbury (482). The southern node attracts workers from nearby areas in the Western Region, Melton with 2021 and Keilor 2336, providing the largest number of workers. Very few workers come from the Hume LGA (800), mostly from Craigieburn/Broadmeadows.

Figure 5. Manufacturing ‘employment corridor’

4.3 The Western Ring Road: an access link or employment corridor?

The evidence provided by the JTW data suggests that there are two very substantial nodes providing manufacturing and transport employment, and there is a significant amount of traffic between the two nodes. Both southern nodes draw a high proportion of their workers from within the node boundaries while both Northern nodes are more dependent on workers from nearby suburbs including a significant proportion from the Western Region. Around a quarter of the jobs in the two nodes are supplied by workers from areas for which the Ring Road provides particularly good access. There is no doubt that the spatial labour markets of the two nodes have been extended and travel times cut by the construction of the Ring Road. However, its development as an employment corridor requires more jobs to be created in the areas between the nodes to complement those already established at the nodes.

It is beyond the scope of this paper to establish existing links between the nodes and complementary businesses outside the node, however the number of jobs in transport and manufacturing in the SLAs adjoining the Ring Road provides an indicator of the ‘density’ of jobs in the corridor outside the nodes. These are shown in Table 3 below.

With the possible exception of Keilor, which is in fact a candidate for inclusion in the northern node, the number of jobs in these sectors in the areas between the two nodes is modest compared with the concentration of jobs in the nodes.
Table 5. Number of jobs in 3 western Melbourne LGAs, 2006

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing</th>
<th>Transport and storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moonee Valley</td>
<td>2112</td>
<td>1239</td>
</tr>
<tr>
<td>Melton</td>
<td>1167</td>
<td>1783</td>
</tr>
<tr>
<td>Keilor</td>
<td>3281</td>
<td>1459</td>
</tr>
</tbody>
</table>


4.4 Developing an employment corridor

Developing an employment corridor involves a variety of factors. One is the economic viability of the nodes. As has been discussed, these have formed partly for historical reasons, in the case particularly of the manufacturing nodes, and to take advantage of the transport infrastructure, principally the Port and Melbourne Airport.

Manufacturing developed initially in the West to take advantage of low cost land, proximity to the Port and a skilled labour force. These historical reasons suggest that there is a level of lock in and its future development is path dependant. It is likely to be capable of evolutionary adaptation but not radical change. It has adapted to the withdrawal of industry protection policies. Surviving textile firms have changed their product mix and the motor industry is adopting more fuel efficient technologies with incentives from the Federal government. Given the national decline in manufacturing, employment levels in nodes, while declining, have proved reasonably resilient. However, it is unlikely that manufacturing will be the driver of the future development of an employment corridor unless the economics of world trade changes, such as if the cost of moving goods were to increase substantially in a carbon constrained environment.

The transport and storage nodes have experienced rapid growth, taking advantage of the forces that have adversely affected local manufacturing. With the expansion in traded goods, transport, logistics and distribution firms have benefited from cheap land available close to the key transport infrastructure of the West. The nodes have taken on a metropolitan, wider regional and national role as goods entering and departing the country, through both the airport and seaport, are sourced and distributed nationally. While the volume of trade declined during the GFC, the drivers of global trade in goods are re-emerging. This should mean that transport and distribution jobs in the nodes will continue to increase.

The nature of jobs in the sector is, however, undergoing significant change as logistics services come to dominate simple road and rail transport solutions. Logistics management is:

... part of supply chain management which plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements. (Council of Supply Chain Management Professionals)

Thus, those providing these knowledge intensive services are highly skilled, applying ICT to management of supply chains. The development of the transport and distribution nodes is a direct result of the rise of the global knowledge economy.

5 Conclusion

This paper has set out to examine the development of the nodes of two global commodity chains, one in transport and storage and the other in manufacturing. The
manufacturing node is stagnating perhaps declining as manufacturing becomes increasingly centralised elsewhere. It is part of a producer driven commodity chain to the extent that production decisions by TCNs and large local companies to source their products from other nodes in the global commodity chains have a negative impact on those in the Western Region of Melbourne. The decision of local manufacturers and large retail firms to source product for local consumption from overseas has however led to the establishment of large distribution centres at transport nodes. These nodes are part of buyer driven commodity chains and their activity levels reflect logistic decisions made by large consumer goods distributors and freight forwarders. Thus while both sectors are concerned with the supply of goods to market, the knowledge-intensive, logistics-driven transport and storage sector has gained at the expense of manufacturing.

The development of hoped for employment corridors between the nodes of concentrated activity appears not to have occurred, although further research would be required to establish possible links between firms located in the nodes and those along the transport corridor. There is an overall objective of increasing service sector jobs associated with the growth in transport and warehousing activity. That this has been slow to emerge may be explained by the separation between trade related services and the physical movement of goods enabled by the new technologies noted earlier in the paper. Advances in remote goods tracking and similar technologies reduce the requirement for co-location of trade related services with warehousing and distribution.

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Melbourne’s transformation: rust belt to renaissance

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Abstract
In the global recession of the early 1990s the Melbourne economy was battered more extensively than the rest of the Australia. The industrial heartland of the city contracted sharply which had a range of flow on economic effects. There was heavy migration out of the so-called rust-belt of Melbourne. Twenty years on Melbourne has emerged from the worst global recession since the Second World War in terrific shape. So what has changed?

The economic reform agenda of the past twenty years has helped transform Melbourne into a post-industrial knowledge intensive economy. Macroeconomic policy settings and a microeconomic reform agenda can be seen to have greatly enhanced the Melbourne economy. But the spatial reforms have played a much greater role in the transformation to a knowledge intensive economy.

Projects such as the Southbank redevelopment and Postcode 3000 helped to revitalise the city. Southbank and Docklands provided the Central Business District with “Greenfields” to accommodate the growth in knowledge intensive service industries. Road projects such as the CityLink, EastLink and the Western Ring Road helped to improve connectivity within the city. These factors have produced agglomeration economies which have attracted high levels of skilled labour to the city and enabled high productivity firms to flourish. This has helped to produce a diverse and nimble knowledge intensive economy.

To continue to advance Melbourne, a new generation of reforms and enhancements has to be embarked on. The next generation of reforms will have to ensure a well connected, higher density metropolis with a focus on growing the highly productive environment centered on the Central Business District to other parts of Melbourne. This will require improved transport links (to overcome the congestion which will accompany increased population and employment growth) and more intensive development in existing employment clusters. The consequences of inaction could be dire indeed.

Keywords – Melbourne, spatial economic reforms, agglomeration, human capital
Paper type – Practical Paper
1 Introduction

A well functioning city provides a wide range of benefits to its residents, economy and government. These benefits take the form of productive economic activity, higher taxation receipts, high levels of liveability and social cohesion for the residents.

During the last twenty years the Melbourne economy has been transformed from a manufacturing hub, reliant on long standing protectionist policies, to a diversified post industrial economy very much living off its knowledge base in a highly competitive and global trading environment. This is evident in the pattern of GDP growth for Melbourne versus the nation as a whole. Since the depths of recession in the early 90’s, Melbourne has, more often than not, outperformed the national economy.

![GDP Growth rates – Metro Melbourne vs Australia](image)

Source: Australian Bureau of Statistics & SGS Economics & Planning

A few points of note in Figure 1 are:

- The 1991-92 recession was MUCH deeper in Melbourne than the rest of Australia.
- The Asian Financial Crisis which occurred around 1997 had a small impact on economic growth in Melbourne.
- Melbourne experienced a larger boom in 1999 and a larger bust in 2001 than the rest of the country. This period was influence by the introduction of the new taxation system which caused changes in consumption patterns to avoid the GST. 2001 was also the timing of the last recession in the United States.
- The Melbourne growth rate has been slightly higher than the Australian rate over the past three years.

The restructuring of Melbourne’s and Victoria’s economies over this period is also evident in the State’s international export profile. Exports of goods, mainly manufactured products, still account for around two thirds of Victoria’s sales to overseas customers, but this figure has steadily declined from close to 80% back in 1990 (Figure 2). Meanwhile, the State’s sales of services to the rest of the world, including travel, education, financial brokerage, legal advice and other business services has grown steadily with a clear acceleration occurring at the turn of the century.
A particularly striking indicator of Melbourne’s re-invention as a vibrant post industrial economy rests in the changing shares of total metropolitan value added attributable to Manufacturing versus Financial and Insurance Services, the latter being in the vanguard of knowledge based commercial activities.

As shown in Figure 3, financial services overtook manufacturing as a key contributor to the metropolitan economy back in 2005. The sector took a beating during the Global Financial Crisis, but has bounced back strongly; in fact, it was one of the key industries which lead Victoria out of the lull in economic growth caused by global economic instability.

This transformation did not happen by accident. It was the outcome of focussed policy effort by both the Commonwealth and State Governments. Canberra’s ‘micro economic reform agenda’, initiated under the auspices of the Hawke / Keating Government of the 80’s and carried on with the fiscal/taxation initiatives of the early Howard years, had a significant positive impact on Victoria, albeit that it may have
aggravated the 1991/92 recession for the State. These reforms provoked an ‘internationalisation’ of the Victorian economy, with the floating of the exchange rate and the decision to allow foreign banks to operate in Australia. In harness with National Competition Policy, the Kennett Government’s moves to commercialise, corporatize and even privatise certain infrastructures and State owned businesses injected a fluidity and dynamism into the Victorian economy. Labour market reforms under the Hawke/Keating Government, which focussed on enterprise bargaining, rendered the Victorian (and other Australian economies) fundamentally more flexible in the face of exogenous shocks.

Infrastructure investment by the Victorian State Government further complemented these national reforms and accelerated Melbourne’s transition to a knowledge based economy. Arguably, the Kennett Government followed an inspired strategy in ‘trading in’ ‘old economy’ assets, like the power industry, to invest in the key attributes sought by a knowledge economy, being connectivity and a vibrant downtown.

Several ‘settlement pattern shaping’ infrastructure projects played a major part in repositioning Melbourne and Victoria. CityLink, commissioned under what were then innovative public-private partnership principles, was vital in connecting Melbourne’s inner western industrial areas to the rich skills pool in the ‘Monash corridor’. This gave a great productivity boost to these manufacturing and logistics areas which, in turn, helped to promote residential growth in a part of Melbourne that had lagged behind for decades. The Western Ring Road further improved the accessibility of Western Melbourne and reinforced the shift in Melbourne’s hitherto ‘unbalanced growth’ towards the east.

More recently, the commissioning of EastLink in June 2008 has given a similar, though more modest, accessibility advantage to the key centres of Ringwood, Dandenong and Frankston. Dandenong, in particular, is now in a much better position with respect to skills access. The transformation of its manufacturing base towards higher value added activities is already underway.

As far as central Melbourne is concerned, the acknowledged heartland of Victoria’s knowledge economy, revitalisation was not just the outworking of clever marketing or inspired residential intensification programs such Melbourne City Council’s ‘Postcode 3000’. Several infrastructure investments paved the way, including the Docklands project (which gave Melbourne a ‘waterfront address’ and the potential to lure finance and other business service houses requiring large floorplate offices), Federation Square (which underlined Melbourne’s commitment to fresh and exciting design) and the Melbourne Exhibition and Convention Centre (which enabled the city to successfully challenge for the mantle as Australia’s premier destination for business tourism).

Together with an aggressive festivals and events program, these investments enabled a virtual overnight ‘rebranding’ of Melbourne, from a gracious but rather tired bastion of ‘industrial Australia’ underpinned by ‘Fordist’ manufacturers, to an eclectic ‘urban’ economy trading on its thinking power and creativity. Meanwhile, at the Victoria wide level, the State Government’s investments in the regional fast rail project took an important step towards greater integration between the labour market of Melbourne and those of Ballarat, Geelong and Bendigo. This permitted Victoria to project a ‘European style’ settlement pattern and aesthetic which also contributed to its reputation as a design based, knowledge economy.

2 Building Melbourne’s knowledge based competitive advantage

The upshot of this review of Melbourne’s re-invention is that infrastructure investment and connectivity were vital. Going forward, they will be even more
important, because accessibility and urban density are likely to be the next major source of productivity enhancement in Australia.

![Figure 4. Travel zone effective job density, 2006](image)

Source: SGS Economics & Planning

A simple measure such as looking at employment density of an area does not effectively demonstrate agglomeration. A firm in a relatively low-employment area but located on the edge of a Central Business District (CBD) could potentially capture agglomeration benefits by being close to the CBD. Thus a measure of agglomeration must “incorporate both proximity and the scale of the economic activity and …be calculated for very small areas” (Graham, 2006).

This measure of Effective Job Density (EJD) enables a more ‘real life’ representation of the proximity (in terms of travel time) component of agglomeration that other more basic measures overlook. That is, 68% of people working in the CBD of Melbourne travel to work on public transport and thus the proximity to those jobs is closely related to public transport travel times. The other extreme can be seen in locations such as Cranbourne (an outer location of Melbourne), where 98% of workers travel to work using private vehicles.

The impact of doubling EJD is referred to as the labour productivity elasticity of the industry with respect to agglomeration and allows the coefficients to be easily interpreted. **Error! Reference source not found.** presents this elasticity for each industry. The weighted total for all industries included in the analysis is 0.07. That is, a doubling of the effective job density will result in a 7% increase in labour productivity in an area. So a doubling in EJD will increase labour productivity which will allow firms to increase production by 7% with the same level of labour inputs. This labour productivity boost is brought about in a number of ways such as economies of scope and scale, access to skilled labour and knowledge transfer.
The elasticity varies considerably between industries. Service industries which make up the bulk of the knowledge economy gain the most from increased agglomeration. This relationship partially explains the vigorous competition for centrally located sites amongst service-based firms. The premium paid for such sites is more than compensated by the increased labour productivity from their operations in these strategic locations. This also explains why it is difficult to attract these types of businesses to suburban locations, notwithstanding the sound urban planning arguments for setting such a goal.

Over the past fifty years the concept of Human Capital has been at the forefront of economic theory and practice. Human Capital comprises the knowledge and skills which enable a worker to contribute to a firm’s production and to earn a wage. Human Capital can be expanded by investment (formal education and experience gained by workers) which will increase the worker’s skill, and hence productivity. Human Capital can be used to understand a number of key issues like labour market outcomes and the distribution of income across society. However, it is also key in understanding the growth in the GDP.

The economic literature provides an explanation of this in Matching Theory (which is also described as Search Theory). Basically if there is a large range of jobs on offer a worker can search through the available jobs and best match their skills to the available job and maximise their wage. Also they have opportunity to work in a number of different jobs and hence gain a range of experiences (which can be seen as on-the-job investment in their education) which will also translate into higher productivity which can be observed in the form of higher productivity.

6 provides an indication of the variation in unqualified male human life time Labour Income across three SLAs in Melbourne. The per capita age-earnings profile is higher for residents with no qualifications in Stonnington (C) – Malvern than in Glen Eira (C) – Caulfield and Monash (C) - South-West.

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1 Since Becker & Schultz published their seminal work in the 1960’s.
So connectivity is crucial, not just from a social inclusion point of view, but from the perspective of economic competitiveness. Thus, to further build Melbourne as a knowledge capital, we need to better understand the spatiality of its economy. To further understand the employment dynamics within Melbourne, a methodology developed and used by the Office of National Statistics in the United Kingdom has been employed. This has used Census origin destination journey to work data to define distinct self contained employment areas in Melbourne.

There are six distinct regions within Melbourne as shown in Figure 6. Of course there are still flows between the different regions. For example, 17,800 people travel from Region 2 to Region 3 for work, 87,400 people travel from Region 4 to Region 1, Region 1 attracts 75,600 from Region 2 and 57,900 from Region 4.

Most flows are towards Region 1 (the Inner Eastern) which contains Melbourne’s CBD and other major employment zones. Understanding the features of the Inner Eastern Region is important to understanding the functioning of Melbourne. The Inner Eastern is the major employment hub, has a highly skilled resident labour force and is serviced by a radial public transport network. In 2006, the Inner Eastern had around 44% of the employment in Melbourne and the City of Melbourne had 18.2%.

Figure 6. Gross annual income for unqualified male human capital 2006

Source: Australian Bureau of Statistics
To optimise productivity, each of these sub-cities needs a heart and needs to be well connected to each other and the centre. So the six Central Activities Districts (CADs) need to host a range of knowledge intensive industries which provide a range of services and employment opportunities for the residents. As shown in Error! Reference source not found.9 the Dandenong CAD provides employment to Pakenham residents. With significant population growth projected to continue in the south east growth area, the importance of the Dandenong CAD will also increase.
More importantly the CADs have to be well linked with the highly productive central core of Melbourne. There is great scope to build wealth by building more connected regions. The southern metro region hosts the second biggest wealth generators (as measured by industry gross value added) in the metro area (as shown in Error! Reference source not found. 8). This will allow the firms located in the CADs to service a much larger economic base, both within Melbourne but also within Australia and even internationally.

We have a long way to go in this regard, with many communities (and businesses) locked out of opportunity. The Error! Reference source not found. 10 shows that the areas with low EJD are the areas with the highest level of relative socioeconomic disadvantages (as measured by SEIFA).

![Figure 9. Location of employment of Pakenham residents](image)

Source: SGS Economics & Planning

The disadvantage in these areas has the potential to become intergenerational which is even harder to address. Disadvantage is associated with a range of costs in terms of welfare services, health services and crime and justice services. It has the potential to create a divided city of the ‘have and have not’s’ which has feedback for the inner areas of Melbourne. This in turn could ultimately weaken the profile of the whole city.

If Melbourne is not maintained in its current level of liveability and economic prosperity the city will become less attractive and the population will migrate to other areas of Australia or the world. It will be younger people (who may have weaker links to the city) who would be the first to migrate, which over time will reduce the number of births in the future. This can result in a smaller working age population to support the overall population. This would have a range of negative implications for Melbourne.
3 Conclusion

Twenty years of economic reform and spatial organisational improvements has helped transform Melbourne into a post-industrial knowledge intensive economy. The recession of the early 1990’s provided the catalyst for many of these reforms. At that time it was clear that the historical trajectory of the economy was no longer robust enough to continue into the future.

The Postcode 3000 project helped to revitalise the city and the Southbank and Docklands redevelopments provided the Central Business District with “Greenfields” to accommodate the growth in knowledge intensive service industries. Improved connectivity within the city brought about by road projects such as the CityLink, EastLink and the Western Ring Road. These factors have produced agglomeration economies which have attracted high levels of skilled labour to the city and enabled high productivity firms to flourish. This has helped to produce a diverse and nimble knowledge intensive economy.

To continue to advance Melbourne, a new generation of reforms and enhancements has to be embarked on. The next generation of reforms will have to ensure a well connected, higher density metropolis with a focus on growing the highly productive environment centered on the CBD to other parts of Melbourne. This will require improved transport links (to overcome the congestion which will accompany increased
population and employment growth) and more intensive development in existing employment clusters.

Inaction on these fronts will cause heavy costs for the Victorian community. Aside from the lower economic growth, it has the potential to create a divided city of the ‘have and have not’s’ which has feedback for the inner areas of Melbourne. This in turn could ultimately weaken the profile of the whole city. People with weaker links to the city, would be the first to migrate, which over time will reduce the number of births in the future. This can result in a smaller working age population to support the overall population. This would also have a range of negative implications for Melbourne.

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Is the edge the new middle?

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Abstract
Academies are powerful places of exclusion. University faculties operate as largely independent silos with the most esteemed academics often being the most specialised. Schools are powerful places of exclusion. Classrooms often operate as independent silos with students moving from one subject silo to another regulated by bells at fifty minute intervals. Likewise commercial organisations will efficiently locate their teams in specialist departments. It is understood that communities of practice are aligned with depth of discipline knowledge but there is also recognition that the edge can be a powerful zone of innovation and questioning (Wenger 1998). There is a growing cohort of within academia, schools and organisations who might be best understood as subversive boundary riders in that they are breaking the fences between disciplines rather than repairing the breaks. The role of subversive boundary rider is high risk because recognition at the edge can be problematic. In academia the established discourses, journals, conferences, academics and grant referees are understandably situated within the hearts of discipline specific knowledge. That said government and corporate bodies are increasingly encouraging and, at times requiring, multi-disciplinary collaboration as a pathway to new knowledge and new partnerships between academia and the community.

The paper includes reflections on a range of multidisciplinary collaborations but with the main focus on an Australian Research Council (ARC) funded Linkage Grant called ‘Smart Green Schools’ involving academics from the disciplines of education, sustainability and architecture exploring the links between space, sustainability and education. We come from different tribes and, as a result, stumble with discipline specific language and thinking. In the process we are challenged to reassess our own practices as we see ourselves in the eyes of others. Our research, while based within a small number of case studies is effectively building a rich description of the difficulties being experienced within schools as they move from the classroom into team-teaching environments. We are finding uncanny parallels between the difficulties and successes that we are experiencing as a multi-disciplinary research team and the difficulties and successes being experienced within our case study schools.

As we struggle to work in new ways and negotiate across epistemologies which are not quite familiar, we are better appreciating the degree of difficulty which learning communities have as they try to shift to incorporate the potential of twenty-first century technologies. For school environments, the shift from classroom to learning commons; from formal to informal; from teacher-centred to student-centred and from subject-based learning to problem-based learning has implications across a range of areas including pedagogy, leadership, change management, spatial design, furniture and ICT. Within this
difficult terrain the role of the subversive boundary rider is worthy of investigation. How can the fences be broken and boundaries dissolved?

There are useful correlations between the difficulties of multi-disciplinary research, the difficulties of 21st century learning environments and the difficulties of supporting creativity, innovation and learning communities. Our research process as well as our research into learning environments suggests the need for communities, organisations and learning bodies to support people who can act as subversive boundary riders. We see these riders as a relatively new group who bring the interpersonal skills necessary to selectively negotiate across boundary fences either building bridges, dissolving boundaries, setting up informal collaborative spaces; carrying messages, building trust or even sending in medical help relationships break down.

Keywords – multidisciplinary knowledge, space and learning, learning communities, informal learning.

Paper type – Academic Research Paper

1 Introduction

The edge can be an uncomfortable place to inhabit. There is uncertainty and instability. It is a location where adjacent disciplines overlap, jostle and challenge each other. One difficulty is that edge dwellers can be located by choice, by exclusion from the centre or because, as newcomers, they are yet to reach the centre. Whatever the reason for edge dwelling, it is useful to consider that there may be advantages. Despite difficulties, there is excitement at the edge as ideas infiltrate and reverberate across discipline boundaries. Transformative learning can occur at times of deep instability. Mezirow (2000) argues that transformative learning requires a significant moment of instability where past preconceptions are challenged and replaced by new understandings.

It can be argued that the physical metaphor of a circle as community of scholars, practitioners, learners unfairly misrepresents the complexities of practice and scholarship. Centres and clusters of knowledge are in constant flux. New understandings can bring slight or catastrophic shifts. Different people will perceive different centres within the same landscape. Centres shift depending on which lens is being used to categorise activity or knowledge. Within this dynamic landscape why is it useful to talk about the edge when the edges and centres are being constantly redefined?

To explore why edges and boundaries are useful metaphors for challenging discipline specific wisdom, I give the following anecdotes coming from five different people commenting on the design of learning spaces:

University academic (education): The research by Hattie (2009) categorically shows that space does not positively impact student learning. Surely this research is hard to refute? He has drawn together over 800 meta-analyses on what impacts student achievement. From this research we can confidently know that new space does not improve student learning.

US schools’ facilities manager: I know exactly what environments are needed to support student learning. Research has clearly shown that students learn best when they are in rooms between X and Y degrees in temperature.

Australian Research Council reviewer: I do NOT believe that the proposed research is addressing a significantly important problem, primarily because:.....it is difficult to support informal interaction; you cannot force someone to interact informally at a photocopier or at a water cooler. Informal interaction happens on its own.

Architect: What is slightly unsettling is the evident, quite recent emergence of a new found invention of innovation among educators and designers. This
moment in time resonates uncannily with the highly speculative and quite revolutionary work being done in the 1970s.

**High School teacher:** I know the learning hub was meant to be innovative but students and teachers hate working in it. We prefer to take them to the library to work instead. It would work okay if the furniture and acoustics were fixed.

These anecdotes come from a range of people who each bring their own framework of knowledge. Each comment is true for the speaker and yet as a group of comments they don’t quite make sense. The first indicates that the design of learning space has no impact on learning outcomes, another says categorically that temperature is the key physical element which can support effective learning. A teacher describes a space she and students struggle to work in while a reviewer argues that it is unlikely that space could encourage informal interaction. An architect wonders why current conversations do not appear to recognise the history of innovation in learning spaces and pedagogy from the seventies.

How do we accommodate or refine these separate truths into a more coherent and richer analysis regarding learning spaces? How might Hattie’s quantitative analysis be critiqued in terms of what constitutes learning? What dangers exist if facilities managers focus on temperature alone as the key contributor to excellent learning spaces? What evidence might convince the reviewer that informal interaction can be supported by spatial layouts and designs? What resonances exist between the 70s and now both pedagogically and in information technology? For the teacher, even if the furniture and acoustics were improved would the space still fail because of organisational and pedagogical hurdles?

Cross disciplinary conversations are needed. For example, with some notable exceptions, issues to do with space are largely absent from educational discourse (Fisher 2002) while terminology used within education is foreign to many designers. Designers are likely to have limited understanding of the impact of changing technology and new thinking on pedagogy while facility planners may focus on life-cycle costing and management rather than pedagogy or space. The difficulty is that universities, education departments, schools and organisations do not easily support these conversations across discipline boundaries. Based on our experience with multidisciplinary research, it may be timely for communities and organisations to invest in some subversive boundary riders commissioned to build bridges and break fences.

Figure 1. We speak different languages
2 The subversive boundary rider

Boundary riders are established in Australian folklore as solitary station workers inspecting and repairing the long wire fences to ensure livestock stay in and vermin stay out. Living out of stringybark humpies, boundary riders carried their supplies by packhorse. Today the term ‘boundary rider’ is also associated with Australian football to indicate the commentators who work from the sidelines during the game. These boundary riders have access to players and coaching or medical staff on the interchange bench in order to be able to give a more detailed commentary of the game and any injury concerns.

A subversive boundary rider working within a knowledge environment might play a role in bringing together knowledge and people from across disciplines, supporting the development of unexpected collaborations and helping repair misunderstandings. Another role of the subversive boundary rider might simply be the carrying of messages from one group to another in order to develop a more holistic view of the question to do with whether space can support or hinder learning communities. Like the football boundary rider, there may be a third role which is to act as a commentator from the sidelines.

The traditional boundary rider carries little baggage. Perhaps our new subversive boundary rider has to travel lightly with an adaptable suite of tools and lenses and a willingness to learn different languages. This is the boundary rider who stays close to the fence lines choosing the high risk life of not quite belonging. Within academia, a dilemma exists for such a person. They risk losing a home base where discipline knowledge depth has clearer peer recognition processes than the boundary rider’s knowledge breadth.

Returning to the anecdotes above; they are the everyday observations. They all deal with learning spaces but they each bring different and conflicting perspectives. Understanding the boundaries inherent within each statement helps with reconciling the conflicting information. Hattie draws conclusions based on meta analyses of available quantitative research. This quantitative approach indicated that space does not have a positive impact on learning outcomes. In response, policy makers and politicians might conclude that money should not be spent on developing learning environments beyond the most basic if they do not lead to measurable outcomes. But are there positive outcomes in schools which are not being quantified currently? What feedback do teachers and students give about new spaces? At the other extreme, a facilities manager in the US stated that he believed schools needed to fit within a narrow temperature range to support effective learning. This simple statement has large repercussions. Keeping learning environments within such narrow temperature bands will require air conditioning in most climates and this will impact on indoor/outdoor connections. The final anecdote describes a teacher struggling with an open plan space who understands the problem to be physical but gradually realises that even with a better designed space there are a range of organisational issues such as timetable, ownership and school vision which will impact the use of space.

3 Interdisciplinarity and multidisciplinary thinking.

In a recent document titled ‘Interdisciplinarity in Research’ (Bolitho, McDonnell 2010) the university researchers interviewed all spoke about the importance of their own founding disciplines and tended to seek interdisciplinarity when ‘this would get them the best results’. One researcher highlighted that his best papers are all within his discipline. Another said that he would not present at a conference outside his cognate field even though these other fields influenced his research. The same document quotes cautionary
notes which state that it is not clear the degree to which academic and research organisations and journals are prepared to change to support interdisciplinary work.

These reservations were evident in the responses of researchers we spoke to in the course of our research. They drew attention to the Australia-wide context and the Bradley Committee’s signal of a greater commitment to specialisation, potentially to the detriment of interdisciplinarity. All researchers referred repeatedly to issues with the University’s faculty structure and excellence-based rationale, and all highlighted that the problem of publishing is acute. The pressure of the ERA is unremitting and interdisciplinary work tends not to be associated with the highest impact journals (p5).

While there is recognition that novel research often occurs at the boundaries between disciplines (Leonard-Barton, 1995, Carlile, 2004), conflicting and powerful forces work against interdisciplinary endeavours. Giving a short history of knowledge formations, Peter Weingart (2010) suggests that disciplines as we understand them first arose in around 1800. Previously books, articles and experiments were written for the general public but as disciplines became established they developed specialised languages in which the audience was other members of their own discipline. ‘The essence of discipline formation and evolution is self-referential communication’ (Weingart 2010, p8) Communities of scholars generated a division between specialists and laypersons. Access of specialised knowledge was available through ‘popularisation’ which gradually became a separate activity not intended to contribute to new knowledge but to mediate scientific knowledge to the educated public. This role aligns well with the boundary rider role we see in football where commentators at the edge communicate to the watching public.

An advantage of being located at the edge of a scholarly discipline is a willingness to accept the validity of a range of intellectual positions. Ann Balsamo in 2006 coined the term ‘epistemological humility’ as a necessary position for interdisciplinarity to succeed (Jasanoff 2010). Successful collaboration begins with the position that one’s own definition of important knowledge may not be the only definition. But humility alone is not enough. Collaboration requires both patience and respect for other disciplines including those that seem frustratingly antithetical to our own ways of thinking.

While we anticipated our research to be interdisciplinary, we are finding that we are working as a multidisciplinary team with growing skills to work in transdisciplinary ways.

4 Case study one: Lessons from an ARC multidisciplinary grant.

Our ARC research work has just been awarded a university prize for excellence in Knowledge Exchange. This research project is focusing on the relationships between pedagogy, space and sustainability in middle schools environments. We have one architect and one teacher undertaking PhD studies and there have been some built outcomes alongside the research outcomes.

On reflection, the key factors which have enabled this research project to achieve beyond expectations are surprisingly simple. An early step was to negotiate a physical space in which researchers could collocate and gather resources. The space enabled easier collaboration through incidental and overhead conversations but also acted as a signifier of a research entity. Our group of five investigators, nine industry partners and two PhD students was large and so the space became a symbolic heart. Our second step, evolving over many months, was the gradual negotiation of protocols to do with mutual recognition, respect, critique and, surprisingly, relative research independence.
This last surprising protocol of research independence is interesting to reflect on as it resonates somewhat with Gardner’s educational concept of multiple intelligences (Gardner 1993). Our academic and partner team consists loosely of architects, educators and scientists with sustainability expertise. We largely each fit our discipline prototype. The architects are tending to rely on visual clues while the scientists work in terms of mathematical modelling and the educators think through interpersonal lenses. The architects within our group delay making decisions and continue to suggest more and more options until time requires a final decision. The educators are effective at quick decisions and getting things happening. The scientists methodically work through cycles of planning, testing, and evaluating. Presumably we are behaving in ways which are driven by a combination of personality, education and social identity. But the intriguing part of this research process has been the constant exploration of the boundaries looking for openings into other ways of seeing the complex relationships between space, pedagogy and sustainability. We are each taking roles as subversive boundary riders and are therefore finding ourselves in strange places where we are feeling a growing respect for the methodological lenses brought by our non-cognate colleagues alongside an increased confidence in our own contribution to debate. At times, we are seeing ourselves through the eyes of our colleagues and vice-versa.

It is useful to describe a small case study leading to a built outcome from the research. This case study relates to the high school teacher’s anecdote above where she described a learning space which was hated by students and staff. Our education PhD student was studying the space as an ethnographic observer. Then as part of a process of participatory action he ran a workshop bringing together the teachers, the school leadership group, chief investigators and partner investigators. The aim of the workshop was to tease out the space, its problems and its potential. What was curious was that the teachers understood the core problems of the space to be poor acoustics and inflexible, heavy furniture, while the visitors suggested that there were broader difficulties which would not be resolved with new furniture and acoustic treatment alone. These difficulties extended to lack of ownership of the space, a difficult timetable, non-consistent expectations for students as well as the difficult acoustics and poor furniture. In particular, the space gave students few clues about behaviour and occupation. A short brief was developed which architects then worked on and the school is now starting to occupy the new spaces. Observation of the new spaces is still underway.

Figures 2 and 3. Design images for the new space by Spowers Architects

We have been finding it useful to transfer methodologies between disciplines. For example, participatory action research not a common research method within the architecture discipline but well accepted within education. Visual mapping strategies are well developed by social geographers and urban designers but less common in education.
Our sustainability expert has been monitoring the indoor environment of some case study schools and also working with students to help them understand the way buildings act as a third skin moderating the climate. Equipment such as temperature tags and infrared cameras have been incorporated into drama classes as well as maths classes.

5 Case study Two: An architectural studio on informal learning.

In 2010, a dozen Australian architecture students travelled to the famous, Thomas Jefferson designed, University of Virginia to work alongside US architecture students. The brief for students was to redevelop the Arts precinct of the campus to support informal learning and the development of community across the Arts disciplines which included drama, art and architecture. Students found themselves designing within the gaps of the campus while considering what a campus might look like if informal learning was recognised as equal to the learning occurring within the formal or timetabled program. They reflected on their own education and noted the significant proportion of their own learning occurring through peer review and sharing of knowledge. They also noted the very few facilities offered by universities to accommodate informal learning. We encouraged students to locate unexpected activities together and in the process envisage new kinds of spaces. Serendipitous libraries and bathroom studies were invented to sit alongside kitchen counter tutorials. Concurrently, students discovered the quite different design cultures flourishing within the UVa architecture program with students predominantly exploring design through timber model making. In contrast, our students were more expert in developing designs using photoshop and digital presentations as well. UvA students had a tactile form-making approach to design while our students began with ideas. Placing the two groups together in the studio was initially confronting, but became educationally powerful as the groups learnt from each other.

This example is included for two reasons; to illustrate how cultural differences can be a fertile ground for learning and as a prompt to consider whether our universities, organisations and communities support the powerful collaborative learning which often occurs outside the classroom, lecture theatre or office.

6 Application for creative, innovative learning communities

There is increasing acceptance that collaboration across subjects, professions and research fields is desirable for innovative thinking.

Space plays a role in supporting collaborations. Cities, organisations, schools and universities are starting to include spaces for different disciplines to collaborate. The Melbourne Model of university education is partly predicated on the importance of bringing breadth to university study as well as depth. Universities such as Queensland and Melbourne are developing student only spaces to support informal collaborations. New template designs for schools in Victoria are allowing classroom walls to be opened up into learning neighbourhoods and outdoor activity spaces. Some schools are using the adjacent community as a learning laboratory and community members are increasingly using school facilities for life-long learning. Organisations are commissioning buildings to include many more facilities for incidental meetings and are including café style kitchens throughout buildings. Within Melbourne both NAB and the ANZ are modelled as learning communities.

Organisational change plays a role in supporting collaborations. In some universities, formal interdisciplinary groupings are being funded to support new research. At The University of Melbourne, several interdisciplinary societies sit outside the faculty
structure which is both a strength and a weakness. More dramatic organisational and policy shifts will be required in schools, universities and organisations for interdisciplinary research to flourish.

Leadership plays a role in encouraging collaboration particularly when the complexity of transformational change is not recognised within more managerial and quantitative processes.

Organisational, physical and leadership are all needed if effective collaborative environments are to be supported. Finally interpersonal and intrapersonal skills can play a role in supporting collaboration. It is suggested that there is scope for communities and organisations to consider the potential of subversive boundary riders with the necessary passion to infiltrate and negotiate boundary territories.

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How to define physical, social and organisation aspects of renewed disadvantaged neighborhoods

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Abstract

The State of Israel, as other countries in Western Europe and the USA are coping with the physical and social urban deterioration of old and distressed neighborhoods. All types of deprivation found in other places in the world can be traced in Israeli neighborhoods as well. One of the predominant features which distinct the policy and performance of the Israeli Project Renewal (PR) of Distressed Neighborhoods from other countries is the concept of phasing out of neighborhoods where the Project has succeeded to solve, improve, cope with and leave the deprived neighborhood at the take-off point. The article will describe the Israeli experiences regarding the phase out processes, the difficulties, the rational and the way how to get and achieve the exact indicators, both physical and social, and the process of decision making to determine the timing of termination stage of the Project activity. The purpose is to present a practical platform of different variables which all together can help decision makers staying at different junctions to examine the successes and failures of bringing disadvantaged neighborhoods to their take–off point.

The scope, size and the long period of PR's operation has naturally put some limitations in presenting the various different facets of the phasing out issues. The paper will describe and analyze the physical, social, economic, environmental and organizational factors that influence the decisions of phasing out of disadvantaged neighborhoods and will suggest indices and criteria to answer the question: how sustainable are phased out neighborhoods?

This paper is based on the author long experiences in PR and on a research carried out during several years examining different models and ideas of how to terminate Project Renewal involvement in disadvantaged neighborhoods and fixing a policy accordingly. The data and facts are based on best practices found out among these neighborhoods which phased out of Project Renewal and on the policies of local and national levels toward the phasing out issues. In our discussion we relate to the following issues and questions:

- Is there a definition to the so-called "renewed neighborhood"?
- Dilemmas of phasing out processes.
- Physical, social and organizational aspects relate to phasing out decision making.
- Attitude of different government tiers to phasing out policy.
- Factors of failure and success of phasing out.
Lessons that might be transferable.

The international literature regarding renewal projects of disadvantaged neighborhoods does not relate to the issue of phasing out. All programs which have been performed were always limited in time and were replaced by new ones in the same sites. In comparison to the Israeli experiences phasing out was accepted as a policy and the termination stage was not replaced by a new program. Once the activity came to its end phasing out regulations were executed and implemented. In this aspect PR in Israel is unique. Therefore, it is considered as the first experiment to analyze and conclude the phasing out process in renewed disadvantaged neighborhood among Western states.

Phasing out process has its own rational based on political, economic and administrative considerations. One can agree or reject them in accordance to specific conditions existed in the wide spectrum of each state and the roles of different tiers of governments. Phasing out process has been declared as an official policy in spite of the fact that its framework is not being kept as it was intended by decision makers. The reason is due to different agendas by different governments and above all the national priorities that are put forward.

Keywords - project renewal, phasing out policy; renewed neighborhood; sustainability; phasing out variables

Paper type – Academic Research Paper

1 Background to Project Renewal in Israel

Project Renewal (PR) in Israel began in 1977. During its early years it was considered one of the most ambitious programs for neighborhood regeneration in the world in terms of scale and scope. At its peak, in the mid 1990s, Project Renewal encompassed 146 neighborhoods (of which 40 benefited only from physical improvements). The Project currently includes 104 neighborhoods with 1.250 million inhabitants equal to approximately 16% of Israel’s total population. Since its launch, including figures for 2009, PR had invested a total of US$3,100 million in housing improvements; public spaces; education (from pre-school to academic); community organizations; resident leadership and community; employment; welfare; health; and public institutions (centres for childhood development; centres for human capital, youth centres, community centres, elderly clubs, day-care centres).

It was clear to project planners that neighborhood regeneration would only succeed with a good mix of physical and social programs (Ministry of Construction & Housing, Department of Project Renewal 1980-96).

The conditions that made neighborhood renewal necessary have their roots in modern Israel's special history. Large waves of immigrants arrived in the country following the declaration of independence of the new Jewish state in 1948. Within the first three years, the Jewish population doubled, and within 15 years it had tripled. The government faced masses of refugees Holocaust survivors and Jews from Arab countries. The task of absorbing these immigrants was enormous, straining the very limited resources of the young state. A lack of a strategic plan and ignorance of the needs of the immigrants exacerbated the situation. The waves of immigrants continued until the mid 1960s.

The housing policy of the state of Israel was dominated by the country's security needs. This was a major factor in the geographic locations of the many new immigrant settlements. Many immigrants were settled in development towns built in the peripheral areas of the country during the mid 1950s. In addition, new neighborhoods were built, on national land, on the outskirts of large cities where immigrant transit camps had been located. These new neighborhood were all built by government or other public agencies.
Housing constructed to provide immediate homes for immigrant families, was substandard, by today's measures, and the inadequate physical infrastructure initially installed deteriorated over the decades that followed. Service frameworks created over the years were also inadequate and encouraged dependency by the residents. Policy dictated the centralizing of most social service agencies so that they were generally located geographically at a distance from their client population (Carmon, 1999).

PR started operating in 1979. The first group of neighborhoods was selected from a pre-existing list of 160 neighborhoods considered to be in need of renewal. The criteria and the socio-economic indicators for including neighborhoods in PR were based on the data of the population census published by the official Israeli Statistical Bureau (ISB):

- Housing – population density, condition of housing and tenant status (public social housing on rent base or ownership).
- Condition of physical infrastructure – electrical, sewage, water and drainage systems, roads, sidewalk and street lighting.
- Existence and condition of public and educational institutions.
- Dependency ratio, i.e. the ratio of residents under 19 years of age and over 65 years of age to residents 19-65 years of age (dependent population to independent).
- Out migration rate.
- Number of children per family and the number of children defined as educationally deprived by national standards.
- Educational level of heads of households.
- Number of young couples in the care of social welfare services.
- Number of minors with criminal records (Hoffman, 1986).

While the declaration of general national goals of PR was made from the starting point, the operational goals remained largely unstated and evolved with time. In Israel, a program of this kind requires no special legislation except for the standard annual budget approval by the Knesset (the Israeli Parliament).

The actual design of PR was left largely in the hands of urban planners, social and community planners and professionals from the education, employment, health, and welfare sectors. Little direct political input was involved in PR. The program as a whole had no termination date, but each neighborhood was to benefit for only several years until it could reach its "take-off" point towards regeneration. Up to date 62 neighborhoods have been phased out of PR (Weinstein, 1997; Hovav and Weinstein, 1997 and 2002).

The neighborhoods included in the Project are located all over Israel, in urban metropolitan areas, in medium size cities, in developing towns, in mixed Jewish-Arab cities, as well as in Arab, Druze and Bedouin settlements.

2 The project's goals

Over the years the activities of the Project developed to reflect a different set of priorities than the goals that were originally defined for renewal. The following are the goals that were set out at the beginning:

- Improving the quality of life in the neighborhoods: physical infrastructure, improving housing condition and level of public services.
- Increasing and advancing opportunities for educational achievements and employment for all age groups.
- Strengthening residents' involvement and control of their lives and environment.
- Stabilizing the neighborhood, stopping processes of deterioration and out migration, and stopping stigmatization.
Resident participation was one of the key goals of PR and it became the main focus of neighborhood decision making for planning, budgeting, managing and monitoring.

The dynamic changes in Israeli society and as well as continuous changes in the country’s economic conditions resulted in the Project taking a stronger role in, and contribution to, economic development (during years of recession and unemployment), political involvement (changes in the government administration due to elections), demographic changes (absorption of 1 million new immigrants from former USSR and Ethiopia during the years 1989-1995), and influencing planning concepts for the creation of new urban suburbs and new settlements. These new conditions caused policy makers to add new goals to the above mentioned (Ministry of Construction & Housing, 1996):

- Improving the ability of weak population (elderly, one parent family, new immigrants) to function and increasing concern for their needs in the community.
- Strengthening reciprocal interests between the neighborhood and its surrounding environment by developing new common services and service delivery system to a broader population base in the fields of education and culture.
- Increasing income levels of neighborhood residents by catalyzing economic development processes, vocational training and encouraging local entrepreneurial activity.
- Assisting with the social and economic integration of new immigrants into renewal neighborhoods.

3 The project's policy principles

To implement its ambitious goals, PR had to create institutional mechanisms that could deliver its vision. The Project had to shake up existing methods of doing government business. This implied a need for innovation. Carmon, 1989; Alterman and Churchman, 1991; Shimshoni, 2002; Weinstein, 2005):

- The Project is comprehensive, and operates within the context of social and physical integration. Activities in the neighborhoods are done in common with all government ministries involved in PR: Housing, Education, Employment, Health, Welfare, Police, Interior, Commerce Labor and Industry and Absorption.
- No dislocation policy of residents from their homes.
- Allocation of resources on general neighborhood basis.
- Delegation of authority and participation of residents in decision making processes.
- The Project is to be operated on a time limited basis.
- The Project is to be operated without creating new organizational structure.
- Adding services rather than providing subsidies.

4 Development of phasing out concept and process

The term project is defined as an involvement aimed to achieve definite targets during a fix period. Therefore, the process of terminate a project must be structured from its very beginning steps. This generalization is valid mainly to physical projects like building a house and paving road when the stage of termination is clear. This situation is not true when regarding social projects. Their termination date is unclear due to their normative features and the organizational and fiscal implications undertaken as a result of the decision. This complexity is more prominent among urban renewal projects which obliged multi involvement scale in variety of domains such as housing, education,
economy, community and physical development. Each of them needs a different period to cause a planned change.

The decision of termination a social project stemmed from changes in issues that stand in the centre of a national agenda. The professional literature teaches us that governments are inclined to declare on a new national project in a short time after they won the elections. Thus were President Lyndon Johnson in the USA with his Great Society program and War on Poverty and Prime Minister Tony Blair in the UK with his New Deal for Community. It was not the situation in Israel where left and right wings governments seized power. They always continued PR.

The declaration of Project Renewal by the government of Israel in 1977 did not define the notion of phasing out from the Project in terms of inputs, outputs, activity rhythm and the essence of rehabilitated neighborhood. The period of time required to accomplish the main goals of PR in a neighborhood is closely linked to the problem of how to bring PR to completion in neighborhoods that have been in the project since its inception. The five years time frame for Urban Renewal work in the neighborhoods became part of rhetoric surrounding the Project in 1977, but was never formally adopted as a mandatory framework by the government. Nor was this figure related to any systematic notion of how much time is required to “rehabilitate” distressed areas.

Project Renewal is being carried out for the last 32 years in 104 neighborhoods out of 160 which were mapped as distresses neighborhoods. Yet, there are still more than 40 sites on the waiting list. Only 62 neighborhoods completed their mission. The answer to the question: how to define the so-called what is a "renewed neighborhood" is strongly related to the stages and processes engaged by PR policies toward the decision of termination.

Although the central problems of the areas targeted for renewal were for the most part readily apparent from the beginning of the Project, no concrete or quantitative goals were defined which would give a clear set of answers to this question, either in general or in reference to a specific neighborhood slogans such as “the neighborhood should be a place where it is good to live and bring up children” conjured up a vision of what the project was ultimately striving for, but were not specific enough to guide in actual planning.

The fact that no official document by the Intergovernmental Committee (IGC)\(^2\) has been published, so far, beside a short written publication of recommended post organizations models, points out that the issue of project’s termination is very problematic. On one hand, entering to the framework of PR means recruitment of financial resources for neighborhood defined in a state of physical and social deterioration which the local municipality cannot cope with and a resource to establish social and community services and to build public institutions. On the other hand, phasing out from the Project means the termination of governmental ministries involvement expressed in budget, professional personnel and programs. Besides, the network considerations which determine the decisions of phasing out from a “renewed” neighborhood are too wide in their range. This is the reason why it is difficult to relate to those considerations as defined criteria.

The time factor and the duration of the project’s activity have, to some extent, an influence on the decision to phase out from the neighborhood. But even today when the Project is celebrating its 32 years anniversary, there are still neighborhoods remained in the Project because of various reasons, such as: neighborhoods which became the nation social symbols (the Hatikvah neighborhood in Tel Aviv and the Katamonim in Jerusalem) or neighborhoods due to their size and number of residents where it is impossible to rehabilitate them in a defined period of years (Pardes Katz neighborhood in Bnei Brak)
and neighborhood “Dalet” in Beer-Sheva); or neighborhoods in the development towns characterized by low social and economical levels (Ofakim, Netivot, Kiryat Malhachi) located in the peripheral areas of Israel.

The decisions to phase out from a certain neighborhood are stemmed mainly from administrative and financial reasons taken by the Ministerial Committee for rehabilitated neighborhoods. For political reasons the official establishment preferred to use expressions like “decreasing involvement” or “limited involvement”. The IGC decided upon four main planning principles in the year 2000. They have been informed to the Local Steering Committees (LSC) in the neighborhoods and to the local municipalities:

The first was to focus investments of PR budgets up to three most central and influential issues to improve quality of life of each neighborhood and its inhabitants. This principle was kept only partially due to fact that scarce of resources toward the termination date of PR activity had caused strong pressures both on the level of the political decision makers and the citizen representatives together with the local municipality who needed to take the decision on which services will continue and which will be terminated. The decision made was to continue all programs and services but in limited scope.

The second was to limit PR finance of the so-called fixed services delivered by the ministerial offices and to transfer the responsibility for their supply and allocation to the local municipality. This principle was fully executing whether in the way of stopping the service delivery or in the way of changing local municipality priorities.

The third was to form up a new organizational array instead of the LSC. The principle was not implemented in most neighborhoods which phased out of PR. The main reason was the local municipality objection to build new mechanisms of resident representatives which might threat the authority of the mayor.

The fourth was to institutionalizing inter-professional teams and enable accessibility of local services to the residents. The principle was partially implemented through enhancing variety of services and decentralizing the city hall departments’ branches at the neighborhood level.

The phasing out process has raised several dilemmas to the decision makers:

1. **The timing dilemma**: The national establishment received its first decisions about the project termination in the mid 80’s, in a period where resources aimed to social services were cut down. Since then, 54 neighborhoods has phased out mainly from political and economic reasons.

2. **The dilemma of local government’s commitment**: No commitment from the local municipality was given to continue the delivery and supply of social and community services to the neighborhoods due to the end of the budget support by the government ministries and the Jewish Agency. The phasing out stage left an empty space of budget. It was only partially covered by the local government due to changes in priorities and by partnerships built with NGO’s and the business sector.

3. **The dilemma of existing social policy at the national level after the phasing out of PR**: Such a policy was not framed by the central government. Government ministries broke off their “naval connection” budget with local government and the neighborhood level. This situation enforced local governments to change their priorities concerning the absorption of services which have been established and developed during the Project.

4. **The dilemma of “immortalizing the distress”**: Mayors have used this motive as a political justification for neighborhoods which were located in adjacent to better off
ones regarding the using of services built in the neighborhoods by outsiders and the fear of stigma attached to them.

These dilemmas have raised the question of how to define renewed neighborhoods when a decision is made by the ministerial committee. The discussions on how and when to complete the Project in a given neighborhood led naturally to posing the question: Just what is “renewed” or “rehabilitated” neighborhood? Some of the main criteria or considerations that have emerged to determine the progress of a neighborhood are as follow:

The first definition suggested that a “renewed” neighborhood is similar to other neighborhoods of similar “vintage” and location in their urban matrix. Thus, it would be reasonable to compare a renewal neighborhood built on the outskirts of town in the 1950s with others of similar background and location or to compare renewal neighborhoods in town centres with others in the same position. Problematic development towns could be compared with more successful ones.

The second definition suggested that a “renewed” neighborhood is one in which central causes and/or symptoms of distress have been removed and its central problems solved. This could entail the provision of a physical and organizational framework for comprehensive social services, improved schools, better housing conditions and improvements in the quality of the environment. This conception is based on the assumption that it is possible to remedy the disadvantaged status of the neighborhood and the residents by providing them with services or conditions equal to or better than those received by other areas.

The third definition suggested that a “renewed” neighborhood is one where directions of change are positive and where there is little possibility of regression to previous levels of distress. This assumes that the causes will not reassert themselves and that the Project can give the people the necessary “push” to create new norms of behavior, new level of demand for services and the organizational means to maintain them.

5 Variables, criteria and indices of phasing out process

Along with these more abstract, various quantitative and qualitative criteria are also used to assess the progress of the various neighborhoods by decision makers. Changes in the following areas can be measured in quantitative and qualitative terms or described in concrete terms: housing conditions and physical infrastructure, formal education attainments, level and scope of utilization of community services, employment rate, availability of and participation in frameworks for resident self-help and responsibility, the functioning of youth in risk and problematic families, attitude as measured in opinion surveys, and the integration of the neighborhood or town into its surroundings. Achieving these outcomes served decision makers to declare the phasing out policy toward the neighborhood or the city included in Project Renewal. Following are the variables used to define the phasing out processes divided into three main issues: the physical, the social and the organizational aspects.

Physical aspects of rehabilitated neighborhood

1. Solution to dwelling density for households more than 2.0 persons per room: PR main housing policy was to solve dwelling density among households where families of 4+ members were housed in small apartments. Approximately 40,000 units out of 250,000 benefited from the special enlargement policy. It contributed to the well being and welfare of those families with direct positive influences on the social aspects of their life.
2. Refurbishing and renovating of buildings and improving their infrastructure: Part of the enlargement policy was to renovate the buildings and advancing the tenants to modern living and higher quality of environment. Over 80,000 were renovated and stopped the physical deterioration of the neighborhoods.

3. Variety of dwelling stock in high quality: Changes in population age groups, waves of new immigrants and inhabitants from different cultural backgrounds led to the consideration of paying special attention to the dwelling stock in each neighborhood and thus enable differential size both as regard to the apartment and to the family size. In most neighborhoods there is a variety of apartments composed of two, three, four and more rooms.

4. Quality maintenance of buildings, public spaces and facilities: During the last decade of PR activity an attention was given to the necessity of maintaining the huge investments in the physical aspects regarding the buildings and their surroundings.

5. Landscape development: Public spaces, parks, play grounds, pedestrian paths and streets are integrated part of each neighborhood's master plans. Their importance to the ecology, leisure and to the people who live on the site is unquestionable.

6. New constructions in the neighborhood territory: This aspect is the most significant proof to the success of PR in each deprived neighborhoods. New constructions and developments following by entering of stronger population serve as a vehicle to strengthen the neighborhood in a comprehensive physically, socially and economically framework. Besides, new developments in a post renewal neighborhood are the best evidence for the rise of land, apartments and real estate values.

7. Entering of socially and economically new strong populations to the neighborhood: As explained above, this phenomenon is the highlight, to my opinion, to the apex of renewal programs where ever they are taken place because it connect together tenants, services, place, neighborhood, the city and institutions through raising the quality and level of services delivery and quality of life for the benefit of the inhabitants.

8. Rising of land prices values and real estates in the neighborhood comparing to its adjacent surrounding: It must be emphasized that not all neighborhood's locations enjoy the rise of apartment or real estate prices. It is seen especially between geographic and social periphery and central areas compared where the demands for dwelling are higher. PR neighborhoods located in the centre of Israel benefited much from these changes up to 25% compared to five years ago.

9. Improved transportation accessibility: Periphery areas are characterized of less job opportunities and employment zones. These are existed in the central areas of the country with much better transport accessibility. The variable has significant influence on people in the labor age group who are seeking for work. Bringing the periphery closer to the centres of economic through improved transportation means, might contribute to the neighborhood's regeneration.

10. Sustainable environment: It is quite a new "buzz word" began to accumulate momentum in the last decade and has been pushed forward by the green movements as well as by governments. In the Israeli case of PR it is done too slowly and has not an expression as a leading aspect. There is no doubt regarding its importance to the global climate, to decreasing emission, to the greening of open and public spaces and to saving energy. Israeli neighborhoods should study its effects and start to take some steps adopting the sustainable environment policy.

11. Variety of community and public institutions: This aspect has been discussed in the literature as one of the most influential index to estimate the power of and strength of the inhabitants in the neighborhood. These institutions are the heart and core for resident participation, information delivery, places where social, educational and community activities occur, develop services for the residents. The more is the
variety of institutions the better are the inter discipline and inter organizational relationships among them.

12. Creating "sense of place": This term is naturally the consequence of the total sum of variables discussed here. Having achieved them will be expressed by a kind of neighborhood everyone will strive to be part and proud of.

*Social aspects of rehabilitated neighborhood*

1. Development of new services at the neighborhood level which supply services to the greater geographical periphery: The social policy of PR adopted at the neighborhood level is to develop different kind of services from childhood up to elderly. These services took the form of centres where multi functional and professional staff serves the neighborhood residents. Thus we have developed centres of childhood development, human capital, employment and youth centres. The centres are collaboration among different ministries, local municipalities, NGO's and the business sector.

2. Raising education level of the whole population: One of the features of deprived neighborhood before PR inclusion was low levels of education expressed in illiteracy, almost zero percent of students entitle to matriculation certificate and for academy. PR has made a revolution in all aspects of education from childhood to elderly. Among them we can point out of new teaching instruction methods, the use of technology and computers, learning centres, encouraging disadvantaged population to continue their studies at the university and other technological institutions, developing educational enrichment activity. Education level goes hand in hand with employment opportunities and each one depends on the other.

3. Decreasing scope of violence, crime and delinquency: Where abandonment, alienation, lack of employment, low income, social gap between those who have and those who have not, low percentage of people serving in the army, lack of services, scarce of housing proper conditions were presence at the beginning of PR, there is no wonder for the high ratio of non-normative behavior revealed. As improvements began in the physical and social aspects, changes of reducing these norms occurred and the social atmosphere got better. The goal to prevent and withdraw this type of behavior accompanying PR's action up to date with the ministries of education, welfare and social services and the police.

4. Developing human capital: We define human capital as a complex of several elements including employment skills, professional mobility, delivery of information concerning education, vocational training and increasing self motivation. Inhabitants in distressed neighborhoods usually lack personal resources to cope with the world of work. The recent economic slowdown in Israel has led to higher unemployment rate (7.4% in 2009), to reduced revenue and lower spending on public services by both local and national governments. PR has put employment skills and education as its top priority through special scholarships, vocational training in technological institutions and completion of education. Reaching the target of full employment means overcoming social and economic problems inside one family and the greater society.

5. Scope and size of using local services by local residents: Neighborhoods where residents have passed self internal change from using the term "entitlement" to the stage of paying for the use of delivered services are those who act independent and are ready to invest for their benefits and to advance their career mobility. Using local services is a sign of healthy neighborhood.

6. Citizen participation in decision making on policy, planning, budget and consultation: PR made citizen participation in decision making its central principle, the core of all the activities at the neighborhood level. The concept of citizen participation made profound changes: from the absence of formal and informal channels of influence to the present stage where it is an integral part of a decision
making process marked by bottom-up participation policy. The implementation of resident participation policy enabled inhabitants in disadvantaged neighborhoods in Israel to have their voices heard and to be part of an influential body of stakeholders working together to build and manage a sustainable community (Churchman, 1990; Weinstein, 2008).

7. Positive immigration into the neighborhood: This aspect contains the climax of rehabilitated neighborhood becoming an attractive location for outside families who come to settle in a place previously known as distressed neighborhood and its implications. Migration to such neighborhood means to give de facto recognition that it became a normative one with the advantages of variety of services, well managed local government, stronger leading population.

8. Number of local activists and residents who participate is various committees in schools, community centre board of directors, NGO’s and local social services: This variable is the outcome of resident participation in decision making policy. It explains the level of neighborhood's maturity and resident involvement.

9. Social and political mobilization: PR enabled residents participating in LSC and other committees to use them as springboard for several dozens of residents who took advantaged and achieved social and political mobilization such as becoming mayors of their own cities, members of the municipality, board members at the community centre, managers of local services and parliament members.

11. Local patriotism: This aspect can be measured qualitatively by surveys, questionnaires and interviews with residents in the neighborhood. Localism is an important index which explains the inhabitants’ satisfaction from the services delivered and their quality level, the function of community institutions, the relations with local municipality and its departments and the brand of the neighborhood.

12. Cultural and intercultural integration of different population sectors: Most of the neighborhoods included today in PR are populated with veterans, new immigrants, secular and orthodox sectors who find themselves in deep cultural conflicts that need to be solved in order to build community capacity and to overcome differences that avoid establishing a sustainable community. Intercultural integration is one of PR's objects in a period of mixed population living together side by side.

13. Developed democratic values: A neighborhood that adopt norms and values of elections, neighborhood’s committees, accountability, channels of information and knowledge software, civic society and voluntarism achieves the level that leads to self governance. It enable neighborhoods to be responsible and powered by local authorities to manage their own services, plan programs, raise funds and to let residents to participate in the decision process concerned their neighborhood.

14. All residents are given equal opportunities (social inclusion): This variable sum up the above list of criteria and indices regarding resident civil rights. It is part of democratic basic human values entitled to every resident in the neighborhood, no matter his/her gender, belief, education, status or sector belonging.

Organizational aspects of rehabilitated neighborhood

We can divide the organizational aspects related to renewed neighborhood to two main groups. The first contains variables that are bottom-up outcomes processes like developing of new organizational patterns at the neighborhood level; Scope and size of information and knowledge transferring to the neighborhood; Creating strong bonds between local government, NGO’s, voluntary associations, business sector and neighborhood establishments; Scope and size of voluntary sector activity. The second are variables of top-down devolution of powers from local municipality to the neighborhood like: Self-autonomous governance at the neighborhood level, mainly in the management of institutions such as community centre, youth club, elderly club, learning centre;
Changing the local government policy and priorities toward strengthening the community fabric and the social, economic, education and employment fields at the neighborhood level; Economic and social strength empowering of local government to cope with disadvantaged neighborhoods of multi problems and a commitment of local government to absorb services that were established by Project Renewal before the stage of phasing out.

6 Criteria to end Project Renewal activity among deprived neighborhoods

It must be indicated here that no evidence in the professional literature concerning regeneration or urban renewal phased out process was found. In most cases, it was pointed out that the old project was absorbed gradually inside the new one. Such were the renewal programs in the USA: Model cities, The Great Society, Empowerment Zones, Block Grant and HOPE VI (Popkin and Katz, 2004) and in the UK: City Challenge, Single Regeneration Budget (SRB), Urban Priority Areas, Town Improvement Zones (Middleton, 1991) and the New Deal for Community (NDFC) (Robert and Sykes, 2000; Cabinet Office, 2001)).

In comparison the above mentioned programs to the Israeli PR we have found three main differences:

The first, the period each national program has lasted was ten years whereas in Israel it is being operated for 32 years; The second, the reason to change one program with another one among western countries was due to changes in power, social and economic focusing occurred during the years in the States and the UK whereas in Israel changing of governments did not change the focus of PR; the third difference concerned the budget commitment of western states to urban renewal projects whereas in Israel the government commitment is only for one annual budget. This situation put heavy burden on policy makers to fix a strategy for the long run at the national level and forming up a planned process to phase out of a certain neighborhood.

Therefore, it seems that the Israeli Project Renewal is a pioneer launching the process that brings to an end its activity after a period of a comprehensive intervention which cope both with multi dimensions of problems and outcomes. A deep studying in PR documentations (Weinstein, 1997; Hovav and Weinstein, 2002; Weinstein, 2005) reveals the difficulty in defining the timing of the Project termination. There are several factors concerned it:

The first ones are PR aims: During the Project performing period many significant changes occurred in the quality of life among all the population sectors in Israel. Therefore, the aims and targets which were posted in each neighborhood included in the first years of the Project, seems to be irrelevant for the neighborhood's today situation. For example, during the 80’s many of the neighborhoods have selected to raise the percentage of children attending pre-compulsory kindergarten and the preparation for elementary school as their main aims. In comparison to recent years, most neighborhoods have posted both the aim of raising the percentage of pupils entitle for matriculation certificate in a level that enable them to apply for academic studies and the aim to raise the percentage of those who are employed in computer and technology occupations.

The second is the LSC attitude: One of the main and based principles of the Israeli PR is to enable the Local Steering Committee, to define the neighborhood problems, the areas of intervention, the operational aims need for executing the change process in each area and the scope and rhythm of financial allocation for each field according to the duration of the program. Surveys done in the neighborhoods show that there is not always an overlapping among neighborhood aims and the national or urban floor targets averages in
the same area. Besides, it became obvious that changes in its composition contributed very often to the changes in defining the aims during the Project activity (Alterman and Churchman, 1991).

The LSC raised significant questions in front of the IGC: Firstly, according to which criteria LSC should determine the timing to end PR, whether according to those defined by the LSC or according to the national social and economic indices? Secondly, should PR continue to perform its activity in a certain neighborhood until all targets and aims decided upon in the beginning of the Project are being achieved or, should the Project’s task be to create only the organizational frameworks and the deliverance of means which will support and assist the achievements of those aims in the future? Surveys had revealed that the points of emphasis put forward by the LSC are not stemmed solely from the neighborhood’s problems but from its composition and the internal self persuasion of its members (Hovav and Weinstein, 2002).

The third is the IGC attitude: The decision makers at the IGC has discussed the phasing out process and concluded the following issues: Firstly, whether the Project has to decide the termination date of its activity according to the inputs allocated for the main and central aims, or according to the outputs or according to the achievements of the expected results? Secondly, continuing surveys in the neighborhoods found out that there is not always an adjustment between the rhythms of improvements attained in the physical aspects compared to the social ones. In this situation the question asked is: does it make any sense to end activity in one of the two aspects and continue with the other one? Thirdly, on which point should PR focus and emphasize its efforts, whether in the neighborhood as a whole or on its residents as individuals? This distinction became more and more empowered when we came to evaluate the termination date of the Project. Fourthly, what is the necessary duration of Project’s activity in the neighborhood? Fifthly, do we have to continue our intervention in places where the original population is not there anymore? And sixthly, do we have to limit ourselves to the establishment of varied and functional services systems to help disadvantaged population enter the neighborhood?

An excellent example to demonstrate the above mentioned issues is the population exchange in the neighborhood. During the 32 years of the Project’s activity 25% to 40% of the original population in the disadvantaged neighborhoods changed. Analysis of characters of those who left compared to those who entered the neighborhood shows, that many of the residents who benefited of the Project’s inputs in the areas of education, employment and housing, became socially and economically stronger, preferred to move to another better off neighborhood in the same city. New immigrants from ex Russia and Ethiopia settled in the neighborhoods during the mass migrations waves in the early 1990’s, as well as from the periphery and other weaker neighborhoods. In many cases, this fact caused to a regression in the level of development achieved earlier. The above mentioned phenomenon of geographic mobility, characterized mainly the deprived neighborhoods in towns located in the central region of Israel.

The department of PR appointed a committee in 2005 to deal comprehensively with the question of phasing out of the Project and its implications and to suggest the suitable criteria and indices to cope with this issue. The committee suggested adopting the following four policies and guidelines:

The first policy regards the dates and timing of termination the physical and social spheres is not to be necessarily overlapped. It is obvious that physical actions like building infrastructures, housing renovations and public spaces developments are seen in short time whereas social activities take longer duration to be seen and to start their influence. Therefore, it was recommended that the termination gap between them will be
up to 3 years. The fact that today the neighborhoods became more heterogeneous brought us to the recommendation to analysis not only the neighborhood condition as a whole but different parts of its territory. The recommendation was to redefine the neighborhoods borders and to limit the intervention just to the most distressed areas.

The second pointed out several advantages in adopting this policy, because it directly and effectively focused on the Project resources and enabled the local municipality to organize its departments in a better way to absorb gradually those programs which were developed and performed in the past by the Project.

The third relates to the unique marginal addition of the Project that is decreasing along the years. The major contribution occurs in the first 5 to 10 years of activity. In this period of time new and adjustable physical and social infrastructures are established, and organizations of residents' representatives are built and functioned.

The fourth relates to the role of the decision makers concerning the end of PR in the neighborhood is to ask whether or not a positive and continuing tendency of achieving the neighborhood’s aims becomes feasible? Whether or not there exists enough satisfaction from the residents towards their neighborhood? Is the awareness toward the use and the accessibility to social services has been strengthened? (Phase Out Committee, 2005).

These parameters are processes and do not point out on the objective physical, social or economic conditions of the neighborhood in comparison to others or to national indices.

Since neighborhoods and cities are organs in motion it is obvious that their local conditions at the eve of PR inclusion are different compared to their situation today. During the last decade, mass amount of new immigrants have settled in the neighborhoods. Most of them were Ethiopian and Caucasian by origin, single parent families and elderly people, revealed long period of adjustment to the Israeli way of life, norms and values. This fact needed special considerations and the recommendation was to postpone the exit process on the condition that PR activity will focus on these groups of immigrants. Data collected by the Department of Physical Regeneration shows, that most of the neighborhoods are included in the Project more than 20 years but due to significant budget cuts it was impossible to finish the physical actions in a shorter period.

7 Sequences of decision making toward the end of Project Renewal

Table 1 shows the relationships between the socio-economic ladder of neighborhood ranking and the number of inclusion years in PR and the type of urban settlement. The data is based on the ISB used as an official records and accepted facts regarding the physical, social and economic situation of the neighborhoods. According to the ISB censuses there are two scales regarding the fixing of social and economic levels to each urban settlement and neighborhood in Israel (ISB, 2006). The socio-economic scale is based on a list including 16 different variables which are calculated in a formula that places cities and neighborhoods in a relative ranking. In 2006 due to budget cuts by the government, the department of PR has divided all neighborhoods into two categories: In the first are neighborhoods scaled in ranks 1 to 6. They were defined as neighborhood characterized by low socio-economic level that need massive resources and involvement to tackle their problems. In the second are urban settlements scaled 7 and 8. They belong to the delay category. It means that they will be entitled to less allocation of budget compared to the first group due to their location in better-off municipalities' capable adding resources to support PR programs in their neighborhoods.
Table 1. Distribution of socio-economic levels of neighborhoods and urban settlements included in PR

<table>
<thead>
<tr>
<th>Socio-Economic ladder of Neighborhood Rank</th>
<th>No. of Neighborhoods included(1)</th>
<th>No. of years in PR</th>
<th>Type of urban settlements</th>
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<td>Local council</td>
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<td><strong>Total</strong></td>
<td><strong>94</strong></td>
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<td>8</td>
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Source: MOCH, Department of PR. Updated list of neighborhoods. 2010.

(1) The table refers only to urban settlements. There are other 12 local councils including rural settlements. Together it comes to 104 neighborhoods in PR.

Table 2 explains the criteria chosen by the phasing out committee to be adopted by both levels of LSC and IGC involved in the decision making process to terminate PR operations in the neighborhood. Accumulated experiences show that sometimes differences could be created between the dates the physical and social regeneration comes to the end line as a result of the specific problems characterized the neighborhood at the beginning stage. The assumption of the committee for phasing out was that achieving the target of accomplishing 80% of the total refurbishing and renovating of the deteriorated buildings in the neighborhood will indicate the end of physical regeneration in the neighborhood. Due to economic conditions the government decided to reduce the budget allocations aimed for the physical aspects of PR and the outcome has been that less neighborhoods are able to reach that target. The Committee decided that the Project has to focus its resources in refurbishing the dwellings at the individual level and not at the public spaces which are under the responsibility of the Local Municipality. Therefore, a weight of 80% was given to the first parameter and 20% to the other one.

In regard to the decision format to determine the date of Project termination in the social aspects the Committee decided upon four indicators: The first is the institutionalization of improvement processes including three parameters: (a) gradually and continuing improvements of social problems characterized the neighborhood such as unemployment, illiteracy, low education, scarce of social and community institutions; (b) the degree of social services utility; and (c) the satisfactory attitude level of the residents. These indicators differ profoundly from one place to another in their essence, depth of deprivation and in the support they receive in order to cope with the planned changes in the neighborhood.

The second is the social and economic strength of local municipality. Local municipalities that have been ranked in the lower part of the social-economic scale, found themselves in greater difficulties to finance the additional services developed and performed by PR from their own annual budget. The main reasons are the high percentage...
of deprived population who needs these services and the fact that big portion of that population is exempted of paying municipal taxes according to their income test.

The third indicator relates to numbers of years a neighborhood is included in PR. The Committee has performed many discussions concerning the justification of this indicator as a factor to end PR activity. On the one hand, there were those who argued that as long as the aims of the Project have not been achieved PR should not end its operations. On the other hand, there were those who argued that the Project, according to its definition, is a short term intervention activity and its main influences are taken place during the first 5 to 10 years. After 20 years of activity, the influence is decreasing and the budgets are used mainly for accomplishing the local municipality own budget and not as a catalyst for social change. Therefore, the phase out committee has decided that the Intergovernmental Steering Committee will be inquired to declare its argument and justification for each neighborhood which is going to continue its inclusion in Project Renewal programs after a period of two decades.

The fourth indicator deals with the concentration of immigrants populations in the neighborhoods. The phase out committee has decided that in neighborhoods with more than 30% of new immigrants mainly from Ethiopia, Caucus and Buchara, the termination date will be postponed in order to reinforce the programs and activities aimed to their integration process into the Israeli society. Evidences of surveys show that the majority of the new immigrants have entered the deprived neighborhoods during the 90’s, and that most of them are reckoned as poverty population. That fact necessitates the establishment assistance to accomplish their absorption process. The members of the committee have pointed out explicitly that the decision to bring the Project to an end, shouldn’t be based only on the numerical calculation way.

The professional level is required to analysis the reasonability of the scaling outcomes according to additional planning considerations and specific neighborhood problems, such as accomplishing a specific program began in the previous budget year or a new and an unexpected severe social problem which wasn’t known in the past, for example, social tension among new immigrants and veterans.

**Table 2. Criteria to end Project Renewal and its relative weights**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Explanation</th>
<th>Source of Information</th>
<th>Relative Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-founded neighborhoods</td>
<td>Neighborhoods scaled in level 10 and above out of 20 in the social-economic index of statistical areas are excluded of the Project</td>
<td>Israel Statistics Bureau</td>
<td>100%</td>
</tr>
<tr>
<td>Physical Regeneration</td>
<td>Accomplishment 80% renovations of buildings.</td>
<td>Local Municipalities and districts of Ministry of Construction &amp; Housing</td>
<td>80%</td>
</tr>
<tr>
<td>Dwellings &amp; infrastructure condition</td>
<td>Accomplishment &amp; improvement of environmental Infrastructure</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>In the neighborhoods compared to National average</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1170
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Explanation</th>
<th>Source of Information</th>
<th>Relative Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Regeneration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Institutionalization of improving processes according to central regeneration plan</td>
<td>*Rising residents satisfactory</td>
<td>Surveys outcomes</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>*Rising awareness to consume services</td>
<td>Local Municipalities</td>
<td></td>
</tr>
<tr>
<td>2. Social-economic strength of Local Municipality</td>
<td>Social-economic index of population</td>
<td>ISB</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Local Municipality revenue sources</td>
<td>Interior Ministry</td>
<td>5%</td>
</tr>
<tr>
<td>3. No. of years neighborhood included in Project</td>
<td>Duration over 15 years need to have special arguments</td>
<td>Intergovernmental Committee Ministry of Housing</td>
<td>25%</td>
</tr>
<tr>
<td>4. Mass immigrants population need special treatment</td>
<td>New immigrants entered deprived neighborhoods in the last decade</td>
<td>Ministry of Absorption &amp; ISB data</td>
<td>15%</td>
</tr>
</tbody>
</table>


8 How sustainable are phasing out neighborhoods?

In order to answer the question we need to define the term "sustainable community". We will use the definition of the OPDM (2005): "Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all" (p. 5). The definition is comprehensive and contains many components that are interrelated and integrated like social, economic and environment elements. Our paper will relate to the components of regarding the social ones including residents' participation in decision making processes; community capacity building to develop the community's skills' knowledge and confidence; service facilities; long run range of social programs; and local representative leadership.

Regarding the above question and the sustainable components we will present two researches by Weinstein (1997) and by Hovav and Weinstein (2002). They represent two different issues related to the outcomes of phasing out processes from PR neighborhoods in Israel. The first one deal with patterns of democratization and decentralization left in phased out neighborhoods. The second examines the outputs and results of programs operated during PR activity and analyses whether they still continuing or were terminated. These two samples will support our answer to the question of how sustainable are neighborhoods which phased out of Project Renewal.

The author has conducted a research among the first group of 16 neighborhoods which phased out of PR in 1990. The recommendations and the conclusions of the research were adopted by the Ministry of Construction and Housing, Department of Project Renewal as policy and strategic guidelines. Based on a research that last six years (1991-1997) detecting patterns of local democratization and decentralization among neighborhoods which phased out of Project Renewal, we can define successful
neighborhoods by both four significant processes and by factors related to three levels of
government (Weinstein, 1997). The research has indicated four significant processes:
The first regards **citizen involvement process** which is characterized in transition from
the institutionalized model of local steering committee to wider and more developed
models of both community involvement and participation in policy and decision making
in the relationships between local government and neighborhood.

The second process deals with the **financial sources of neighborhood** and it is
characterized in transition from dependency on external sources mainly from government
ministries, the Jewish Agency and local government in the time of Project Renewal, to
independent sources such as the community organization trusts, the voluntary and
business sectors and the community-business partnerships.

The third process concerns the **delegation of powers to citizens**. A transition from
dictations originated and stemmed from national government level to empowerment of
bottom-up processes. Its expressions are: high level of citizen involvement in community
life and the use of collaboration and negotiation strategies toward the surrounding
organizations.

The fourth process concerns the **strategies taken by neighborhoods**. The transition is
characterized by challenging position from advocacy and protest to organizations that
supply and deliver services. That was the most significant change happened in
neighborhoods where multi services centres were developed. This process pointed out on
internalization of behavioral values and norms in local organizations relationships with
their surroundings.

The research presented by Weinstein (1997) relates to the types and factors
influencing the degree of democratization and decentralization neighborhoods which
phased out of PR succeeded to achieve. The research found out three types of local
organization patterns and the factors that define them according to the three levels of
governments: neighborhood, local government and national government. Each level has
its set of factors that influenced the type of organizational pattern that was achieved after
PR phased out.

The first type of factors belongs to the neighborhood level. They compose of nine
variables described below:

1. **Size of neighborhoods**: In small neighborhoods up to 3,000 inhabitants, low levels of
organization were established, mainly neighborhood’s committees which lasted for
short time. But in neighborhoods with more than 5,000 inhabitants, local processes
of citizen involvement, participation in decision making and a creation of a dialogue
between them and both the local and central governments were developed and
established. The size factor had two significant implementations: Firstly, large
neighborhoods became a threshold to services supply. The more services and
institutions (such as: public, community, education) were established the stronger
were the empowerment to citizens both in participation and institutionalized of
democratization. Secondly, large neighborhoods succeeded to enhance their electoral
influence and to achieve greater achievements than small neighborhoods.

2. **Population composition**: Two main groups of demographic compositions influenced
the character of the organization were established after the project ended: The first
group included neighborhoods with homogeneous population who originally
migrated from Asian and North African countries where no tradition of local
democracy developed. The second group included neighborhoods that
contained heterogeneous population included: natives, veterans and new comers. In
this type of inhabitant composition the participation relation was created both with
the local government and service suppliers. That fact enabled the variety of interest
groups to have representatives in the negotiation process.
3. **Number of activists**: Population size and human composition are two main factors to determine the number of activists. Small neighborhoods had five activists, middle size had about 10 and the bigger ones had more the 25 activists not including few dozens of volunteers. This factor has very great influence on the local steering committees and sub-committees.

4. **Neighborhood socio-economic level**: The neighborhood classification according to demographic and social variables (number of capita in the household, dwelling density, country of origin, education level) and economic variables (occupation, income level, percentage of employees, percentage of housing ownership) were explanatory factors to the existed or to the non-existed of local organizations. The higher the rates of social and economic variables, the higher level of organizations pattern were developed.

5. **Neighborhood location**: This factor influenced the neighborhood physical and community development and its services supply level. Neighborhoods located in the outskirts of the city suffered from both physical and social neglect. From the social point of view the physical break up influenced both the frustration and alienation feelings of the citizens and the local government - neighborhood relationships, as well. The groups of neighborhoods located in the outskirts belonged to the first pattern of neighborhoods in which no organization was left after Project Renewal ends. Even the fact that the physical urban gap between neighborhood and city centre was completed, the deep feelings of breaking apart relationships did not change the organizational situation.

6. **Public and community institutions**: This factor had the most important influence on democratization and decentralization processes. The outcomes of the research have proved that these institutions are significant triggers for the development of social and political processes which have great implementations on many fields such as: citizen involvement in the community activities, citizen participation in decision making concerns their life and surrounding, opening of communication channels with the local government, political mobilization and voluntary organizations activities. The institutions are continuing to supply services for both the neighborhood and the periphery in formal and informal education, social services, health, welfare and job training. Inside these institutions relationships among citizens, services suppliers, local government bureaucracy and politicians were established.

7. **Resources held by the citizens**: The research has identified three types of resources: (a) Human resources such as: knowledge, information and legitimacy received from the neighborhood residents; (b) Political resources such as: support of political lobby, political mobilization, electoral influence and participation of neighborhood representatives in the institution boards of management and directors; (c) Financial resources: Since there were no more financial resources after the project came to its end, the citizens understood that they have to make use of their own human and political resources in order to achieve their aims. The better organized neighborhoods held more resources. In some cases the local mayoral offices were depended on the neighborhoods because of their political influence and electoral votes.

8. **Relationships between local organization and local government**: The political resources held by citizens had a significant role in their networks relationships. Many neighborhoods had exercised their electoral influence and translated it to achieve many targets. The local leadership in the neighborhoods had similar political party identification with the politicians in the city hall. That fact had ensured continuation of finance resources to support services supply.

9. **The local organization ability to function**: This ability depends on three variables: the internal structure, the leadership functioning and the extent to which the local organization receives support from the neighborhood’s residents. Only the third type of neighborhoods where new models of organizations were established held three
variables: the local organization has its own hierarchy of roles, it has variety of committees and many members. The organization has institutionalized democratic processes such as: accountability, election and standardized procedures. The local leadership has been defined both social and missionary and took care of the community development. The third group of neighborhoods is supported by local government because it was its initiative to bring the deprived neighborhoods to an equal level in comparison to others in the same city.

The second type of factors which influence the local government included three elements as followings:

1. **The local government concept concerning the project’s termination:** Decision makers at the local government level had three options to cope with the phase out stage: (a) Ending the project activity without any consideration on past experience and to return back to the starting point of relationships between local government and the neighborhood; (b) Receiving the assistance of public institutions networks which were established in the neighborhood such as: community centres and to maintain Project Renewal achievements; and (c) Establishing semi-independent organizations.

In regard to the local government, the termination stage related to three dimensions: The extent of commitment toward the neighborhood during the project cycle life; the extent to which the local government has prepared itself to the termination stage; and the extent of democratization processes established in the neighborhood level.

Research outcomes pointed out that in neighborhoods where active involvement of local government took place during and after Project Renewal period, mutual relationships have been established. Local government that supported citizen demands and cooperated with the central government won the political support of the neighborhood. The expressions of that active support were: achieving much greater budgets from government ministries, allocation of city resources to the neighborhood and extending the professional personnel to the neighborhood. Most local governments absorbed nearly 75% of the total services both in activities and personnel staff compared to the project period. To reach that figure the local government had to change both its agenda and to allocate budget priorities (Weinstein & Hovav, 2002).

2. **The extent of legitimacy from local government to local neighborhood organization:** The local government gave de-jure recognition to a neighborhood where elections campaigns and new patterns of organizations took place after the project ended. In neighborhoods where the veteran leadership remained in power but no elections took place, only de-facto recognition was given. De jure recognition was given to neighborhoods due to two reasons: firstly, local government took the key role for establishing new organization model and secondly, where local leadership had a significant political power component by influencing the re-election of the mayor.

3. **Collaboration between local organization and local government departments:** During Project Renewal period and after it phased out there were several departments that continued their closed relationships with the local organization such as: social services and welfare departments especially the community work department which had the most important role organizing and guiding citizen involvement and participation; education department which had the significant role to change completely the methods of instruction and to improve totally the physical conditions of school buildings; youth and sports departments which collaborated closely with the community centres.

In the third type of factors depended on national level no evidence of factors influencing the neighborhood after the phase out stage was detected on the national level. The central government did not put on its agenda the issue of democratic institutionalized at the neighborhood level and the establishment of either full or partial local independent organizations. This point was important because it did not bring to an implementation stage the social processes which occurred in the neighborhoods. Issues of politics
sensitivity, fear from authorities separation and the fear of losing the governance, and political power of central government were brought up to the surface. In spite of that, we could follow some slow changes which are occurring in the structure and composition of central government concerns the personal election to the prime minister office, and in a growing numbers of local municipalities which may pave the road to future processes. These changes were predicted in the neighborhood management in Jerusalem, the urban quarters in Tel Aviv, the community centre network in Ramat Hasharon and in the local municipality of Yehud.

9 What does the phase out stage mean?

Two types of neighborhoods remained at the aftermath of Project Renewal: those with no future way and those which succeeded to produce both positive outcomes and outputs from their long experiences.

In places where local organizations are continuing their activities and especially where new organizations were established, they are performing cooperative organizations characterized with close collaboration and partnership with local government. These organizations improved the services level, encouraged citizen participation and institutionalized democratic processes such as: neighborhood elections, transferring of information, accountability and management of local services.

Participation and collaboration have achieved three aims: First, creation of new power focus for neighborhood citizens, that is to say, existing of a dialogue between the local organization and local government in which interest groups of citizens are represented; Second, along ways of participation and negotiation strategies, it is easier to achieve resources than in ways of protest and advocacy; And third, collaboration brings to a higher degree of involvement among different circles of citizens who produce greater benefits using the services networks.

In addition, the local municipality gained feedback from the neighborhood through the involvement of citizens in consuming services. The result is an openness of the local municipality, mainly from the part of the politicians and services suppliers and less from the bureaucracy. Local municipality has passed through structural changes such as: decentralization of its own departments namely, social services, welfare, youth, sports and culture. The results are the attaining of social and political silence enabling the local municipality to focus on efficient and controlled planning of services supplied to the neighborhood.

The chart below describes the four patterns of democratization and decentralization of neighborhoods phased out of Project Renewal and their main features (Weinstein, 2008, p.147).
The second research by Hovav and Weinstein (2002) aimed to examine the social, economic and the institutional implications of the phased out process in 17 neighborhoods where PR has ended its operations between 1996 and 2000 according to government decision.

Figure 1. Patterns of democratization and decentralization in phased out neighborhoods

Several questions were asked: Whether or not the services and programs performed and operated by the Project's budget (the total number of services and programs were 268) are continuing after PR phased out?; Whether or not there are differences in the level of the services and programs operation?; Are these differences could be explained using variables such as: geographical characteristics, services domain, targeted population, demographic changes, level of neighborhood's organization, the services organizational array, changes at government policy priority?; and what are the lessons learnt. The research findings are presented below:

1. The neighborhoods are located in settlements where the socio-economic level (divided into 10 clusters where 1 is the most distressed) was 4-6 (13 out of 17 neighborhoods) and 7-8 in 4 neighborhoods.

2. The average duration of a neighborhood included in PR was 18.6 years in comparison to 15.2 years among neighborhoods phasing out in 1995 due to budget cuts on one hand and mass waves of new immigrants entering the neighborhoods on the other hand.

3. In most neighborhoods two tendencies of population growth and age distribution changes occurred due to suburbanizing processes among settlements where low density attracted families to improve their quality of life and the new developments in the neighborhoods attracted new immigrants because of the relatively low housing prices. The age group of 0-19 became dominant (35.1%) among the total population.

4. Budget investments in these neighborhoods ranged from 650,000$ to 6 millions $ during the PR activity.

5. The gap in scope of investment is due to two factors. Firstly is the time of inclusion in PR: neighborhoods included in PR during its first decade enjoyed ample of resources compared to those included in the 1990's due to the small number of neighborhoods in PR at that time; and secondly, numbers of years the neighborhood was included in PR.

6. In order to examine the question to what extent programs are continuing or terminated after PR has phased out? we used several categories

   a. **The program continues and has been extended**: In this category all programs which compose part of social services infrastructure established by the initiation of PR such as centres for childhood development and elderly activity. This category holds 9.3% of the 268 programs that were examined.

   b. **The program continues in the same scope as in PR**: This tendency is significant among programs where the major investment was in labor personnel (social and community workers, clinical communication, librarians). When PR phased out, local municipalities took over responsibility and continued their employment. This category included 41.8% of all programs.

   c. **The programs continue in a limited scope**: This category is due to lack of budget or to a decrease in demand for specific service such as learning centres. They composed 8.3%.

   d. **The program is operated in a different array**: In this category programs are continued but in a different framework. For example, a psychological service given in the neighborhood's clinic, serves today a wider population area. These services are 13.8% of the total programs.

   e. **The program is terminated**: In this category are programs that fulfilled their purposes and there is no need to be continued such as pare-professionals neighborhood workers whose function was to increase the awareness of using local services. They consisted 12.3%.
f. Programs terminated due to lack of budget or lack of organizational framework enabling the finance of the programs. They composed 14.6% of the total sum of programs.

It must be emphasized that 72% of the total programs that have been operated during PR in the years 1996-2000 are still continuing after PR has phased out by local authorities. The explanations for that most significant fact are:

a. Strengthening awareness among the local level to the significant contribution of the social programs of PR to improve quality of life of neighborhoods' residents.

b. Involvement and participation of local authorities departments in planning and operating social programs funded by PR increase the chances of absorbing them after the project has phased out.

c. Gradual decrease of PR budgets in neighborhoods where it plans to end its activity, enable the gradual absorption of the social programs by the local authorities.

d. PR has caused to local authorities' agenda to pay special attention to deprived neighborhoods in their territory and to develop local residents groups which put their own pressures on public elected personal to continue the most effective social programs.

e. PR has prepared local residents in special workshops how to raise funds from the business sectors and NGO's and to build successful partnerships.

<table>
<thead>
<tr>
<th>DOMAIN</th>
<th>NO. OF PROGRAMS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHILDHOOD</td>
<td>46</td>
<td>17.2</td>
</tr>
<tr>
<td>LEARNING CENTRES</td>
<td>61</td>
<td>22.8</td>
</tr>
<tr>
<td>AFTER SCHOOL CLUBS</td>
<td>6</td>
<td>2.2</td>
</tr>
<tr>
<td>ENRICHMENT</td>
<td>22</td>
<td>8.2</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YOUTH IN RISK</td>
<td>23</td>
<td>9.3</td>
</tr>
<tr>
<td>DRUG ABUSE</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>COMMUNITY ACTIVITY</td>
<td>22</td>
<td>8.2</td>
</tr>
<tr>
<td>SOCIAL ACTIVITY</td>
<td>5</td>
<td>1.9</td>
</tr>
<tr>
<td>HUMAN CAPITAL</td>
<td>47</td>
<td>17.5</td>
</tr>
<tr>
<td>ELDERLY</td>
<td>7</td>
<td>2.6</td>
</tr>
<tr>
<td>OTHERS</td>
<td>25</td>
<td>9.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>266</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Figure 2. Distribution of central domains which remained after PR phased out

The domains represent main fields of programs absorbed by local authorities. Each of them contains different activities, for example: Human capital centres deal with topics of completing basic education, vocational training and preparing for the framework of working. The domains are explained below:

a. Childhood: This category includes programs for ages 0-5 and focus in treatment and preventive activities for both children and parents. Three Departments are involved: Health, Welfare and Education. PR established integrative and holistic frameworks which supply the needs for that population. The high percentage represented in figure 4 is due to the consensus among parents and professionals about the significance of childhood

b. Learning Centres: Most programs are targeted at improving basic skills of reading, writing, language and numeracy among elementary pupils and raising the percentage of eligible students for matriculation. The programs have been implemented into the formal educational system.
c. After school clubs: All programs are continuing their performances as a decision taken by the government to extend school hours among deprived areas.

d. Enrichment activity: The domain includes community programs performed among community centres. Many of the customers are new comers holding higher socio-economic status settled in the neighborhoods and are aware of using leisure and cultural activities.

e. Youth in risk: Youth in risk remained an unsolved problem among many neighborhoods due to the new immigrant's waves of 1990's. Difficulties of socio-economic absorption into the Israeli society contributed to that phenomenon. Programs are concentrated on prevention, youth business enterprise, young leadership, parents and youth activity.

f. Community activity: Community that is well functioned and residents' empowerment are central aims of PR. Programs are targeted to establish local residents organizations, interested groups, varied resident committees and citizen involvement and participating in decision making processes.

g. Human capital centres: The significance of this category is shown in the high percentage of continuing programs (17%) after the stage of phasing out. The category includes all programs aimed at raising the level of family income, learning vocational skills, upgrading employees at their working place, completing formal education of 10 to 12 years and preparing for academic studies as well.

h. The domains of drug abuse, elderly and social activities have been delivered to the responsibility of other agencies, Ngo's and foundations that continue to support these programs.

10 Conclusion

The paper related to the question of how to define physical, social and organizational aspects of the so called "renewed neighborhood". Adding to that the issue of timing the termination of Project Renewal and the answer seems to be quite a problematic in spite of the fundamental experiences of those who lead the Project Renewal comprehensive policy. The task to create an acceptable procedure toward the phase out stage is very complex and it is integrated with many interrelationships factors which are dependent on each other.

The administrative and political parameters seem to be more dominant in the Project but thanks to the professional Committee that leads all steps ahead and supervises the inputs, outputs and outcomes of the programs, a reasonable framework has been determined towards one of the most significant issues Project Renewal is challenging.

The lessons learnt from the two researches that investigated phasing out processes and their outcomes teach us significant points that might be the guidelines for better understanding the issue. The research shows the high percentage (72%) of continuing programs in deprived neighborhoods after PR had passed out and point out the fact that local institutions and organizational frameworks are aware of the Project's contribution to improve dramatically quality of life in these neighborhoods.

There is a great significance to the fact that local governments and professional bodies are involved in building the process of decision making regarding those programs that will remain after phasing out of PR. The more head of departments are engaged the higher is the rate of absorption specific programs.

Programs that are characterized and defined as universal and serve a greater population comes from outside the disadvantaged neighborhood are of higher potential to continue their performances when PR has phased out. They include programs which adopted the idea of being a social service "centre" like childhood development centres,
youth, human capital and community centres. In addition to that are programs that aimed to build the community capacity, too.

Programs which could raise funds from different sources had better chances to continue their activity compared to programs depend solely on government allocations. These are programs of social and community enrichment activities and volunteering action in the community. The gradual transferring process of both programs and professional personnel to the local authority supported the absorption and implementation process when PR has phased out from the neighborhoods. It approves that PR had a significant influence on local authorities and their departments.

The fact that 62 neighborhoods have phased out of PR teaches us that the policies adopted by different levels of decision making acting in PR's committees like the LGC, the LSC and the Interested Groups of residents are implemented. The criteria, indices and variables that were designed to build the framework of phasing out procedures are acceptable as guidelines policy to each neighborhood. One has to keep in mind that the urban arena and the national economy are changing all the time, especially during periods of crisis, fiscal condition of local authorities and changes in demographic composition of the neighborhoods.

To sum up, we present here a list of both supportive and preventive factors based on the Israeli experiences of phasing out of Project Renewal neighborhoods considered to be on the course of taking –off point. We suggest that this factors can be considered, tested and be used as a frame define and to establish "renewed neighborhoods" elsewhere in democratic countries. It is clear that there are differences between Israel and other countries concerning the political system, culture, socio-economic conditions and demographic composition history of urban renewal, governmental priorities and more. The list below is not complete, but it points out the most influential and important variables and factors as experienced and functioned in PR.

Factors of failure
An administration using regeneration policy for short-term solutions; social and economic issues that are not on the public and government agendas; a powerless mayor; demographic composition (long term residents, new comers, youngsters); population changes (in and out- migration); lack of information; a majority of tenants living on rent in public housing; lack of residents skills; the lack of community building; a lack of community institutions; lack of authentic neighborhood leadership; low financial investments; shortage of professional personnel.

Factors of success
A city Hall that cares; professional staff aware of decentralization processes; socio-economic level of the neighborhood/city; the degree of legitimacy given to resident representatives; a pragmatic resident committees; a community that works according to a "SMART: (Special, Measurable, Achievable, Realistic) vision, strategy and policy development; resident involvement in volunteering activities; community cohesion; and variety of community institutions.

As stated above, these factors should be analyzed everywhere in accordance with the particular context. The author believes that the definition of a neighborhood phasing out process can be achieved through bottom up policy of resident participation from the very start of urban renewal program together with other stakeholders representing different government levels as well as the public, private and the business sectors. Besides, there is a need to adhere to these indicators, variables and parameters and learn from our own experiences to create a codex which will enable us to work along with its systematic and explicit interpretation.
The chart below summarizes the steps of decision making process and policy a neighborhood has to take if it successfully allocates the last three years given by the IGC to take the right decisions and shape the future of both the neighborhoods and its inhabitants and bringing it to the take-off point.

### Steps to be taken by a neighborhood in the last three years before phasing out

<table>
<thead>
<tr>
<th>Time table</th>
<th>IGC announcement of phasing out process to local government and residents including policy guidelines and budget allocations to empower neighborhood before phasing out of Project Renewal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third year before Phasing out</td>
<td>Establishing and performing of think tanks teams including local government, local services suppliers, tenants, stakeholders and business sector representatives divided to interested groups in the fields of physical, formal and informal education, local services, economic development, human capital development, employment, community and voluntarism.</td>
</tr>
</tbody>
</table>
| Second year           | Steps to be considered and discussed by think tanks teams:  
- What should be improved  
- New priorities of local government  
- Mapping neighborhood's state of art  
- Functioning survey of social services  
- Empowering residents leadership  
- Fund raising  
- Integrating the neighborhood in the urban mosaic  
- Establishing local NGO's  
- Dwelling buildings maintenance  
- Develop organizations to operate local services  
- Gradual transferring of PR programs to local authority |
| One year to Project Renewal Termination | Institutionalization of processes to continuing operation of community services  
- Establishing neighborhood administration  
- Decentralization and devolution of powers to local citizen organization  
- Signing a convention between local authority and neighborhood management |
| Final Phasing         | Continuing the management process at the local neighborhood: Community capacities, strengthening local services, residents are volunteering to participate in Interested Groups. |
|                       | Reaching the take-off point of an independent function of the neighborhood |
Notes


2. Inter Government Committee (IGC): The committee is composed of government ministries representatives who are partners in Project Renewal. The ministries are: Housing and Construction (head of the committee), Education, Health, Welfare and social Services, Employment and Industry, Absorption. The IGC is responsible of the strategic and policies of Project Renewal.

3. Local Steering Committee (LSC): The most important organ of Project Renewal and the vehicle which entitled the residents of the neighborhood to be part of decision making processes regarding planning, budgeting and prioritizing aspects. The committee is composed of 50% residents elected and 50% of local municipality head of departments and government representatives at the district level.

4. Fixed services: The term means that services which developed by PR will be allocated financial and personnel support for a period of three to five years depend on the kind of program or service and then the responsibility is delivered to the local authority or another local agency.

5. Jewish Agency: A national organization of the Jewish communities in Israel and abroad. It became an important partner of PR during its first seven years. It created the so-called "Twinning Projects" where a Jewish community abroad adopted a community in Israel and raised funds to build community institutions (schools, kindergarten, libraries, community centres, day-care centres, elderly and youth clubs) to improve the quality of life in areas of social services, education and community capacity.

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Social capital, knowledge sharing and knowledge assets among residents in disadvantaged neighborhoods the case of Israel project renewal

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Structured Abstract

Purpose – The purpose of this paper is to address the subject of social capital, knowledge sharing and knowledge citizenship from the perspective of Project Renewal that made citizen participation in decision making its central principle, the core of all the activities performed at the neighborhood level. It focuses on a case study of Project Renewal in disadvantaged and underserved neighborhoods in Israel. The paper describes the concept of citizen participation utilizing social capital, knowledge sharing and knowledge assets in disadvantaged areas, how it developed in practice, its organizational changes and its new form in Project Renewal neighborhoods in Israel. In addition, it considers which factors contribute to or impede the development of citizen participation and the lessons learned during its 30 years of existence regarding the strengthening of social capital elements.

The paper analyzes and examines the process of social capital building among disadvantaged neighborhoods, and how planners and policy decision makers can invest in social capital infrastructure to improve the well-being of the disadvantaged.

Design/methodology/approach - The citizen participation concept as implemented in Project Renewal presents distinct organizational methods. Its importance is in the significance transformation of resident participation concepts changes in neighborhood rehabilitation: from the absence of both formal and informal channels of influence to the present stage when it is an integral part of a community decision-making process. The implementation of a resident participation policy through social capital principles and establishing knowledge base to enabled inhabitants in disadvantaged neighborhoods in Israel to have their voices heard and to be part of an influential neighborhood body of stakeholders working together to build and manage sustainable community.

We have divided the issue of resident participation in Project Renewal into three parts. Each of them covers a specific period and has its own characteristics: The first period, from 1979 to 1988 represents the climax of resident participation - the establishment of local steering committees; The second period from 1989 to 1998 represents the sharp decline of resident participation in approximately two third of the total neighborhoods; The third period began in 1999 and is still on-going, represents the creation of a new type
of resident participation namely, leading interest groups. In our discussion we relate to the following issues and questions:

- Social capital and community development.
- Knowledge sharing and knowledge assets of resident participation.
- Residents’ part in decision making processes.
- The degree of powers devolution transferred to neighborhood's community.
- To what extent was social capital implemented into resident participation concept.
- To what extent were democratization and decentralization achieved.
- Long run influences of resident participation utilizing social capital and knowledge sharing.
- Lessons that might be transferable.

Public participation in decision making processes on one hand, and PR on the other hand, are two interrelated issues that have drawn great attention in the last 30 years. In the world at large and in Project Renewal in particular, the public was involved in decision making but this kind of partnership often led to disagreements especially in the framework of Project Renewal. The issue of “Public Participation” has been discussed in the professional literature of urban planning, political science, public administration, architecture, person-environment relationships, community organization and labor relationships. No wonder, that the concept of “Public Participation” has many meanings and definitions. In Hebrew, this notion has several terms. We can distinguish between “Partnership” and “Participation” (Law-Yone, et al 1981): The first describes the initiative and the actions of the local authority personnel and professionals interested to involve residents in the decision making process. The result is TOP - DOWN policy. The second term relates to the act or instance of taking part. It expresses the residents' actions responding to the initiation or to initiate the involvement themselves. The result is BOTTOM - UP policy. Project Renewal policy adopted the second

**Originality / value** - The establishment and development of leading groups methodology in disadvantaged neighborhoods became the leading leadership and responsible to create self governance and to manage the delivery of services to the residents. It puts in evidence the abilities and skills of a community to collaborate together and to build strong social capital base and knowledge base. In addition, it describes different ways to combine social capital and knowledge sharing at the neighborhood scale and expands their roles in community revitalization.

**Practical implications** - The outcomes of the application are the best evidence that citizen participation in decision making process in deprived neighborhoods is not just a slogan but an approach and policy that have practical implications. The Israel experience an investment in building social capital among deprived neighborhoods can serve other countries to learn what processes are more suitable and applicable for them.

**Keywords** - citizen (residents) participation; social capital; leading groups; decentralization; democratization

**Paper type** – Academic Research Paper

1 **Background to Project Renewal in Israel**

Project Renewal in Israel began in 1977. During its early years it was considered one of the most ambitious programs for neighborhood regeneration in the world in terms of scale and scope. At its peak, in the mid 1990s, Project Renewal encompassed 146 neighborhoods (of which 40 benefited only from physical improvements). The Project currently includes 104 neighborhoods with 1.250 million inhabitants equal to
approximately 16% of Israel’s total population. Since its launch, including figures for 2009, Project Renewal had invested a total of US$3,100 million in housing improvements; public spaces; education (from pre-school to academic); community organizations; resident leadership and community; employment; welfare; health; and public institutions (centers for childhood development; centers for human capital, youth centers, community centers, elderly clubs, daycare centers, and for new immigrants). It was clear to project planners that neighborhood regeneration would only succeed with a good mix of physical and social programs (Ministry of Construction & Housing, Department of Project Renewal 1980-96).

The conditions that made neighborhood renewal necessary have their roots in modern Israel's special history. Large waves of immigrants arrived in the country following the declaration of independence of the new Jewish state in 1948. Within the first three years, the Jewish population doubled, and within 15 years it had tripled. The government faced masses of refugees: Holocaust survivors and Jews from Arab countries. The task of absorbing these immigrants was enormous, straining the very limited resources of the young state. A lack of a strategic plan and ignorance of the needs of the new immigrants exacerbated the situation. The waves of immigrants continued until the mid 1960s.

The housing policy of the state of Israel was dominated by the country's security needs. This was a major factor in the geographic locations of the many new immigrant settlements. Many immigrants were settled in development towns built in the peripheral areas of the country during the mid 1950s. In addition, new neighborhoods were built, on national land, on the outskirts of large cities where immigrant transit camps had been located. These new neighborhoods were all built by government or other public agencies. Housing, constructed to provide immediate homes for immigrant families, was substandard, by today's measures, and the inadequate physical infrastructure initially installed deteriorated over the decades that followed. Service frameworks created over the years were also inadequate and encouraged dependency by the residents. Policy dictated the centralizing of most social service agencies so that they were generally located geographically at a distance from their client population (Carmon, 1999).

Project Renewal started operating in 1979. The first group of neighborhoods was selected from a pre-existing list of 160 neighborhoods considered to be in need of renewal. The criteria and the socio-economic indicators for including neighborhoods in Project Renewal were based on the data of the population census published by the official Israeli Statistical Bureau (ISB). They included: Housing – population density, condition of housing and tenant status (public social housing on rent base or ownership); Condition of physical infrastructure – electrical, sewage, water and drainage systems, roads, sidewalk and street lighting; Existence and condition of public and educational institutions; Dependency ratio, i.e. the ratio of residents under 19 years of age and over 65 years of age to residents 19-65 years of age (dependent population to independent); Out migration rate; Number of children per family and the number of children defined as educationally deprived by national standards; Educational level of heads of households; Number of young couples in the care of social welfare services; Number of minors with criminal records (The Jewish Agency Renewal Department, 1982; Hoffman, 1986). The neighborhoods are located in urban metropolitan areas, in medium size cities, in developing towns, in mixed Jewish - Arab cities, as well as in Arab, Druze and Bedouin settlements.

While the declaration of general national goals of Project Renewal was made from the starting point, the operational goals remained largely unstated and evolved with time. In Israel, a program of this kind requires no special legislation except for the standard annual
budget approval by the Knesset (the Israeli Parliament). The actual design of Project Renewal was left largely in the hands of urban planners, social and community planners and professionals from the education, employment, health, and welfare sectors. Little direct political input was involved in Project Renewal. The program as a whole had no termination date, but each neighborhood was to benefit for only several years until it could reach its "take-off" point towards regeneration. Up to date 54 neighborhoods have been phased out (Weinstein, 1997; Hovav & Weinstein 1997 & 2002).

2 The project's goals

Over the years the activities of the Project developed to reflect a different set of priorities than the goals that were originally defined for renewal. The following are the goals that were set out at the beginning:

- Improving the quality of life in the neighborhoods: physical infrastructure, improving housing condition and level of public services.
- Increasing and advancing opportunities for educational achievements and employment for all age groups (human capital goals).
- Strengthening residents' involvement and control of their lives and environment (social capital goals).
- Stabilizing the neighborhood, stopping processes of deterioration and outmigration, and stopping stigmatization.

Resident participation was one of the key goals of Project Renewal and it became the focus of neighborhood decision making for planning, budgeting, managing and monitoring. The dynamic changes in Israeli society and as well as continuous changes in the country’s economic conditions resulted in the Project taking a stronger role in, and contribution to, economic development (during years of recession and unemployment), political involvement (changes in the government administration due to elections), demographic changes (absorption of more than one million new immigrants from former USSR and Ethiopia during the years 1989-1995), and influencing planning concepts for the creation of new urban suburbs and new settlements. These new conditions caused policy makers to add new goals to the above mentioned (Ministry of construction & Housing, 1996):

- Improving the ability of weak population (elderly, one parent family, new immigrants) to function and increasing concern for their needs in the community (social networks).
- Strengthening reciprocal interests between the neighborhood and its surrounding environment by developing new common services and service delivery system to a broader population base in the fields of education and culture (trust and bridging).
- Increasing income levels of neighborhood residents by catalyzing economic development processes, vocational training and encouraging local entrepreneurial activity (economic and human capital).
- Assisting with the social and economic integration of new immigrants into renewal neighborhoods (social networks and sense of belonging).

3 The project's policy principles

To implement its ambitious goals, Project Renewal had to create institutional mechanisms that could deliver its vision. The Project had to shake up existing methods of doing government business. This implied a need for policy innovation. (Carmon, 1989; Alterman & Churchman, 1991; Shimshoni, 2002; Weinstein, 2005):
• The Project is comprehensive, and operates within the context of social and physical integration. Activities in the neighborhoods are done in common with all government ministries involved in PR: Housing, Education, Employment, Health, Welfare, Police, Interior, Commerce Labor and Industry and Absorption.
• No dislocation policy of residents from their homes.
• Allocation of resources on general neighborhood basis.
• Delegation of authority and participation of residents in decision making processes.
• The Project is to be operated on a time limited basis.
• The Project is to be operated without creating new organizational structure.
• Adding services rather than providing subsidies.

4 Development of public participation in Israel and abroad

The principle of public participation became common during the 1960s. Alterman & Churchman (1991, pp. 226-7) pointed out several trends that brought about that development:
• The acceleration in governmental institutions and the extent of involvement in the lives of the citizen and the increase sense of alienation between citizens and the government authority (Kasperson & Breitbrat, 1974; Kweit & Kweit, 1981).
• The fact that government policy is executed by bureaucrats who are not as affected as their political colleagues to citizens influences (Warren & Warren, 1977).
• Negative reactions to the Urban Renewal plans of the 1950s, and the awareness that physical regeneration which does not integrate with social sphere is judged a failure (Landsberger, 1980).
• The residents’ criticism against the power and influence of the so-called “experts” on one hand, and their continuing recognition of direct contact with the residents, in order to understand their will and priorities and preferences (Wooley, 1985).

These trends were summarized by Susskind & Elliot (1983): "For advocates of participation, citizen involvement in government decision making is synonymous with (a) DEMOCRATIZATION of choices involving resources allocation, (b) DECENTRALIZATION of services systems management, (c) DEPROFESSIONALIZATION of bureaucratic judgments that affect the lives of residents, and (d) DEMYSTIFICATION of design and investment decisions" (p. 3).

The above trends became common to the extent that the principle of public participation was accepted in many countries with different cultural, historical traditions, economic and political structures. Urban planning and social planning are matters that concern interrelated problems, issues and interests among different groups in society. Therefore, the significance of the term “Public Participation”, the targets and aims of participation and the ways to achieve them, are the focus of disputes, since public participation can serve to describe a variety of issues and frameworks of stakeholders.

Programs that emphasized resident participation were implemented in the USA, The Netherlands, Israel and other countries (Alterman & Cars, 1991). In the USA the first programs were initiated by non-governmental bodies and their influence went beyond their size and scope (Boyte, et al, 1986; J. Perelman, 1979). During the Kennedy Administration the OEO (Office Economic Opportunities) and The Great Society program in the Johnson Administration concentrated on residents empowerment; It was the first time that the poor became central players on the stage and were not entitled only
to welfare benefits. The OEO program emphasized that “the poor involvement in planning, designing, policy and project operation form a vital aspect” (Moynihan, 1969:97) and it encouraged social action groups to by-pass the City Halls and their deteriorated political mechanisms.

During the 1960s and the 1970s the new program – Model Cities – strived to achieve citizen participation in a consensus approach through frameworks of forums between citizens and City Halls. The demand was to enable what Moynihan termed "Maximum Feasibility Participation" and Arenstein (1969) termed "Ladder for Citizen Participation". But in less than one decade the Community Development Block Grant Program replaced Model Cities and gave less emphasis to resident participation. The cities were given powers and authority to “consult with residents”. But, in a very short time, national budgets were transferred from social programs to plans that supported economic growth. In many cities the result of this change was critical as significant budgetary cuts affected the financing of the projects.

In the winter of 1993-4 Vice-President Al Gore launched a new community program known as Empowerment and Enterprise Zones which offered financial assistance to communities in distress - for schools, communication, housing, and infrastructure in rural areas. The state governments, local authorities and local communities could create partnerships among themselves and bid for resources given by the central administration. In other countries, integrated physical and social programs were implemented, but little attention was given to resident participation. The government of Canada in 1970 set up a scheme for resident participation but it was mainly concerned with physical improvements and ended after few years. The French government included social provisions but they did not ask for resident participation. In contrast to the above, the Netherlands’ program for neighborhood regeneration had as its aim neighborhood development and active resident participation (Alterman & Cars, 1991). The UK government launched a new regeneration program in 1996 known as the New Deal for Communities (NDFC), which accompanied the Local Strategic Partnerships for resident participation (Fisher and Sarker 2006).

5 Social capital and community development in disadvantaged neighborhoods

The literature dealing with the concept of social capital is vast as well as complex and concerns many interpretations. In our survey, we will focus mainly on the professional literature that deals with the relationships between social capital and deprived neighborhoods, community development in poor neighborhoods and their practical implications for residents who build social capital among their communities to benefit its advantages.

Researchers like Putman, Rohe, Briggs, Coleman and others, working with the concept of social capital have gradually but unmistakably converged on a lean-and-mean definition that focuses on social networks and the associated norms of reciprocity (JAPA, 2004). They relate to social capital concept in variety of meanings and definitions regarding different issues that characterized society. Many definitions have been suggested for social capital concept. Following in a brief summary of different definitions:

Light and Gold (2000) argue that disadvantaged and impoverished people are relatively more likely to have access to social capital than to other forms of capital like human, physical and cultural. Relative to other forms, social capital is uniquely democratic with respect to accessibility. They define social capital as relationships of trust and social networks. Embedded social trust enables action whether it is present.
Coleman (1988) argues that social relationships become capital, a store of value when participants can rely upon one another to uphold social norms and to reciprocate help. This reliance permits the participants to make instrumental use of relationships of solidarity and to conserve the resource that spontaneously emerges from them – mutual trust. Regarding the poor people, Colman explains that they have limited ability to create and maintain social capital. Admittedly, many forms of social capital are inversely related to socioeconomic status. When poor people have social capital, they are better off. For instance, in neighborhoods where residents have more organizational memberships, workers display a lower likelihood of long term joblessness (Lichter & Oliver, 2000). According to Massey (1999), “people gain access to social capital through membership in networks and social institutions and then convert it into other forms of capital to improve or maintain their position in society” (p. 43). Using their social capital, the poor mobilize politically, turn out to vote, and elect governments that improve public education, fund cultural events, parks and community institutions. In other words, the social capital of the poor, expressed in political mobilization, expand their access to human, cultural and finance capital.

Briggs (2003) raises three important questions following the trade of social capital to other forms and its relation to inequality, political power and action ability: (1) how social capital relates to economic inequality in that not all social ties are created equal; (2) how the concept relates to political action and political power, including the possibility that some degree of parochialism and exclusion is nearly inevitable as planners and decision makers work to build social capital with and within their communities; and (3) how is one to take a resource concept such as social capital and make it action-able.

Briggs (2003) and Putman (2000) describe two faces of social capital as an individual good and a collective good. The first is a resource that helps us and our constituents to solve problems from the everyday to the crisis level, reaching out along networks, drawing norms of trust and reciprocity and other social bonds through which so much of our lives are informally organized. Social resources that help us to get by or cope with particular challenges are referred as social support, while those that help us to acquire something valuable and scarce in order to change our opportunity set and get ahead in life are referred as social leverage (Briggs, 1998). Both support and leverage types of aid are viable aspects of social capital in use.

The second face of the concept – social capital as a collective good – is a resource possessed by social system that helps the system as a whole to solve problems. As Putman (2000) and others instruct, communities that are rich in civic participation and relatively high levels of social trust are rich in social capital in this collective sense: It is a resource that may benefit many members of the community, even those who do not themselves participate actively or trust much.

Rohe (2004) relates to the social capital and its application to community development. He addresses three questions: (1) what are the essential elements of social capital at the neighborhood scale? (2) how the level of social capital can be measured at the neighborhood scale? (3) can social capital be developed at the neighborhood scale, and if so, how? Rohe suggests that social capital is what sociologists and community planners have been talking about for long time: citizen engagement, interpersonal trust, and effective collective action. This can be thought as a model linking together the three mentioned elements. Putman (1995) defined social capital as "social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (p.67). In Putman's definition there is an implied set of relationships that begins with civic engagement. Those who are civically engaged will be involved in a network of
local social relationships, which will lead to greater impersonal trust. That increase in trust, in turn, will lead to more effective collective action and ultimately to both individual benefits, such as increase in housing values (Temkin & Rohe, 1998), and social benefits, such as a stronger local economy (Putman, 1993, 2000). Rohe (2004) distinguishes between social networks and social capital. The former refers to the interaction patterns in society and the second is concerned with how interaction leads to trust and, ultimately, to effective collective action.

Based on this definition, Rohe suggests including four key constructs of assessments social capital in the community: the level of community engagement; gauging the characteristics of local social networks; assessing levels of trust among community members; and, assessing the extent and effectiveness of community organizational infrastructure. We will make use of Rohe's measures (Rohe, 2004:160) of social capital at the community level to examine and analyze how it was built, developed and maintained among disadvantage neighborhoods. The measures are divided into four categories and include the following elements and their subdivision:

1. **Engagement**
   - **Horizontal**
     - Neighbor interaction (amount and quality)
     - Volunteer activity in the neighborhood
     - Participation in neighborhood based organizations
     - Use of neighborhood facilities
   - **Vertical**
     - Informal interaction outside the neighborhood
     - Volunteer activity outside the neighborhood
     - Participation in organizations outside the neighborhood
     - Use of facilities outside the neighborhood

2. **Social Networks**
   - Network size (how many people)
   - Network diversity (how diverse in income, race, ethnicity, age, social context?)
   - Network location (do network members reside inside or outside the neighborhood?)
   - Network closeness (how close are their ties?)
   - Network use (what do they use their networks for?)

3. **Trust**
   - Trust in other residents
   - Trust in neighborhood organizations
   - Trust in nonprofit organizations
   - Trust in city agencies

4. **Organizational Infrastructure**
   - Number, type, and size of organization
   - Membership size
   - Participation rate
   - Perceived effectiveness of institutions
   - Perceived status of organization outside the neighborhood

6 **Measurement explanations**

Effective community development efforts require horizontal integration, as evidenced by the involvement of a critical mass of local residents (Rubin & Rubin, 1986). Without a critical mass of engaged residents, it is difficult to get things done and to influence the actions of organizations in the larger community. Members of the community also need to
be engaged with individuals and organizations outside the neighborhood. These relationships extend the resources of local community (Rohe & Mouw, 1991).

Measuring social networks characteristics among residents of a community will tell a lot about communication flows in the community. It will reveal the degree to which engagement has led to important interpersonal connections among residents and between residents and persons outside the area.

Trust levels are assessed within and among the various groups involved in community development work, including residents, local neighborhood organizations, nonprofit organizations, city agencies, developers, financial institutions, real estate companies' and others.

The strength of social capital is expressed through the community institutional infrastructure. This will provide a sense of the degree to which local residents have been able to create organizations through which their collective goals can be accomplished. In practice, we need to assess their number, size, effectiveness, perceived status and connectedness.

There are two main ways to build social capital at the neighborhood level. The first is to act toward engaging more residents in community development activities. The more active group involvement techniques such as community visioning strategies, trust building, using strategies of negotiation and advocacy instead of protest and community events are likely to keep them involved. The second prong of the strategy is to work at a larger scale of the citywide area to open up what have traditionally been fairly closed systems. This is achieved mainly by using political support from the city hall, financial funding of community programs by the city, change of city hall investment priorities in the neighborhood compared to other parts of the city (Weinstein, 1997; Rohe & Gates, 1985).

7 Building social capital to achieve community equity

Vidal (2004) relates to the relationships between building social capital and promoting of community equity. He argues that building social capital in disadvantaged neighborhoods is one facet of the broader challenge of developing local assets that promote community equity. Vidal emphasizes two aspects: stronger working ties among neighborhood stakeholders with different interests, so the community can articulate a shared vision of its goals, and priorities, and stronger ties to external sources of the economic and political resources the neighborhood must tap in order to develop.

Community development is asset building that improves the quality of life among residents of disadvantaged neighborhoods (Ferguson & Dickens 1999; Vidal: 1995). The assets may take various forms: physical, human, intellectual, financial, political and social. As assets, by definition they generate streams of benefits (such as income, service, or enjoyment) over time. An active civic association may foster ties among its members that can be helpful in community problem solving and may give neighborhood residents good access to their city council member.

Developing social capital (i.e. assets) for poor neighborhoods is one approach to the broader task of building community capacity. Given the basic building blocks of a community - individuals and organizations – we can think about four strategies for strengthening community capacity: (1) enhancing the abilities of the individuals (education, leadership development), (2) making the organizations stronger (capacity development), (3) building links among the individuals (community organizing), and (4) building links among organizations (through collaborations, partnerships) (Chaskin et. al., 2001). The former two strategies strengthen communities in myriad ways, some of which
(e.g. leadership development) can contribute to the development of social capital for both individuals and communities. The latter two build social capital directly.

Gittell and Vidal (1998) as well as Stack (1974) distinguish between two forms of social capital: bonding capital and bridging capital. Bonding capital brings closer together people who already know each other and have some affinity; bridging capital concerns with people or groups who previously did not interact with one another.

The literature includes two concepts of bridging. The first is bridging within a community among people with diverse interests and points of view (Gittle & Vidal, 1998). Its importance lies in implying neighborhood needs inclusively to all major groups in the community; in proposed changes that find external access to financial and political support; and in community willingness and ability to work together and to cooperate with external sources of public and private resources. The second is building links between the disadvantaged community and the mainstream (Briggs, 2004). These links could also be bridges to other low income groups that share the community’s values and goals.

Hutchinson (2004) in her case study research on social capital and community building in the inner city provides indicators to measure the level of social capital as a resource for neighborhood revitalization. They include measures of attachment to the community, range of acquaintances in the geographical area, levels of trust in neighbors, levels of reciprocity among neighbors, and involvement in local initiatives for neighborhood improvement.

Sustainable community depends on collective attachment with the neighborhood (Christenson & Robinson, 1980). Long term residence is frequently thought by planners and social capital theorists to increase people interest in and commitment to their community and their neighbors (Sviridoff, 1994). Ties to other community residents are thought to create bonds that support community building (Jacobs, 1961). Creating and later paying off obligations is a corner stone of social capital. Coleman (1988), Portes and Sensenbrenner (1993), and Light and Bhachu (1994) have all defined this characteristic of social capital as community members giving with the understanding that somehow within the context of the group they will receive in return.

The measure of trust in connected to the engagement process which can initiate and create a productive cycles of trust among residents in the community. Trust is one of the most frequently encountered elements in definition of social capital (Fukuyama, 1995; Grootaert, 1998); and is an essential ingredient of any successful community building effort. Information flows and sharing use strengthen the ties that turn collections of people into communities. It is vital to build a "belonging community" (Ball-Rokeach et al., 2001, p.4). Information sharing, often through effective informal communication system, is a vital component of social capital (Coleman, 1988).

8 Resident participation and involvement in Israel before Project Renewal

A strong dualistic character runs through the Israeli political tradition concerning channels for active citizen participation in public affairs. By “dualistic character” we mean the differentiation in attitude of official bodies, government departments and public agencies toward different population sectors composed the Israeli society. Apart from the act of voting in national and local elections, most Israelis had very few formal channels through which they could influence decision making of public institutions or government bodies, especially at the local or neighborhood levels. In other words, resident participation had lacked both knowledge sharing and social capital elements. These have been assimilated during the formal establishment of Project Renewal.
The introduction of Project Renewal and active resident involvement as a basic principle of operation was a major departure from practice and precedent. Public participation in Israel began to accumulate momentum only in the 1970s. However, this novel approach struggled to cope with difficulties due to the following factors (Churchman 1988: 344-347):

- Israel had no democratic participatory tradition or a decentralized democracy: The central government decides on most of the planning and delivery of services at all levels;
- The Israel government’s attitude to participation was paternalistic, especially towards new immigrants. The attitude was that politicians, professionals and experts know what is good for the poor people in all aspects of life – housing, education, culture etc. That approach resulted in a state of dependency and not of independent thinking and initiatives;
- Most new immigrants arrived to Israel from countries in North Africa, Asia and Eastern Europe (including ex-Soviet Union republics), where no democratic governments existed and most of them came from cultures where the traditional family authority structure prevailed. The majority of these people lacked the ability to influence government decisions as they had no previous experience in citizen participation and decision making at a local level.
- Most professionals and bureaucrats in the government offices did not have any knowledge or experience on how to act on that issue.

Project Renewal led to a significant change in the concept of resident participation. The idea that citizen participation is a basic principle and that residents should have an integral part in the decision making process was a revolutionary step. No one had a clear understanding how this was going to work out. Many saw the concept of citizen participation as a strange idea, imported from the USA, and did not believe it could be adapted in Israel. The fact that the principle was dictated by government authorities and was not derived as a result of residents’ advocacy groups evoked great suspicions.

On the other hand, there were several factors that supported and strengthened resident participation and planted the seeds for building social capital among disadvantaged neighborhoods (Shimshoni, 2002; Churchman, 1988):

- A centralized structure decision to devolve powers can impose a pattern of participation.
- During the years residents in the neighborhoods learnt something about the possibilities and abilities to influence the democratic networks and they were willing to participate in a process that promised them all kinds of opportunities. These residents were characterized not by a “poverty culture” and they weren’t alienated totally from society.
- The influence of the Jewish communities abroad which supported the principle of resident participation.

**FIRST PERIOD: 1978 – 1988:**

9 **Project Renewal concept of resident participation**

The format of resident participation that was eventually established by Project Renewal was in the form of Local Steering Committees (LSC) in each renewal area. This represented something roughly midway between the more authoritarian ideas among government bureaucracy and the more confrontational styles that had emerged in anti-poverty programs in the 1960s in the USA.
Some cited a view of the authoritarian style that “participation means consultation”. Action is taken after asking people their views, which professionals then try to accommodate as long as they do not violate their professional or administrative judgments. This approach could be found among some education and housing officials. Both ministries – Education and Housing – were the most dominant bodies in the LCSs regarding policy and budget decisions making processes especially in neighborhoods where the local leadership lacked residents and local authority political support.

Another view expresses was that the professionals really know best, and should be the ones to make decisions within the framework of national guidelines; but the actual choice of specific programs should be decentralized to the local professionals working with the resident committee. This approach was common to community centers and to educational welfare programs, which set up local committees to decide which types of compensatory and enrichment programs to introduce. The experience gained through these two institutions some years before Project Renewal contributed to the effectiveness of LSC and its subcommittees. A more liberal view was held by community workers, namely, that resident participation in decision making and implementation should develop through grassroots community organizations. This approach encouraged informal participation in a variety of neighborhood forums accompanied by much open discussion.

The view taken by the National Social Policy Team was that informal community organization and resident expression are positive elements of participation, but they should be augmented by formal frameworks and procedures based on democratic principles. Guidelines for the establishment and operation of the LCSs as the primary renewal unit at the local level were formulated and approved in 1979, and further elaborated and modified by the experience of the next two years. Each Local Steering Committee was composed of 23 members, divided equally between eleven elected residents and eleven public officials including regional coordinators of governments ministries and heads of local municipality departments and a chairperson who was either the mayor of the local authority or his/her deputy. Besides, there were other participants – Jewish Agency officials and local services suppliers. The LSC was authorized to decide on the allocation of resources for neighborhood programs within a budgetary limit, set at the national level by the Inter-Governmental Committee (IGC); to set priorities; to discuss every plan, program or activity suggested for the neighborhood; to supervise implementation and outcomes of Project Renewal annual programs; to be informed by the IGC decisions and policies regarding Project Renewal. Local renewal plans had to be reviewed and approved by the IGC (in later years it became the responsibility of the regional coordinators of Project Renewal).

In this setup, neither the residents nor the officials on the LSC have a veto and at least in theory, decisions were taken through joint deliberations. This format was adopted to bring local officials and residents together to work for common goals, and sought to avoid both the extreme powers held by bureaucrats and confrontational struggle for power by the residents. On the whole, the LSC format has been successful in steering clear of these extremes. In only a few cases did residents seek complete autonomy in decision making and implementation, but these experiments failed to get off the ground (Carmon, 1989).

The participatory framework of the LSC was based on a crucial assumption concerning the “political culture” of the neighborhood residents. The assumption was that despite their past privations and frustrations they aspired to be part of the mainstream and would respond positively to the opportunities offered by Project Renewal and would cooperate, if they witnessed that the renewal approach could deliver the goods. Their apathy, pessimism, and cynicism were regarded as an adaptive mechanism built up over
the years, designed to protect them from the anguish of repeated dashed hopes for improvement.

10 Citizen participation – first steps of social capital and knowledge sharing principles and development

Authentic citizen participation that goes beyond taking part in mere formalities depends on the following factors which were relevant to some extent in Project Renewal: arming the residents with appropriate knowledge and skills that would enable them to deal with officials and professionals with greater self-confidence and authority; assuring that the residents taking part in the LSC and other forums are indeed representatives; frameworks to provide real sharing of decision making power; and the exercise of direct responsibility for programs.

It was soon realized that residents’ participation in the LSC would not work unless something was done to enable them to take part in committee deliberations on a more equal footing. Very few of the residents had any experience of such forums, and had little or no acquaintance with such basic items as an agenda or a budget, or the administrative frameworks beyond the neighborhood nor where they familiar with the types of policies or programs available. In addition, the residents’ diverse origins and backgrounds suffered from a lack of education in democratic processes including the rights and duties of citizens. Under these circumstances, the officials on the LSC would be able to implement things as they saw fit without any meaningful input from the residents.

The proposed solution to this situation was “Democracy Shock”, a word coined by Weinstein (1983) to describe a new approach. In other words, residents would be put together with government officials, facing each other in the neighborhood itself, and try to learn and work out, how to manage their own neighborhood problems.

Inviting residents to participate in decisions concerning their own lives was not easily accepted by both residents and the public officials. The political culture and lack of personal involvement of most residents in deprived neighborhoods did not encourage them to join the process of elections and to become representatives of their neighborhoods.

To remedy this situation the national project leadership set up courses and seminars for neighborhoods activists designed to acquaint them with tools and skills regarding committee work and the broader political and administrative structures relevant to the project. In addition, special courses of study were designed, in conjunction with the Open University and other organizations, to produce an academically trained cadre of neighborhood leaders. The main purpose was to cultivate an educated group of neighborhood activists who would be able to provide knowledgeable leaderships and enable them to deal with various experts and administrators through major engagement and involvement in their community.

Another aid to meaningful resident participation provided in the early stage of Project Renewal was the appointment of urban and social planning consultants in order to help the residents formulate their desires and priorities in the shape of plans that could be brought to the LSC for discussion. Although these advisors were usually employed by the government or the Jewish Agency, they acted as advocate planners, to represent residents before the authorities.

The first resident members of the LSCs were usually drawn from those active in neighborhood voluntary bodies, and were appointed to the LSC by the project authorities. In some cases a previously existing neighborhood council was deemed to represent the residents on the LSC, although some of these were not elected either. Mayors and other
local leaders adapted soon enough to the new reality created by Project Renewal since it brought significant budgetary benefits their way.

Opportunities for real sharing of decision-making powers by the residents through Project Renewal were to be found not only in the LSCs, but also in their numerous subcommittees that dealt with specific areas such as early childhood education, the aged, youth programs, informal education, public health, physical improvements and so forth. In addition to the eleven neighborhood representatives on the LSC, another several dozen could take part in the subcommittees, as volunteer and stakeholders. Resident participation was performed also on the committees of community centers set up in most Project Renewal areas, which became the implementing agencies for many of the social programs run through the project. The idea of resident participation quickly broadened to include the criteria of direct responsibility for certain services established by Project Renewal such as: community centers, enrichment activities, center for early childhood development, learning centers, youth centers and libraries. It was accepted by the residents in disadvantaged neighborhoods that since they benefit from them they had a responsibility to cover part of the cost, which are not mandated services provided by law.

Another area where resident responsibility emerged was in housing and maintenance. Part of the problem of neighborhood deterioration, it would be recalled, stemmed from poor maintenance of buildings and grounds by the authorities, and by the lack of motivation or interest on the part of the residents. The role of the social workers was to organize tenants committees so that the renovation and buildings enlargements works done by Project Renewal would achieve effective results and high standards of performance. According to Project Renewal regulations, tenants who wanted to improve the state of their buildings had to establish a tenant committee and to pay their part of the cost, which reached 25% of total expenses. The tenant committee decided which company would do the works, signed the contract and supervised the developers' work. This kind of tenant participation in improving their physical housing problems became one of Project Renewal flagship.

The first decade of resident participation concentrated mainly on building the basis for participation and the organizational infrastructure for networking among partners, the City Hall and its different departments, professional staff, social and community workers, health and education staffs, local services suppliers and residents.

It took between two to three years to establish a complete understanding of what participation means, how it should work, what were the relationships between residents and the authorities, what should be expected and what degree of influence and development residents could achieve. Project Renewal neighborhoods that succeeded were characterized by the following features: their location was in relatively well-founded urban centers; staffed with professional personnel who were open enough to implement social change in deprived areas; strong local resident committee; elected representatives who had close relationship with the politicians at the City Hall and the Government levels; strong twining relationship between the neighborhood and Jewish community abroad that supported it financially and politically; and a close relationship with the Project Renewal Department consultants.

The organizational infrastructures that were implemented during the first period of Project Renewal planted the roots of social capital and networks building among the first stakeholders founders. Vast efforts were invested through community development practices in the neighborhoods. The first steps of social capital focused on building residents committees, strengthening networks with the more dominants institutions working with the residents, encouraging residents to get engaged in decision making
processes and to be elected for the Local Steering Committee and to participate as neighborhood representatives in local services boards.


11 Declining of resident participation framework

The second period of PR’s resident participation shows a steady decline. To explain why that situation happened, one has to be aware of the internal changes that occurred in Israel during this decade:

- In the years 1989-1995 Israel witnessed mass immigration waves coming from the Soviet Union and Ethiopia. More than one million people were settled and absorbed. Many of them settled in deprived neighborhoods were the housing prices were lower than in other parts of the country.
- Since the end of the 1990s all governments of Israel cut budgets aimed supporting social programs.
- The number of neighborhoods included in Project Renewal reached 110 compared to 92 in the first period. No additional budget was given except for a short time between 1993 and 1995.
- The heavy burden of budget on welfare, health, education and employment services grew tremendously.
- Frequent changes in the political composition of government led to discontinuity of policy concerning Project Renewal.

From the point of view of the social capital theory, the second period achieved less achievement compared to the first one. The Project tried to face these difficulties by keeping the frame of resident participation similar to the previous decade. Most of the veteran elected residents to the LSCs continued to function as representatives in their neighborhood. Thus, the social ties established during the first period faded away. There were great difficulties to engage the newcomers in social and community activities, due to differences in culture, language, political background, tradition and lack of understanding of local and state policies. Besides, the new immigrants were totally focused on their own families, the daily cares of employment, maintaining reasonable standard of living and getting used to the Hebrew language.

A study to analyze variables of democratization and decentralization that had been left in neighborhoods after phased out found that only six neighborhoods out of 16 succeeded in maintaining and improving their local resident organizations. The most significant factors that supported them were: neighborhoods with at over 10,000 inhabitants; strong local leadership; local authorities that added resources to continue programs and activities begun by Project Renewal developed social and educational services, and a variety of community institutions operating at the neighborhood level.

Other neighborhoods failed due to reasons of: local political rivalry between the mayor and the residents; a high frequency of municipal elections; changes in professional staff; sharp budget cuts for community empowerment; out-migration of strong families; and, the entry of weak population, mostly new immigrants from Ethiopia and the former Soviet Union (Weinstein 1997).

During this decade most neighborhoods neglected the procedures of elections and thus, those representatives who were elected years before remained in their position. The situation brought about a state where decisions were made by the local municipality, professional teams at the neighborhood local services and government offices without significant attendance of residents.
THE THIRD PERIOD: 1999 TO DATE

12 Leading interested groups: the second phase of resident participation in Project Renewal and the social capital take-off point

Nearly 20 long years of residents’ participation passed until a new type of participation idea was born. The new approach developed due to a group of residents supported by some City Hall politicians in one Project Renewal neighborhood which had suffered from a state of stagnation for some years. This situation caused to conflicts with the project manager, with government officials and with the local social services in the neighborhood. The decision was made to end their rule in the neighborhood and to work out an alternative to the old system of Local Steering Committees.

The alternative is known by its term "Leading Groups" or "Interested Group". Project Renewal had established community infrastructures such as LSC’s, subcommittees, tenants committees, resident boards in community centers, volunteering organizations, contacts with the business sector and local services functioned in a very high degree of service supplying. Past experiences pointed out that when the Project was phased out from a neighborhood, the networks of resident involvement and community leadership did not remain for long.

The national Project Renewal team felt that something was missing in the process of real citizen participation and commitment to their neighborhood and that a new approach has to take place. The new idea emphasized a transformation from the stage of local leadership with all its disadvantages (political influences, self interests, few numbers of activists, years of personal grind, leadership that remained in power too long, and lack of innovative leadership) to the stage of motivating residents to be leaders of change. These Leading Groups are supposed to be the voice of the residents representing their needs and problem-solving before the local, city wide and national authorities. They are build on the base and components of social capital, knowledge information, and knowledge sharing which act as bonds and bridges among all stakeholders in the neighborhood.

13 What is it a leading interest group?

Leading group is a comprehensive, integrated, shared information and knowledge community that holds specific elements that are bonded to social capital approach. It is defined as a group of voluntary activists, residents of the neighborhood concerned in a specific domain, act to initiate, to plan, to advance, to implement formal and informal programs and activities for the benefit of their neighborhood. It uses strategies of cooperation, coordination, negotiation, participation, and partnership with all possible stakeholders.

14 How leading interested groups were setup?

The initiation to develop a new type of resident organization based on social, human and economic capital in Project Renewal neighborhoods was the author himself, who functions as Project Renewal Coordinator.

The first place where Leading Interested Group was setup was in two adjacent neighborhoods in the city of Petah Tikva. Members of a big family with strong political connections in the local municipality tried to stop the activities and programs of the
Project building opposition to the project manager and his professional staff. They took advantaged being the majority group at the LSC. The main reason for the opposition was because Project did not agree to give in to personal demands such as job appointees and subsidized prices for relatives. Under these circumstances Project Renewal decided to slow down its activities and to open an investigation with the aim of work out a solution. The author found the situation a best opportunity to develop a new vision for resident participation in Project Renewal neighborhoods. The course of investigation continued for eight months and many people were interviewed: local residents, local municipality seniors, head of local departments and services as well as the Project's staff.

There were several options. The first was to close down the Project activity in the neighborhood. The second was to declare new elections for the LSC. The third proposal was to continue the Project work and programs without any residents. The fourth was to create a revolutionary type of resident participation based on volunteering and not on elected representatives and to strengthen the social capital infrastructure of the community. The last became the leading priority.

The reactions were expressions of opposition and rejection. It was not easy to persuade the mayor, the heads of different departments of the City Hall, the community and social workers and of course, the residents themselves. They presented real fears: loss of powers and legitimacy for the municipality and local services suppliers; the future of resident relationships; the devolution of authority. Many people who were involved in the process of establishing the Leading Group were worried by the "over democratization" the new type of organization offered them aiming to working together as equals with no hierarchy of ranks; residents who are not elected but volunteer, and who receive legitimacy from all partners. Developing special relationships among all participants acknowledge that the main goal is the benefit of the neighborhood population and local services, infiltration of democratic values and norms into the local municipality as an institution regarding the decision-making process, respect towards ethnic and cultural differences, and ensuring human rights. The Leading Group aims to achieve the following targets:

- To develop Leading Groups involved in a variety of issues concerning community spheres such as women's employment, education for all, public spaces, and access to higher education;
- To extent the scope and variety of residents from different age groups who contribute to the development of the neighborhood/city/region;
- To represent neighborhood inhabitants before the authorities and service suppliers;
- To maximize representation, engagement and involvement of neighborhood's residents; and
- To strengthen the organizational and communal infrastructure of the neighborhood.

Based on the successful experiences learnt from the neighborhoods in Petah Tikva, the Department of Project Renewal made decision to sustain the new model of Leading Groups among all neighborhoods included in Project Renewal. There are numerous examples of Leading Groups acting in the neighborhoods to develop local services such as kindergartens, schools, community center, health, religion, elderly and childhood services, leisure, culture and art, ethnic music, sports, one parent families, women, youth, community television, preservation, new immigrants and Arab, Bedouin and Druze culture and tradition, environmental issues, employment, transportation and ecological obstacles.
In order to succeed, guidelines and recommendations were issued by the local municipal department of social services to the local residents in the neighborhoods, community workers as follows:

- To promote the concept among the residents, through the community workers, local services operating in the neighborhoods and the project manager.
- To join forces with the local municipality departments which will give their professional assistance, experiences and contacts with other services; and
- To establish networks for workshops and courses for preparing the residents and to equipped them with skills and to enable build their social capital in the community.

Leading Groups have been operating since 1999. The experiment so far points out that the main obstacles are recruiting of new residents and the money needed to keep their continuing activity, breaking up political ties with officials in the local municipality, and deciding about the preferred strategic choice for each.

On the other hand, we can point out some significant successes. In neighborhoods where Leading Groups were established the number of residents participants increased tremendously up to - 80 – 150 people compared with the of the eleven to 25 residents in the LSC and subcommittees.

There is a wide range of issues residents are eager to relate to that influence in their daily life: The resident demands of the local authority became more sophisticated and rational; residents are using their experiences gained during Project Renewal period in negotiating, building new partnerships with NGOs and the business sector. Neighborhoods are winning benefits such as improving physical infrastructure (roads, sewage, street lightening) public spaces developments, changes in school enrollment, building new public institutions and enrichment activities. The Leading Group concept seems to be the future of PR activity among deprived neighborhoods in the coming years. To enhance this approach the department of Project Renewal arranged special workshops in many neighborhoods for the residents, local authority' departments, professional workers, local services suppliers and other stakeholders both inside and outside the neighborhood.

The passage from the usual framework of LSC to Leading Interest Groups was unacceptable by many. Among them we found the Inter Government Committee, political resident activists, local services suppliers, community workers and local municipality staff. The sharp shift was because for the first time in the Project history the following occurred:

- A decision was taken to abolish election process.
- Residents were recruited on a voluntary basis.
- Heads of municipal departments became professional mentors to neighborhood activists.
- Contact between neighborhood residents and local municipality was not based any more on political ties.
- De facto recognition was achieved for all participants involved in the process.

15 Organizational structure of leading group network

Where Project Renewal is initiating local organization at the neighborhood level together with the City Hall politicians, bureaucrats or professionals, it always suggests that the mayor or his deputy will be the chairman of the committee or network since the local municipality is an important partner whether in recruiting the professional personnel or
allocating other resources. Figure 1 shows the Leading group organizational structure. Its organizational functions are described as following:

- **The Think Tank Staff:** It is chaired by the deputy mayor and composed of heads of local authority departments such as Welfare, Health, Education, Youth, Planning, Environment and Social Community Work. Its purpose is to lead and change attitudes of public elected officials, senior bureaucrats and residents toward the Leading Group model. Besides, it conducts evaluations and surveys among residents and collects data concerning the model development, policy and implementation.

- **Heads of Local Authority Departments:** The local team has a very important and significant function in implementing the model of resident participation Leading Group. In the first place they are the professional coordinators of the Leading Groups. They are an integral part of the group and participate in every meeting and became the resident representatives at the city hall (not from political reasons, as it may sound, but from deep understanding and recognition of the model benefits to the city itself). Finally, they bring with them long professional experience to improve the work of the Leading Group, to discuss issues and to suggest solutions, to improve local neighborhood services, and to allocate municipal budget for programs, personnel and activity at the neighborhood for the benefit of the residents.

Community Social Workers: They work at the neighborhood level and have the daily ties and contacts with the residents and local services suppliers on one hand and with their department at the municipality, on the other hand. The social workers work together with semi-professional employees, who are in many cases residents of the neighborhoods equipped with skills of being consultants, mediators, advocates, coordinators, community experts and executives. As a matter of fact, they have a very difficult job to cope with political pressures and lack of confidence among those who do not believe in attitude changes toward resident participation and engagement in decision making processes.

![Organizational structure of Leading Group Network](image)

**Figure 1.** Organizational structure of Leading Group Network

- Coordinators Forum: The forum consists of heads of local municipality departments and units. They are professionally guided by the social community workers and receive the skills and tool kits how to lead the Leading Groups and to coordinate between them and the local authority, to create partnerships among different departments, to collect data and use it for both their strategy and policy.

- Residents Forum (Neighborhood Council): Each Leading Group sends two to three representatives to the forum. The forum meets once a month to discuss and plan proposals and issues brought by the Leading Group, developing of a comprehensive network view concerning the residents' needs, supervising and advancement of social and physical programs, and meeting with professional consultants to work out better strategies for achieving a sustainable community. The Resident Forum also appeals to the City Hall to improve and develop environmental infrastructure, fund raising for new developments of community institutions and social services, and organizes community events.

- Leading Interest Groups: There is no limit numbers of participants groups, themes or issues the residents wish to forward. Usually, each group consists of 15 to 25 volunteers and non elected members. They have regular meetings with their coordinators, the mayor, the business and NGO sectors and academia, they recruit new activists to join their groups, they have the privilege to offer new plan, program or activities, and to build their own priorities. They also participate in building and discussing the neighborhood's annual program, and they have direct channels to the local authority networks.

16 The growth and development of leading interest groups is based on six stages

- First stage- Preparing the ground: At this starting point stage a decision is made by the professionals and political networks to cancel the former LSC and communicating it to the community and the inter-governmental committee. The Think Tank Team begins to plan the long run program for coordinating and training the participants of the Leading Groups and the new organizational structure led by the social community workers.

- Second stage- Intensive activity: This stage focuses on recruiting activists to join Leading Groups and the beginning of their training, mentoring and backing them with professional tools for community activities. The representative forum is established too. The local municipality networks are coping with opposition from the former activists and the politicians who are not accustomed to group working. Besides, Leading Group activists consolidate their status and achieve legitimacy.

- Third stage- Cultivation activity: At this stage the professional teams of social and community workers, local service suppliers as well as the heads of the municipality departments support and involve Leading Group activists in decision-making processes. Leading group begin to initiate, plan and implement projects in the community.

- Fourth stage- From dependency to maturity: Leading Groups are moving toward a gradual process of self-management of their community. The representative forum is empowered and establishes its status as the only entity representing the whole community. Professional teams composed of community and social workers start to develop powers to the representative forum as preparation stage for self-management.

- Fifth stage- Independent community: The Leading Groups are reaching the step of self-management of their neighborhood. They have a significant role in designing and moving their quality of life. On-going recruiting of activists
continues. The forum builds direct and continuing ties with both political and professional networkers. A new reality of relationships among inhabitants, public elected officials and local services exists.

- Sixth stage - Democratic civil society: This is the top and the highest stage regarding the development steps of Leading Interest Groups where the vision of integration among comprehensive networks, strategic coordination and cooperation is achieved.

Neighborhoods that chose to adopt the new type of resident participation have not yet achieved the full six stages. Most of them are heading towards the third stage. One has to keep in mind that making a revolution takes time. Processes have to be implemented and absorbed by all stakeholders. New volunteers joining the Leading Group have to pass the preparation stages and find their position most suitable Leading Group where their contribution will be most effective.

Comparison between the two phases of residents’ participation during Project Renewal activity is shown in table 1. It shows that the transition from one stage to the other caused many positive changes for the benefit of the residents. Residents can expand their activity and to invite different sectors to establish new partnerships (private, business, voluntary) which they were not available in the former LSC organization. The legitimacy achieved enables the Leading Interest Group to act freely in all spheres of their community life. Residents create their own priorities and ways to cope with the surrounding competing organizations. Pressures from the local municipality to arrange and prepare elections are faced with great resentment from the residents themselves due to their past experiences with local politics.

**Table 1**: Local steering committee ↔ leading group

<table>
<thead>
<tr>
<th>Inter-Government Committee Decision</th>
<th>Local neighborhood decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>National network program</td>
<td>Local neighborhood program</td>
</tr>
<tr>
<td>Limited number of activists</td>
<td>Unlimited number of activists</td>
</tr>
<tr>
<td>Residents elected</td>
<td>No elections</td>
</tr>
<tr>
<td>Interested residents</td>
<td>Voluntary activists</td>
</tr>
<tr>
<td>Political party identity</td>
<td>Non political party identity</td>
</tr>
<tr>
<td>Fixed composition of participants</td>
<td>On-line activists recruiting</td>
</tr>
<tr>
<td>Limited legitimacy</td>
<td>Wide legitimacy</td>
</tr>
<tr>
<td>Passive activists pattern</td>
<td>Active pattern</td>
</tr>
<tr>
<td>Resources base are fixed</td>
<td>Resources are varied</td>
</tr>
<tr>
<td>Limited strategic partnerships</td>
<td>Wide strategic partnerships</td>
</tr>
<tr>
<td>Social &amp; community workers</td>
<td>Heads of local authority depts.</td>
</tr>
<tr>
<td>Segregation</td>
<td>Synergy</td>
</tr>
</tbody>
</table>

The concept of the Leading Group model is operating in about one third out of 104 of the total number of neighborhoods included in Project Renewal in the year 2010. The differences in implementation among the neighborhoods regarding stage of development are due to several factors: differences in size and settlements characteristics; differences of attitude whether a whole city or number of neighborhoods are included in the Project; City Hall attitude toward citizen participation in decision making processes; the community organizational status; and the number of community institutions (which is the fundamental base for resident participation). Other reasons are: local officers attitude toward decentralization and democratization; the level of ties with private, business and NGOs sectors; the population composition (long-term residents, new immigrants, mixed population); the local authority commitment to resident participation concept; and the level of devolution agreed to be given to the residents, and importantly, the long run commitment to support the process.

17 Leading groups and social capital

Leading Group concept, as described above, is the embodiment of the social capital. It consists of the principles and components of social capital definitions as adapted from Adler & Kwon (2002) and are presented by different researchers: "The ability of actors to secure benefits by virtue of membership in social networks or other social structures" (Portes 1998, p. 6); "The ability of people to work together for common purposes in groups and organizations" (Fukuyama 1995, p.10); "Feature of social organization such as networks, norms, and v social trust that facilitate coordination and cooperation for mutual benefit" (Putman 1995, p. 67); "The information, trust, and norms of reciprocity inhering in one's social networks" (Woolcock 1998, p. 153); "The sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu & Wacquant 1992, p.119); "The process by which social actors create and mobilize their network connections within and between organizations to gain access to other social actors' resources" (Knoke 1999, p.18).

Based on the Israeli experiences in Project Renewal I agree with the structures established by Putman (1995) and the social capital model set by Rohe (2004). Moving according to the stages linking together the concept of civic engagement, building social networks, interpersonal trust and achieving effective collective action where both individuals and the community as a whole gains their benefits.

Leading Groups, the new approach of resident participation in Project Renewal present how a community can build its social capital and knowledge sharing assets along durable processes of working together between individuals and the larger society and between the local community and the institutions built in the neighborhood to enhance stability and sustainability.

As mentioned above, we adopt Rohe model of measurements (2004:160) to analyze them as they appear among Leading Groups and to evaluate their contribution to build a social capital framework at the neighborhood level:

1. Engagement: The horizontal aspects
   Resident interaction: under the Leading Group approach came to its climax regarding their amount. They consist of eleven different groups: formal and informal education; housing; physical infrastructure; employment; elderly; youth; health; environment; community and business sector; new immigrants. Each of them has between 15 to 20 and more members whom are all functioned on voluntary base and are not elected. This feature is a unique one since up to their establishment, resident who wish to act as
representatives of the neighborhood had to be elected and appointed to the Local Steering committee.

It must be emphasized that the Leading Groups are durable and exist ten years already. The long period of activity deserved a special explanation: since the very beginning of the new approach all groups were supported by the community staff of the local municipality. The support was given through common meetings, discussions at the different groups working on their agendas. Besides, there were the heads of the local municipality who participated in every meeting or workshop with the residents of the neighborhoods. They became the front supporters of the community in every issue and problem that were raised.

Participation in neighborhood based organizations: Most leading groups became local organizations by themselves. In other words, each leading group acted and built around it social networks characterized by many connections with the municipality departments starting from the mayor and the City Hall, the city council, and especially with the departments of education (from pre-schooling up to secondary school), with the local suppliers services (community centers, health clinic, centers for child development, centers of human capital) and with the local institutions such as schools, kindergarten, and science centers.

The main reason for the variety of networks is the implementation of a comprehensive and holistic approach in each activity among Project Renewal neighborhoods. Different stakeholders are participating in shaping policy, strategy and evaluation.

Use of neighborhood facilities: One of the outstanding characteristics in all Israeli disadvantaged neighborhoods included in Project Renewal is to complete, as far as possible, those facilities that were lacked. The majority of the neighborhoods enjoyed the building of physical infrastructures (street, sewage, pavements, street lighting, public parks) in addition to many public institutions like: community center, youth club, elderly club, day care centers, kindergarten, library, elementary and secondary schools, science centers, child development center and human capital center.

These facilities are the focus and main meeting places for all residents in the neighborhood, where social networks are established and the places that motivate residents to take actions to improve their quality of life in every domain, whether education, leisure, sport, culture or employment.

Engagement: The vertical aspects

Informal interaction outside the neighborhood: Building outside interaction and relationships are difficult to establish due to the insufficient resources the neighborhood can allocate. On the other hand, they have the potential to increase the information and expertise available to a community and to provide potential allies in conflicts or in case of advocacy to support the local community achieving its goals. In the case of Leading Groups they established informal interactions with other neighborhood's steering committees to gain additional budgets in order to balance the local municipality investments equally among ll neighborhoods. Besides, Leading Groups made use of their political interactions with government politicians in order to prevent annual budget cuts of Project Renewal.

Volunteer activity outside the neighborhood: There is no evidence to volunteer activity outside the neighborhood. That measure is found only inside the neighborhood territory alone.

Participation in organizations outside the neighborhood: Organizations that have a branch in the neighborhood in the form of active institution like day care center, elderly club, veteran club and sport group send their representatives and volunteers to participate in meetings at the national and local authority levels. This type of participation benefits the neighborhood with information and contacts that helps them managing their local organizations.
Use of facilities outside the neighborhood: the utilization of facilities outside the neighborhood is very limited and concentrates around playgrounds, public parks, nature reservations and museums. The number of those who use and exploit the facilities depend on the mobilization degree and the access possibility of the residents.

2. Social networks

Network size: It is difficult to measure the size of the networks. Taking into consideration the number of residents and the physical size of the neighborhood, one can take for granted that there are no total networks among all residents. The neighborhoods and the urban cities included in Project Renewal differ in their size and their inhabitants. The range of residents’ size is between 5,000 and 40,000. Knowing the number of Leading Group in each neighborhood and the number of volunteers participating in them, add to that the number of families and individuals who are using the ample of facilities, we can assume that between few hundreds and few thousands residents are having networks in their neighborhood.

Network diversity: The network diversity in each neighborhood is great due to the fact that all neighborhoods are heterogeneous. Therefore, we can find different groups of populations that established their own networks like youth and elderly people: new immigrants and veterans; peer groups; business sector located in the neighborhood and so on.

Network location, closeness and use: As mentioned above, most networks are creating, executing and performing inside the neighborhood territory. The public institutions and social facilities like the services system acting in the neighborhood are playing a very important role in establishing both closeness and use among the residents.

3. Trust

Leading Groups were created as a new approach to citizen engagement in their community and a critical point for social, human and cultural change. They are based on both democratization and decentralization elements. In order to manage constructive networks and interactions among different stakeholders a very high level of trust must be used and kept for the long run. Otherwise, the building of social capital will collapse.

The aims and goals of each Leading Group in the neighborhood and their practical achievements for the resident benefits, play an important role to build social cohesion, sense of community and sense of belonging. All these cannot workout without common and mutual trust within groups of residents, the city hall, the neighborhood service systems.

4. Organizational Infrastructure

Figure 1 describes the organizational structure of Leading Group networks. The full legitimacy given to it by different stakeholders from the City hall, government departments local service suppliers means that they are given recognition by other institutions whether inside or outside the neighborhood. The effectiveness is measured by the achievements of the Leading Group that strengthen and build social capital.

The fact that Leading Groups concept exists more than a decade, continuing to keep the composition of volunteer residents in each interested group and continue to keep the social, political and economic networks is the best evidence that social capital can be maintained for the long run and be developed according to changes occur in the surrounding ecology whether it is the national, local or neighborhood levels.

Figure 2 describes the Leading Groups social networks’ map built during its operation. Mapping social networks whether existed or potentially has been the Leading Groups principle from its very beginning. Project Renewal and local municipality have worked together to pave the way that enables building social capital. Therefore, it is not surprisingly to reveal the mosaic of many networks operating together with local Leading
Groups. The key word to understand the unusual phenomenon is "round tables" with all possible stakeholders to cope with every need or problem in the community.

Figure 2: Leading Group Network Map

18 Conclusion

The paper described the relationships that are built between the two concepts of resident participation on one hand, and social capital on the other hand among disadvantaged neighborhoods included in the Israeli Project Renewal. Both aim to build productive benefits for residents in the community.

Project Renewal has passed through many stages regarding resident participation and building social capital. As was discussed, participation levels between residents in deprived neighborhoods and the authorities, whether local or national, witnessed ups and downs in their relationships: from the basic demand expressed in their words "we deserve it [Project Renewal] and you [the Government] owes us everything for nothing" to becoming part of the establishment system through means of elections, volunteering actions, participating in local steering committees, building local organizations and developed services. They won many benefits especially in using community services, building leadership and creating the Leading Groups model.

The paper pointed out on changes in participation structures. From the starting point of "Democracy Shock" through a long study and learning process of power relationships between residents and the authorities, through stages of neutralization of politics, through achieving legitimacy and devolution of powers, through the transition from self-interest to general community demands and to supporting identification of positive factors inside the community, to building close relationships with both local services and City Hall.
departments and establishing Leading Groups as a new pattern of neighborhood organizations.

One important achievement of Project Renewal concerning resident participation was the establishment of a unique process in Israel. A public decision-making process where residents were involved according to a government legal decision which enabled them a certain measure of influence. Indeed, not in every neighborhood did residents succeed in making that opportunity feasible, but resident participation as an end which enabled changes was a significant achievement. All goals of resident participation were advanced, at least partially.

Both the system and the culture of Project Renewal have gone through fundamental changes. The participation process enabled the residents who cared to act in improving the neighborhood physical, social, communal, educational, welfare and health conditions. A better balance has been created between the citizen and the authorities, and the City Halls could not ignore anymore the needs of distressed neighborhoods. The bureaucrats learnt to negotiate with the residents as equals. Many residents acquired experience in community initiative and in democratic values. Indifference decreased and new norms of participation were established, especially among the elites of different neighborhoods. These were the social networks build inside and outside the neighborhoods.

Democratic values were spread over the neighborhoods themselves and Project Renewal was the first national plan where the political establishment was exposed to direct experience with resident participation.

Project Renewal proved that the public earns new abilities to act with the authorities as an effective partner by learning, negotiate and getting organized. Neighborhood leadership has changed its protest behavior to a more democratic role, and the elections held in the neighborhoods encouraged the claim for accountability.

To answer the question can social capital be built at the neighborhood level, we can conclude, it can, although it is not an easy task. The three decades of Project Renewal operation present the fundamental changes expressed by the different approaches to resident participation. The Leading Group concept created additional opportunities for community residents to get engaged, to participate in the political and economic system. The process of engagement influences the dominant political systems to change their attitude towards the neighborhood. The decision of the inter-governmental committee to adopt the bottom-up policy instead of top-down made all the difference between a civic engaged neighborhood that is motivated to build social networks that combines to an effective community that benefit of social capital and neighborhood that does not experience these processes.

The success of building social capital among disadvantaged neighborhoods is due to several factors: the good will of the local authority to invest in professional personnel skills like community and social workers, planners and even the decision makers levels, aiming them to create the compatible conditions both among local government departments and residents at the community level; to prepare residents for a long run mission of workshops, learning community development and community capacity skills; to persuade heads of local authority departments that the real decision stage is not in the City Hall but at the community center or youth club in the neighborhood level; to be aware that the new policy agenda is nor top-down but bottom-up; to understand that to build social capital means sometimes to devaluate authority to lower levels of decision making; to cause residents to leave behind the concept of elected representatives to local committees and to strengthen the type of volunteering instead.
In addition, there are more factors that support the building of social capital in disadvantaged neighborhoods: A city hall that cares; professional staff aware of democratization processes; socio and economic level of the neighborhood / city; the degree of legitimacy given to resident representatives; the number and scope of local resident organizations and NGOs existing in the neighborhood; the number and quality of stakeholders; a high percentage of housing ownership; pragmatic resident committee; a community that works according to a "SMART" (Special, Measurable, Achievable, Realistic, Time Bound) vision; resident engagement in volunteering activities; community cohesion; and the variety of community institutions and facilities.

In spite of the fact that there exists vast and wide literature regarding social capital, additional development and research in needed to concentrate in the relevance of building social capital among disadvantaged communities and how it can be translated into community benefits whether individually or collectively. As stated above, these factors should be analyzed everywhere in accordance with the particular conditions. I believe that resident participation can be achieved to levels that will enable citizens to become an integral part of society and equal partners in building their own sustainable communities bonded by social capital.

Notes

(1) For further information, see Carmon (1996).
(2) National Social Policy Team: A government forum in charge of the social strategy and policy established at the beginning of PR. Due to policy and organization changes it became the new Inter-Governmental Committee.
(3) Jewish Agency: a national organization of the Jewish communities in Israel and abroad. It became an important partner to PR during its first seven years. It created the so-called "Twining Project" where a Jewish community abroad adopted a community in Israel and raised funds to build community institutions (schools, kindergarten, libraries, community centers, daycare centers, elderly and youth clubs) to improve the quality of life in areas of social services, education and building community.
(4) Inter-Governmental Committee (IGC): A representative forum of all the government ministries who take part in PR. The IGC has five main functions:
first, to decide which neighborhoods will be included or phase out of PR;
second, to allocate their annual budget; third, to approve the neighborhoods' programs every year; fourth, to supervise and control how the budget is used; and fifth, to issue regulations and strategic policy guidelines.
(5) Multi Service Centers: An original concept of PR whose aim was to build and focus its activities on issues to become anchors for sustainable communities after the phasing out stage. Examples are: child development centers; Human capital development centers; and Youth centers. The common idea is to develop services which are interrelated and offer different functions and services at one spot.
(6) PR physical aspects: the housing policy engaged in PR did not use demolishing or displacement policies. It rather coped with the existed housing stock to improve it by building enlargements and renovations; improving physical infrastructure and a maintenance policy. A new redevelopment policy is being considered these days. For further reading see: Weinstein (2003).
(7) Developing Town: Settlements built during the 1950s and 1960s in peripheral areas of Israel as a national policy aiming to cope with population dispersal. Most inhabitants were new immigrants from North Africa, the Middle East and
Eastern Europe. Due to their location, deteriorating housing, a lack of environmental infrastructure, an economy based on traditional industry, and lack of skilled people they become the first ones to be included in Project Renewal. For further reading see Berler, (1970).

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Building social and human capital among ethnic groups in deprived neighborhoods in Israel

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Structured Abstract

In 1998 a new start-up initiative began by a coalition of Government Ministries (Construction & Housing; Welfare & Social Services; Absorption); the Joint - Israel Organization (JDC); and the Association of Community Centers in Israel in order to cope with the social-economic and community absorption of new immigrants who arrived to Israel from Ethiopia. The initiative is known by the name - Immigrants Integration in Defined Localities (IIDL).

Purpose - The purpose of the paper is to describe processes and actions performed among new immigrant communities in Israel, with a focus on the Ethiopian and former Soviet Union populations settled in distressed neighborhoods included in Project Renewal program. The questions we ask are: firstly, how the concept of social capital can be relevant to the challenges of social exclusion, cultural tension, marginalization, disengagement, lack of networks with host community, norms and values differences; and secondly, what are the social, human and cultural capitals' benefits of the absorption process in a new country for them.

Design/methodology/approach - The population examined in the study is Ethiopians and former Soviet Union immigrants in Israel. They are all residents of disadvantaged neighborhoods included in the Israeli Project Renewal. The model of IIDL integrates between theory and practical implementation in the field. This fact designs the approach of the model in 20 neighborhoods where the program is taken place. We have based out data and analysis on documentations, evaluations written by local operators, meetings with the professional staffs, services suppliers, groups of new comers, and visiting to the location to follow up the advancement of the program. The case study of Immigrants Integration Defined Localities program described in this paper is a summary of 8 years operation.

Originality/Value - The paper describes the unique concept of a simultaneously holistic involvement in community - social, environmental - housing, personal - family and the organizational network aspects. The uniqueness of the program rests on both personal practice and community-group practice. It emphasizes the central processes ethnic groups are passing from the first stage when they leave their country of origin until they are absorbed in Israel. These are fundamental and complex processes due to deep gaps between old and new; between past traditions performed in less developed countries and

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traditions based on modern history; between lack of democratization and citizenship. Immigrants Integration Defined Localities became a challengeable action and a new way to absorb culturally new immigrants. It is using culture capital as a vehicle, a mean and a mechanism to overcome differences and gaps in situations that have to be coped with, aiming to build healthy and sustainable society based on social networks.

**Practical implications** - The model became best practice for programs operators dealing with social plans specially emphasizing the cultural sensitivity toward different ethnics groups in the Israeli society.

**Key words** - cultural conflicts; distressed neighborhoods; building community; multicultural integration; social and cultural capitals

**Type of Paper** - Practical Paper

1 **Introduction**

This introduction section describes different aspects of immigrants absorption by the host community that are influenced by culture, exclusion, diversity, social cohesion, social capital and cultural capital processes. It is important to understand them as a background to the approach that was chosen as a model to absorb new immigrants from poor countries into Israeli society.

The process of immigrants into host society has been studies for many years, from many perspectives, and with relation to multiplicity of factors and characteristics that influence the process. In addition to immigration characteristics (such as number of years since migration) and the demographic characteristics of the immigrant (such as gender and age), economic, social and psychological characteristics have also been found to be linked to the process. Language plays a central role in the integration of the immigrant in the new labour market and his/her ability to narrow economic gaps vis-a-vis the natives (Chiswick 1998; 2002). The relevant skill applicable to the new country, together with appropriate level of education and local language proficiency, all comprise the human capital of the immigrant.

1.1 **The intercultural junction**

The Western world is going through deep processes of big migration waves moving from countries characterized by lack of resources, poverty, political unrest and internal wars among racial and ethnic groups. The main targets of these waves are the European Union and developed countries like Israel. As a result, governments are facing new problems: Higher rates of unemployment; racial conflicts; cultural conflicts; concentrations of immigrants in deprived areas; vandalism; crime; and housing deterioration; These effects caused governments and local authorities to invest larger budgets to tackle the problems, from hiring additional professional personnel to providing suitable services and resources to different groups.

Migration from one country to another is often connected to loss of personal and communal status, place of work place of dwelling and friends. During the process of absorption the new immigrant has to acquire new symbols, norms, manners, language, neighbours and friends; to communicate with his new surrounding and to re-examine those norms and values he/she was raised along on. In the literature it is termed "cultural shock" (Oberg, 1960). The features of cultural shock are: a decrease in self-security, segregation, lack of orientation, lack of working and learning abilities, breaking of family ties, changes in family functions, stereotyped outlook toward local people, alienation. Marx (1999) describes a model of adaptation stages in a new cultural reality:
Honeymoon-cultural shock-recovery-passage to adaptation. Weinstein (1983) added the term "democracy shock" to describe the state of sharp changes and transformation immigrants are passing through when originally came from countries where no democratic values were performed to a free and democratic state. This cultural reality compelled policy makers to a more comprehensive view in their approach to, and engagement with, localities where different cultural population groups live side by side.

Figure 1 describes the stages of an adaptation model an individual immigrant experiences in the new cultural reality. The model is characterized by lack of linearity and it is composed of different stages repeating themselves. Non-adaptation and staying in one of those stages might create a deep crisis resulting in lack of function, apathy to the surrounding, segregation and anomaly. The processes a new immigrant passes and influences the whole community in the locality are:

- Difficulty to connect to others and to contribute to the wider community.
- Apathy and indifference toward the local physical and environmental of the community. This is expressed in neglect, vandalism, resentment, lack of cooperation and confrontation with other groups.
- Segregation and continuing keeping of norms and values of original culture and unwillingness to be integrated in the community.

![Figure 1. Stages of an immigrant adaptation model](image)


Each group of affiliation has its different cultural context. The cultural junction point among the groups raises questions that need to be considered to:

- Are the affiliation groups of both absorbers and absorbed easy or contentious to the process of absorption and the adaptation for mutual life in the locality?
- Are the affiliation groups insisting in keeping the norms and unwilling to accept the other one?
- Is there an openness and readiness to make concession towards the other?
- Do the norms and values of the absorbed community clash with those of the veteran community?
1.2 The cultural mode

In order to understand the community process both parties are going through it is necessary to examine the characteristics of each group. The most important feature is the cultural one. We use here three definitions for the term "culture":

1. Culture is the sum of ideas, beliefs, values and the knowledge for the mutual basis for cultural activity (Collins, 1991).
2. Culture is the way things are done and practiced (Marx, 1999).
3. Culture consists of both external and internal layers. The first includes symbols (habits, customs, dressing, guests' reception and food), heroes (historical figures that design culture and are most significant and important), and ceremonies (mourning, marriage), whereas the second includes the values (Hofstede, 1994).

The internal layer includes the principles and attitudes that influence human behavior and design his/her relation to significant issues in life. Values influence and fix our thoughts, senses, feelings and manners. Values are obtained in the socialization process, for example: what is allowed or forbidden, attitude towards authority, good and bad. Values include among other things sensibility, tolerance, analogy and respect to culture.

The paper adopts Hofstede definition due to his basic assumption where human being from different cultures are coping with the same basic problems such as attitudes towards authority and the self, but they take different ways to reach solutions.

1.3 Social aspects of immigration

The complex conditions that have been unleashed by changing demographic profile of Project Renewal neighborhoods draw attention to the need to engage public policy responses that will mitigate the tensions arising from conditions of social exclusion and create conditions within which access to opportunities are enhanced and institutionalized for immigrant communities.

Social networks have been used successfully as a foundation for local social and economic development in many countries. There are numerous examples of developing social capital in development, health, child welfare, education and in the fight against poverty (Dourston, 1991 in Galabuzi, 2010).

Increased levels of ethnic immigration among mixed populations of new immigrants and veterans living in Project Renewal neighborhoods raised concerns about the need to establish positive relations between the receiving populations and recent immigrant groups. As Kumar & Qadeer (2006) suggest, immigrants' social relationships and networks, along with other forms of capital, can offer potential solutions to improving their economic and social well-being, which in turn benefits society as a collective.

The decision to immigrate is highly important step for the individual, as the process involves economic, social and cultural risks and expenditures. Economists who have studied the process presume that individuals make their decision based on rational considerations; however, this assertion has since been weakened by the growing understanding that individuals do not always make completely rational decision. Another distinction in migration decision-making relates to the differences between free and forced migration. The former describes individuals who believe they will succeed in covering the costs involved in the immigration process through their skills and talents and make free choice to immigrate These immigrants, whom the literature calls economic immigrant, are motivated by economic consideration, ad are different from refugees who
have no choice but to abandon their countries of origin due to persecution, prejudice, natural disaster, anti-Semitic attitude, feelings of social alienation (Amit & Riss, 2007).

In the immigration process, social networks may play a central role in the initial stages of integration into the receiving country, especially when they serve as support groups. In recent years, the promotion of supportive social networks has come to occupy essential place in policy makers' interests, especially when dealing with migrants in poor neighborhoods (Phillipson et al., 2004 in Amit & Riss 2007).

As immigrants go through the various stages of settlement into the Israeli society, they rely on different types of social networks. Results from the Longitudinal Survey of Immigrants to Canada found that friends and family are key reason for immigrants' decision to immigrate and where to reside in Canada (Kunz, 2005. P.54). In addition new comers use these familiar contacts to help them find a place to live and to adjust to their new host societies, including obtaining information about employment, health and education.

Beyond neighborhood selection and its impact on social capital, differential experiences among racially groups can also determine the quality of social networks and social capital. Some ethnic groups are more likely than others to leverage social capital both from within the groups and from the broader community. They are also more likely to be represented in the low social capital and low income neighborhoods than in the middle-class high quality social capital neighborhoods.

Since bonding social capital is linked o other forms of capital, the quality available to those who are poor and socially deprived is limited by the strength of their social networks, even within their own ethnic communities. As a result, for a majority of immigrants employed in their own ethnic group, due to the poor quality of their social capital and poor access to other forms of capital, they tend to be economically marginalized in lower-paying positions in poorer-paying labor market sectors (Kunz, 2005).

In addition, the quality of social networks in immigrant and ethnic communities is tied to the communities' institutional completeness. Institutional completeness refers to the full parallel institutions in comparison with those found in the mainstream society. The more institutionally complete is, un term of business, religion, banks and social services, the more it can offer newcomers and established members in terms of resources that increase ethnic attachment and bonds (Kunz, 2005, p. 55).

Communities of minorities are often subject to social distance from the dominant cultural group. This distance interferes with their ability to utilize their social capital and to build relation with members of the broader community. An important dimension of the process of bridging capital is, therefore, the development of relations between dominant groups and minority groups.

The argument here is that greater contact through inclusive institutions, such as schools, recreational centers, public spaces and libraries can help diminish the social distance between groups and open the door for sharing capital across cultural or ethnic boundaries. Providing opportunities to bridging and linking social capita also has the possibility to reduce discrimination due to increased contact between dominant and minority groups in line with Allport's (1984) contact hypothesis.

Pettigrew (1986) argues that encouraging the tendency to minimize antagonism based on group difference and interest of values requires four key conditions: equal group status within the situation; common goals; intergroup cooperation; and the support of authorities, laws and customs. The successes of bridging and linking networks depends on the capacity of ethnic and newcomers communities to participate in coalition building.
efforts, rather than being simply passive participants. Services delivered in the
neighborhoods are providing innovative strategies to create more inclusive communities
by acknowledge the service needs of newcomers’ communities, along with more
established ethnic communities (Caidi & Allard, 2005).

Immigration flows trigger two-way processes of integration for host communities and
immigrants with social, economic, cultural and political implications at the local
community level. It is in local neighborhoods that the changes to economic and social life
are felt first hand. These processes of change bring with them both opportunities and
challenges particularly given the ethnic and racial diversity among 21st century
immigrants.

The changing ethnic and racial makeup of the population means that social cohesion
must be reconstituted around new and varied points of common bonding that internalize
diversity. Research from many western countries shows that the existence of cultural
differences between immigrants and receiving populations does not in and of itself
undermine successful integration, and that building mutual support and solidarity within
communities can be a basis for effective integration into mainstream society (Banting &
Kymlicka, 2006; Harty & Murphy, 2005).

Florida (2002), cited in Galabuzi et al, (2010) has suggested that diversity, as a key
positive value, can be harnessed for community renewal, since it offers new ideas and
creative energy vital to the organic process of community building. Investments in
diversity and maintaining strong community relationships pay off not just for local or
ethnic communities but also for other sectors of society such as the business sector
(Prusak & Cohen, 2001). In multicultural societies, accommodating differences is
essential to successful immigrant integration, making diversity a positive societal value.
The cultural differences that exist between immigrants and receiving populations can be
harnessed for community renewal, building mutual support and solidarity within
communities as a basis for effective integration into mainstream society.

In immigrant settlement, the activity of receiving new residents into communities
often invokes normative structures, including existing social networks, norms and shared
values that act as community assets, representing a renewable “capital” that can provide
the glue and the institutional bulwark around which to constitute “new” functional

1.4 Social cohesion

Social cohesion refers to a process and outcome of social solidarity based on shared
values, common norms and common bonds within a community (Osberg, 2003). There are
two key approaches to the concept. The first suggests that it is rooted in common norms
and shared values that make society possible (Almond & Verba, 1963). The focus here is
on how homogeneity provides the glue or common bond that unites individuals and
groups in and the basis for group identity.

The second approach focuses on citizenship practice an exclusion/inclusion based on
the broad community engagement and citizen participation as key to a form of social
integration that acknowledge the multiple identities that compose modern societies has
argued that social cohesion represents the absence of exclusion and marginalization, and a
contrast between a sense of belonging versus isolation, participation versus non-
engagement, recognition versus rejection and legitimacy versus illegitimacy (Jenson,
1998 in Galabuzi, 2010).

There is another approach that is increasingly cited in the literature - one that equates
the idea of social cohesion with the dependence on social capital maintenance and
formation (Osberg, 2003; Soroka, et al. 2006 in Banting & Kymicka, pp.49-91). Drawing largely from Putman's work, there is a growing understanding that social cohesion requires the constant maintenance and regeneration of social capital, understanding as representing networks of social trust, civic organizations and associational life generally (Putman, 1995; 2000).

Soroka et al. (2006) have argued that both inclusive citizenship and social solidarity though seemingly contradictory agendas to the life of diverse, multicultural societies and need to be pursued through public policy. Kymlicka, 1998 in Galabuzi et al. 2010) has suggested that they are mutually compatible, in that to successfully integrate marginalized groups or new immigrants into society, it is essential that such groups retain a sense of their heritage as a basis for engaging in the broader society.

Social capital theory suggests that social trust is a critical ingredient in social relationships and is indispensable in the process of community building and social cohesion (Putman, 1995, 2000; Potres, 1998; Woolcock, 2000; Coleman 1988; World Bank, 1998). The Canadian experience shows that growing intersection between low income and ethnicity is increasingly correlated to neighborhood selection (Hulchanski, 2007; Preston & Giles, 1995 in Galabuzi et al., 2010).

These conditions can amplify isolation, marginalization and powerlessness, and limit the capacity for civic engagement. They are also literature that shows that ethnic concentration, especially around coherent social networks, tends to moderate the negative effect of such conditions and provides a bridge to better service delivery in ethnic enclaves (Galabuzi & Teelicksingh, 2010).

1.5 Social capital among immigrants

The social integration of immigrants may be reflected in their level of social capital. Social capital was defined by Pierre Bordieu (1986) as the total resources, feasible or potential, that an individual or group accumulates by means of constant maintenance of social networks or reciprocal social interactions. It follows that social capital is a resource associated with social interactions conducted by the individual or the group and it is based on mutual commitment. Hence, social capital enables individuals to manage and obtain economic and cultural resources, including information and knowledge and ensure benefits for themselves by belonging to organizations and social networks. Studies dealing immigrant integration cite the relative deficit of social capital suffered by immigrants in a new country, as compared to the veterans and native-born. In order to compensate for this deficit, organizations and social networks are formed at both the family as well as the group level in order to assist and support the immigrant (Amit, 2010).

Putman suggests that social capital has quantifiable effects on different aspects of life in the community, and goes well beyond community or cultural pride (Putman, 2000, p. 23). Galabuzi (2010) mentions some further aspects of social capital effects of everyday life from different sources, such as the U.K. Office of National Statistics notes that it is associated with better health (Wilkinson, 1996), better educational achievement (Coleman, 1988), improved child welfare (Cote & Healy, 2001), effective governance (Putman, 1995), enhanced economic achievement and low transaction costs (Fukuyama, 1995).

Two dimensions are often used to describe social capital - homogeneous (i.e., relations or ties among those of similar background or interests), relating to what is called bonding capital, and heterogeneous (i.e., relations or ties that cross boundaries of ethnicity, race, class, minority status), relating to bridging capital. In both cases, we come
to understand individual or group actions as being both potentially rational and self-interested, on the one hand, and socialized, or governed by social norms, rules and obligations (Coleman, 1988) on the other. Social capital is, therefore, said to have various social functions that relate to bridging, bonding or linking. Bridging capital is said to allow for communities or individuals to get beyond their preoccupation with common bonds and engage in cross-community, cross-cultural or mainstream relation building.

According to Putman, bonding capital keeps pre-existing networks together and may be valuable for immigrants who need to transition into integration by offering familiar environments and reference points, up to and including such frameworks as ethnic and religious social networks and ethnic enclaves.

The third formulation is linking capital, which focuses on the relationships between individuals and groups and their ability to leverage those relationships for individuals and social benefits. Onyx and Bullen (1997) have identified eight factors that can be said to constitute social capital in action:

- Participation in local community
- Neighborhood connection
- Family and friend connection
- Tolerance of diversity
- Work connection
- Proactive in a social context
- Feelings of trust and safety
- Value of life.

These factors will utilize us in analyzing the case of building social capital among new immigrants to Israel who settled in disadvantaged neighborhoods included in Project Renewal.

1.6 Social exclusion and immigrants

Social exclusion is understood as describing both the structures and the dynamic processes of inequality among groups in society which, over time, structure unequal access to critical resources that determine the quality of membership in society and ultimately produce and reproduce complex of unequal outcomes (Galabuzi et al. 2010). Omidvar & Richmond (2003) note that: "Whether the source of exclusion is poverty, racism, race, fear of difference or lake of political clout, the consequences are the same: a lack of recognition and acceptance; powerlessness and voiceless; economic vulnerability; and limited life prosperity" (p.viii).

Immigrant exclusion from the labor market leads to such outcomes as high levels of unemployment, underemployment and underutilization of skills, as well as problems associated with poverty, including neighborhood selection and the poor integration of children into school systems. Derouin (2003) mentioned in Galabuzi et al., (2010) suggests a link between exclusion and social capital. Communities with poor relations between host communities and newcomers will encourage intra-ethnic networks as a survival strategy.

Neighborhood services play an important role in assisting immigrants to overcome social exclusion by improving access to needed information in ways that are linguistically and culturally appropriate for all members of immigrant families (Omidvar & Richmond, 2003). Social inclusion, as both goal and a process involves a commitment on the part of dominant groups to bring about the conditions of inclusion.
2 The Israeli case

The migration of Jews to Israel can be classified as a ‘returning Diaspora’, quite unique feature among migratory movements in general (Semyonov and Lewin-Epstein 2003). As a returning Diaspora, the Jewish immigrants (Olim) who came to Israel feel an affinity with their new host society even before migrating and frequently exhibit warm feelings of homecoming upon arrival. Immigrants to Israel are driven by a complex mixture of various motives; alongside the religious and ideological motivation to immigrate there is also the fear of nationalist persecution, compounded by economic damage to the Jews’ interests (Amit, 2010).

Throughout the years, the State of Israel has been ideologically committed to the successful integration of new immigrants into Israeli society. In spite of that, the social and economic gaps among different ethnic groups are very significant. Findings point out clearly that the absorption process of new immigrants from poor and traditional countries was very difficult in comparison to immigrants arriving from industrialized countries. Moreover, the social and economic gaps created among these groups are not limited only to the first generation but continue to next generations. These gaps are the source to tensions and conflicts, and threat the social solidarity of the Israeli greater society (Ruppin Index, 2007).

As mentioned above the key factor to cope with the absorption of different ethnic groups is to understand their cultural features and to find out those contact points enabling to build a multicultural and sustainable community where they live side by side. This paper will relate to two main cultural groups - Caucasians and Ethiopians.

The concept that dominated Israel regarding Jews who arrived from ex-Soviet Union was to divide them into two main groups - "Jews of Russian origin" and "Jews of Asian republic origin". Perception of new immigrants in dichotomy terms is typical pattern to the Israeli society: Ashkenazim <> Sephardim; Modernists <> Traditionalists; Orthodox <> Secular. This pattern of thinking perpetuates polarization and ignores the variety, the richness and cultural uniqueness exists among the different ethnic groups. There are additional variables that design each community and sharpen the differences among them: leadership patterns; socialization; norms and values of internal and external relationships.

In regard to the Ethiopian community their absorption turning point occurred when they moved out of caravan sites and absorption centers into permanent housing in cities and neighborhoods defined in Project Renewal. Along with this movement there arose the need to monitor the process and assess the immigrants’ absorption in various areas, including their integration into local communities and their relationships with neighbors. The differences in housing form caused to negative influences of the quality of life and with the relationships with their veterans neighbors.

3 Influences of cultural meetings

Meetings between people from different cultures might bring diversity and enrichment to cope with daily situations. They may lead to the development of mutual tolerance, identification, empathy and readiness to accept the other. Sometimes, these meetings encourage curiosity and the need among the participants to get acquainted with different cultures and even the desire to adopt new habits regarding food and communication. On the other hand, in Israel a country of polarized society based on political identification, cultural diversity might evoke conflict between groups. Table 1 presents some examples of different cultural characteristics between Ethiopians
Caucasians immigrants and veterans populations reside in Project Renewal neighborhoods.

<table>
<thead>
<tr>
<th>External Behavior</th>
<th>Internal Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethiopians</strong></td>
<td>* Giving respect to the other</td>
</tr>
<tr>
<td>* Lowering eyes</td>
<td>* Merging between body &amp; soul</td>
</tr>
<tr>
<td>* Using traditional medicine</td>
<td>* Giving respect to authority</td>
</tr>
<tr>
<td>* Not saying &quot;NO&quot; to official person</td>
<td>* Asking questions is considered</td>
</tr>
<tr>
<td>* Avoiding asking questions and initiatives from the authority</td>
<td>an arrogant action</td>
</tr>
<tr>
<td><strong>Caucasians</strong></td>
<td>* Keep the family respect and good name</td>
</tr>
<tr>
<td>* Outwardly reporting that all is good</td>
<td>* Modesty and respect toward woman</td>
</tr>
<tr>
<td>* Male supervise women behavior</td>
<td></td>
</tr>
<tr>
<td><strong>Veterans</strong></td>
<td>* Care, honesty, manhood</td>
</tr>
<tr>
<td>* Direct speech, involvement</td>
<td></td>
</tr>
</tbody>
</table>

*Table 1. External and internal behavior among Ethiopians, Caucasians and Veterans.*

Source: Angle & Avrahami, 2005, p. 22.

Differences of norms among groups which share mutual properties (like block buildings) raise conflicts and disputes. As long as the conflict continues and forms part of the community's history and tradition, its power will be higher and the solution might mean an attack on traditional values (Katan, 2002). Conflicts are usually accompanied by strong negative feelings. Inability to understand the source of the cultural value makes it difficult to cope with them. The different ways to cope with them both personally and within groups are embedded in the personal, historical, status and belonging, concepts and values. The professional literature presents four strategies to deal with conflict: Problem solving - searching the win-win solution; Struggling - enforcing one solution on both parties; Concession - satisfying one's needs on the account of the other one; and Avoidance - non-action steps or cessation of the conflict intervention (Rubin, Pruitt & Kim, 1994)

Selecting strategies in order to cope with is influenced by the collective cultural capacity. Different cultures are placing different claims and pressures characterized by their culture in front of their community members. On the other hand culture put towards the individual some limitations against members' claims, and supplies him with sources that contribute individual decisions in solving these problems (Gibson-Cline, 1996). The conflicts are empowered when different ethnic groups take measures that differ one from the other such as struggle vis-a-vis problem solving.

Working with populations characterized by different cultural background obliged the professional team to thoroughly study their mode of life, cultural codes and patterns of behavior. Although the new immigrants (mainly the youngsters) adopt partially the outlook of the surrounding society and despite the fact of being citizens of the country for many years, the norms and patterns of behavior as well as their cultural codes are remain rooted in them and affect their behavior within their own communities. The more veteran immigrants who experienced failures during their absorption reveal passive patterns of reaction and do not believe in making any change in their lives. One way to overcome
cultural differences among different ethnic groups is understanding variety of behavioral meaning among them.

The professional teams have learned how to get closer and gain a better understanding of different cultural groups, using a number of insights described below:

- It is important to learn the norms and habits customary in the motherland. This insight supports the building of good contacts with the elder of the community. Among the young generation there exists a kind of denial to cultural codes performed by their parents. Today, they criticize the establishment and express their dissatisfaction with the attitude of the authorities.
- In order to enhance programs at the community level it is necessary to keep contact with the recognized leadership and spread information to the community through these channels.
- Intercultural mediators play a significant role in understanding and translating cultural codes, and transferring exact information from one language to another. This is done orally or by means of written pamphlets which provide details of services available to the entire community.
- Creating suitable conditions for dialogue to enable Ethiopians to talk freely about their feelings and thoughts. Young Ethiopians find it easier than their elders to participate in discussion with others.
- To keep the community's private interests and concerns 'in the face of strangers' professional people need to interact and communicate with a high degree of sensitivity and respect, building credibility and trust.
- Transferring knowledge and tools to service suppliers of the different communities in order to improve and facilitate their communication with the population.
- Among the Caucasians community there is a need to invest in building a community network to be accepted by the congregation leadership in decision making processes regarding the whole community.
- The mother-in-law in the Caucasian family has a very important and central position. They must participate and take part in every change that occurs inside the family.

The professional team plays an important role in preparing the local activists to take an effective part in establishing contacts with the population in the neighborhood. The preparation stage is one of the most important principal aspects for the success of the IIDL. Special attention is given to the behavioral codes of the Ethiopians ethnic group and these must be explicitly understood both by the new immigrants and the professional staff. For example, when an Ethiopian person wishes to suggest an issue for discussion or to relate to a particular theme, he or she won't ever do it directly, but indirectly and through hints. The professional team organizes mutual activities for all parties in the IIDL. General agreement is given to activities like national holidays, summer events for children, celebrating the New Year, maintenance of common property.

The differentiations in implying cultural codes caused by sharing common living site in the Immigrant Integration Defined Localities might create tensions. These are expressed in the following issues:

1. **Community, personal and family events:** Communities give different meanings and interpretations to their events and rituals, their significance and the manner in which individuals should behave. Among veterans, absence from attending mourning or happy events does not imply insult or disrespect as it is perceived by Ethiopians who might impose a community boycott on the family who did not take part in a wedding or any other ceremony. There is usually more than one event per day and it is customary for Ethiopians to attend several events in one evening.
2. **Life habits**: Mourning and happy ceremonies are traditional customs among the Ethiopian community. They usually take place on the common space belonging of all tenants (for example, the garden or yard where a tent will be built to host people coming from all over the country). Using the common space provokes conflicts among ethnic groups in the IIDL.

3. **Problems and conflicts solving by the community elders**: In comparison to the veterans who have the confidence to "exploit" community and establishment resources and to use them for problem solving, the new immigrants apply to an influential and authorized person to reach mediation and conciliation.

4. **Eating habits**: Using sharp and smelled spices by different ethnic groups in the IIDL might cause antagonism from the tenants.

5. **Decision making process**: Different communities need confirmation and agreement from respected persons in their community to execute decisions which could influence individuals or families in the IIDL. For example, the community had to agree that the local civil guard could deal with the drunken behavior of the youth.

4. **Background to the immigrants integration defined localities program**

Following the enormous immigration waves (over one million) to Israel from Ethiopia and countries from the ex-Soviet Union in the early 1990s, concentrations of deprivation were created in many cities where new immigrants settled. The two main reasons why this happened is the implementation of the public housing privatization policy and the attraction of low price housing in poor neighborhoods under the Project Renewal program. The stronger veteran population succeeded to move out of these neighborhoods and those who remained were elderly people and weak families of third deprivation generation who felt resented following the entering of the new immigrants. Both groups found themselves sharing the same buildings. This situation created a new housing reality characterized by low maintenance of the flats; inter-cultural conflicts between veterans and new immigrants; lack of social and communal framework; multi-dimensional risks - environmental neglect, vandalism, anxiety and fear among elderly, crime and unemployment.

Coping with multiple deprivation of both affecting immigrants groups and veterans living in the same area, brought about the need for a change and establishment of a new approach of comprehensive involvement in these defined areas. The new program is called "Meesh'ol" in Hebrew(1) and its initials mean: Immigrants Integration in Defined Localities (IIDL).

The initiative behind the program is a direct result of the creation of concentrations deprivation in areas involving immigrants, mainly from Ethiopia, who acquired apartments following the Israel government's decision to implement the "Direct Absorption" policy(2). Most immigrants settled in distressed neighbourhoods included in Project Renewal (PR)(3). These neighbourhoods are characterized by low level housing, poor physical infrastructures and weak social-economic population. A complex new reality was created whereby new immigrants and veterans had no choice but to live together in these neighbourhoods sharing the same buildings and facilities. The sharing of buildings exposed the deep social gaps among the tenants. The lack of social ties between the tenants intensified alienation and feelings of being marginalised (Abrahami, 2005). To alleviate the problems, and tensions created by the mix of different cultures in poor neighbourhoods, new ideas, as well as different levels of engagements, needed to be explored which could help bring about a change for the better. The IIDL adopted and
implemented a comprehensive intervention program to improve the environmental, social, community and personal lives of the tenants and their neighbourhoods.

The intervention program aims to create substantial changes: from isolated groups to integrative communities; from dwelling in risk conditions to better build housing; from feelings of alienation to a sense of belonging; from dependency on locality to being fully absorbed into integrated communities which encourage independence, self-help and group empowerment.

The program is operating in partnership with government ministries, public institutions, NGOs and the business sector. The partnership includes the Ministries of Construction & Housing, Welfare, Employment, Absorption, the Association of Community Centers and Local Municipalities. The IIDL program began in 1999 and has been on-going since then. It is currently operating in 13 cities among 10,000 inhabitants.

The program has two central aims: (1) Improvement both quality of life and quality of housing of all tenants in multicultural localities characterized by high concentration of veterans and immigrants who lack resources; (2) Enhancing partnership and mutual responsibility among defined areas residents and local services suppliers in order to improve the physical and social conditions of the areas.

The program is executed according to the following innovative principles:

- The intervention program is not focused on immigration populations as other absorption programs but rather in a defined locality where new immigrants and veteran residents live together.
- The intervention relates to both physical and social aspects in a defined locality.
- The intervention program is based on systematic work in a defined locality and on a genuine acquaintanceship with the tenants. It tries to overcome the lack of reliability phenomenon which exists among professionals, service suppliers and residents.
- The program is based on building a genuine partnership with tenants: establishing tenants’ committee and local steering committees enabling empowered to represent resident needs and taking responsibility and commitments on themselves.

4.1 The program

The "Defined Area" approach (IIDL) means a physical space including 250 - 400 dwelling units, usually building blocks consisting of 16 to 36 flats each surrounding a common public space. There are 20 sites in 13 cities included in the program, populated mostly by immigrants of Ethiopian origin, ex-Soviet Union immigrants and veterans. The total budget invested so far is $3.5 Million (Starkov, 2005).

The program's targets developed and changed during the decade of operation. In 1999 the target was defined as "to enhance residents, to improve the environmental conditions and to create a positive social and communal climate".

In 2001 the definition was "to execute a positive process in endangered environment to cause new immigrants and veterans who live together in a multi-distressed and multi-cultural location, to participate them in the creation of better environmental conditions and creating a positive social and communal climate" (Starkov 2005:12).

In 2004 the target was changed to: "The IIDL program aims to create a process to enhance cooperation between tenants, newcomers and veterans and make services accessible to everyone in the neighborhood". This aim will be achieved through four sub-
targets: First - identifying needs and problems out sourcing, developing services and creating solutions to support different groups in the neighborhood; Second - educating tenants to use existing services in the neighborhood; Third - encouraging residents to become involved in neighborhood affairs and to acquire knowledge and tools to be responsible for their own environment; and Four - personal and group empowerment women; advancing their involvement in the community.

During the years some developments occurred and from a general target of assisting tenants in 1999 it focused on treatment targets and empowerment. It must be emphasized that in 2004 there was a certain decline in tenants' participation and moving the support to assist in services access and needs. But the aim of enhancing involvement was changed into taking responsibility as a tool, but still not as real participation in decision making processes due to the long process and skills acquisition needed to get acquainted.

The Defined Localities sites are selected in accordance with the following criteria:

- Cities over populated with new immigrants (over 30%).
- Areas in deteriorated situation environments characterized by physical neglect and social alienation.
- Social and economic inequalities.
- Welfare dependency ratio.
- Lack of supporting community during both crisis and routine periods.
- Local municipality willing to build a true partnership.
- Existing and valid base to service accessibility.
- Partnerships with organizations located in the urban region.

The sites were characterized by deep economic distressed, inter-cultural conflicts, youth at risk, ineffective use of leisure time, violence and abuse, high rates of unemployment, women at risk, language difficulties, lonely elderly people, communication difficulties among tenants and the establishment official representatives and lack of minimal involvement by the establishment in community activities. Besides, the program included guiding working concepts of five elements:

- **Operation in emergency and routine periods**: Creation of a supportive community and delivering a sense of security to the residents in both periods. That is done by empowering residents, improving the neighborhood environment, establishing the community mechanisms such as community institutions and local services.

- **Interdisciplinary approach**: The IIDL approach implements a comprehensive involvement integrated in the personal, physical and community spheres. An approach like that obligated the establishing of partnerships both at the local and national levels, leveraging financial and professional resources like physical building and renovation, community work, welfare, health and education. The main vehicle to implement it is by establishing local steering committees engaged and accompanying the program along all its stages.

- **Resident engagement in leading change**: Creation of resident responsibility by means of establishing interested groups of residents who lead the change. According to this concept, the program encourages residents to take responsibility by identifying their own needs and plan relevant responses, to build mechanisms that ensure community strength for the long run independent of external and establishment institutions and to build local leadership.

- **Enhancing residents at the individual, group and community levels**: The program aims to strengthen the individual and the whole community by
improving accessibility to services of welfare, employment, health, education, leisure, neighborhood events and meetings between different populations.

- **Partnerships between residents and organizations**: These partnerships are due to become the future organizational structure which will replace the present activity after the program will phase out the locality.

This approach aims to build a genuine contact with the residents based on mutual confidence and commitment to the housing and the community living there. It enables to develop awareness and to build the need of engagement. The concept commits professionals and especially the function of the community bridging person to accompany the tenants to get to know them personally, to be located at the area, to open an office in the defined area and to establish residents working groups on a variety of issues concerned them.

![Figure 2. Stages of building IIDL program](image)

### 4.2 The program policies and principles

Working in a systematic model requires performance of a practical approach which can combines various environmental, physical and social elements: Establishing a
steering committee > Selecting a defined locality > Recruiting personnel > Mapping needs > Building leading resident groups for change > Establishing housing committees > Enhancing the locality in physical, social and community-cultural aspects (see figure 3).

- Mapping needs: The mapping process is done through person to person acquaintance with the defined area residents which enable to know each household and it serves simultaneously two functions: examining personal and family needs and an intimate acquaintance with each member of the household.

- Building leading residents groups for change: This is the program's most significant activity and the basis for future institutional infrastructure. Leading groups are established in accordance to a variety of issues such as, environment and neighborhood guard as well as in community and social domains like youth and women. Building leading groups aim to create a commitment among the residents. It is followed by training and guiding them by professional staffs.

- Tenants committees: Each building on the locality site must establish a committee. This is done with the assistance of the social worker in charge, who also runs workshops to train tenants chosen as committee members. The training is done with the cooperation of the Housing Association, to whom tenants pay their monthly membership fee.

- Physical renovations: Maintenance of buildings and their yards in the defined areas are in bad condition. Water, electricity and sewage systems are old and do not functioned. Yards around the buildings are neglected. Leisure facilities are broken and unsecured. Each building receives a special grant to renovate the entrance to the buildings (lighting, doors, post boxes, floors, and sewage system), and developing community gardens. Tenants are involved in the decision making process concerning the items to be renovated. The renovations are done in compatibility collaboration with other partners: Ministry of Construction & Housing (Project Renewal Department), local municipality (department of environment and physical infrastructure).

- Services accessibility and new social programs: The IIDL program creates opportunities for services accessibility located in the urban space for example, employment, vocational training, teaching Hebrew language, centers for young population, youth programs, encouraging women back in to work, cultural mediators. In addition, new program are developed: a neighborhood fair, celebrating holidays, workshops for one parent families, health, youth leaders, parents-children, women empowerment through art, after school activities, preparing for first grade school, budget management.

- Relationship with external groups: The IIDL program seeks to strengthen the social fabric of the neighborhood community through enrichment activities provided by college students and graduates of youth movements. Students participating in these activities receive scholarships to cover half of their rents; in return they commit to volunteer 8 hours per week working with elderly people and school children.

- Multi-cultural dialogue: Understanding culture is the key to connect and overcome the differences and diversity among ethnic groups which make up the locality. Great efforts are invested to enhance conversation between new immigrants and veterans. The IIDL program pays special attention to cultural sensitiveness and preservation of cultural identity and ensures that proper channels for dialogue and community meetings are used. Some practical examples: setting up a translation center for Russian speakers; publishing bilingual information about neighborhood services for Ethiopians residents,
employing professional mediators to resolve conflicts caused by misunderstanding cultural differences.

The Immigrant Integration program operates according to five principles:

1. *Residents participation in decision making processes:* Residents, both new immigrants and veterans are partners together with planners and professionals in developing programs to improve their quality of housing and life.

2. *Multi cultural approach:* The defined areas are populated by immigrants from Ethiopia, Caucasian, Bukhara, Russia and veterans of third and fourth generation of social deprivation. This kind of reality suggests a special attitude and approach towards different culture groups when taking into consideration developing of new plans. The guiding principles of the multicultural approach are developing inter-cultural dialogue; strengthening the cultural roots of the different groups developing cultural identification as a vehicle for empowerment.

3. *Inter-organizational partnership:* Developing partnerships of institutions and organizations at both the local and national levels.

4. *Integrated work of community and the individual:* The model encourages collaboration between the community and individual in order to share allocations, resources and professional support.

5. *Adaptation and implementation:* Integrate the planning process and its aims in structural and strategic lines to ensure the program's continuation for the long run.

### 4.3 Organizational structure of the immigrant integration defined localities

The organizational structure is built on two parallel levels: national and local municipality. In both, managerial and executive partnerships exist. At the national level the managerial partners sitting on the steering committee are representatives from the Ministries of Construction & Housing, Absorption, Welfare, as well as representatives from the JDC and the Housing Association. There are three other partners who are responsible for the execution of the program: an organization consultant; a NGO appointed to operate the program at the national level and a regional coordinator.

On the local level there are the local steering committee composed of regional representatives from the different ministries; the community workers department in the local municipality; the program's coordinator and a local NGO in charge of the program operation.

There are many other bodies active and engaged in the program: municipal departments like engineering, education and youth at risk; community center; center for conflict in the community; housing associations; center for child development, community police; schools and academic institutions. The main functions of the IIDL organization are:

- **National steering committee** - The committee acts as a professional body and it operates as a "think tank forum" to examine new models and phasing out processes. The national steering committee is authorized to select the areas for the IIDL, to decide on the action principles, to approve each IIDL plans and strategies and to decide the annual budget for the program. It meets at least four times annually.

- **National directorate** - The committee which mentors and guides the local coordinators is in charge of the establishing, developing and institutionalize all networks and systems of partnerships at the local level.

- **Local steering committee** - It is a parallel committee to the national one acting on the local level of the neighborhood. It is composed of all representatives
from the district and the municipality engaged in the program. The local steering committee decides about the program details; has the responsibility to execute it; controls and supervises the advancement of the plans and the overall program; fundraising; and service accessibility. The committee meets three times annually.

- **Local IIDL coordinator** - The coordinator is the most important factor in the program. Coordinators are social workers specialized in community work. They are entrusted with a wide range of responsibilities: developing partnerships with organizations and local municipality departments; mapping the neighborhood needs; coordinating the services provided by organizations and municipal departments; maintaining daily contacts with tenants; setting up tenants leading groups; establishing tenants committees; developing new plans; reporting regularly to the local steering committee.

- **Community work department** - This department acts as the professional mentor and consultant on all aspects of the program.

- **Community worker** - a social worker, speaks fluently the dominant language in the locality, creates intimate contacts with the tenants and work together with the local coordinator.

- **Community house keeper** - This person is in charge of the maintenance and repairs of the physical aspects of the Defined Localities.

Having approved the decision to enter the program the local steering committee of the city composed of government officials, professional teams and residents delivers the annual comprehensive master plan that identifies its targets, context and criteria for success.

Table 2 describes the four domains the program is engaged with: social - communal; environmental and housing; personal and family; and the organizational integration. Each domain has its own inputs and outputs criteria as well as the targets for change.

The indices for success identify the percentages of changes expecting to be achieved in the future. When the levels reach the expecting changes then the program comes to its end. The criteria and indices are the consequences of the targets, aims and the principles of performance and therefore they have to be measured and updated with information, surveys and quantitative research. One important point should be emphasized: all criteria and indices are according to "western eyes". But priorities are fixed in accordance to the cultural and social background of the residents' characteristic.
<table>
<thead>
<tr>
<th>DOMAIN</th>
<th>TARGETS OF CHANGE / CRITERIA</th>
<th>INPUTS INDEX</th>
<th>OUTCOMES INDEX</th>
</tr>
</thead>
</table>
|        | Relationship system among tenants of different cultures | • x% Out of all plan and programs aimed to the tenants  
• x% out of all plans and programs in IIDL deal with intercultural dialogues | • X% increasing of tenants participating in the program  
• X% decreasing in cultural confrontations |
| 1. COMMUNITY-SOCIAL | Developing loyalty relationships among tenants and service suppliers | • Acquaintance with cultural features  
• Developing x% of new needs or x% of accessed services  
• Developing new tools and skills to cope with social community issues | • Increasing number of residents consulting with services representatives  
• Increasing number of residents using services and expressed satisfaction |
| | Resident participation | • Developing partnership model between residents, organizations and services  
• Tenants representatives are partners in planning and performing x% of the total programs operated in IIDL | • Residents acquire knowledge and tools from decision making processes to problem solving and to working with organizations  
• X residents who represent different cultural groups are part of local steering committee  
• Establishing forums shared by residents and services staffs |
| | Management responsibility for shared property  
Decreasing vandalism | • In x% of the buildings tenants established housing committees | • Building are maintained and managed regularly  
• Decrease of x% in destruction and vandalism |
| 2. HOUSING - ENVIRONMENT | Building renovations | • X% buildings in IIDL are under renovations | • X% of all buildings needed to be renovated in IIDL were completed |
| | Environmental development | • Enhancing plans for environmental development | • In x% of the buildings gardens and paths were built |
| | Decreasing sanitation obstacles | • Establishing routine treatment to cope with sanitation obstacles | • Pest control is done twice a year |
| | Improving maintenance of open spaces | • Develop and maintain public spaces by municipal and private bodies | • Develop public parks - vegetation and cleaning |

Cont./
The IIDL program achievements

The policies and the principles of the program, as they have been presented in the paper, have succeeded to establish fundamental changes among new immigrants from Ethiopia and the former Soviet Union republics. Figure 3 describes the social networks that have been built among ethnic groups living in disadvantaged neighborhoods where the program is operating. The changes and achievements will be examined according to Onyx & Bullen eight factors to constitute social capital in action.

1. Participation in local community: Utilizing best practices and experiences both from Project Renewal and long periods of absorbing new immigrants in Israel, the initiators of Immigrant integration program have begun from the very beginning to build social networks with the immigrants, trying to engage and involve all members of the

<table>
<thead>
<tr>
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<th>TARGETS OF CHANGE / CRITERIA</th>
<th>INPUTS INDEX</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improving residents function</td>
<td>• Establishing self-help groups</td>
<td>• X% declining of welfare services clients</td>
</tr>
<tr>
<td></td>
<td>Enhancing employability</td>
<td>• X% of the plans are focused in preparing residents for employment</td>
<td>• X% unemployed in IIDL began to work&lt;br&gt;• X% increase in labor force&lt;br&gt;• Family Income level among low wagers increase</td>
</tr>
<tr>
<td>3. PERSONAL FAMILY</td>
<td>Skills &amp; training</td>
<td>• X% of total programs are devoted to acquire skills&lt;br&gt;• X% of total families participate in programs devoted to parents and children</td>
<td>• Participants achieve at least X skills</td>
</tr>
<tr>
<td></td>
<td>Enhancing education</td>
<td>• Acting X programs for first grade&lt;br&gt;• All children up to 18 years old are in formal or informal activity</td>
<td>• X% number of children prepared for first grade&lt;br&gt;• X% less children at risk&lt;br&gt;• X% non-speaking Hebrew achieve language skills&lt;br&gt;• Establishing X plans for youth at risk</td>
</tr>
<tr>
<td>4. ORGANIZATIONAL FRAME</td>
<td>Developing comprehensive personal and community work</td>
<td>• Developing model of partnership between community and personal work</td>
<td>• Team met once in two months&lt;br&gt;• Private, family and community programs are developed</td>
</tr>
</tbody>
</table>

Source: Angle & Avrahami, 2005: 48
family and especially with the religious and honored leaders of each ethnic group. The reason for that was the high creditability these leaders deserved from their own fellow communities. They became the contact persons with the outside world, that is, with the neighborhood and local services at large. In order to overcome cultural differences the program employed bi-lingual translators, educated people and student who belonged to the same ethnic group. Through many workshops, local steering committees meetings, recruiting professional staff in charge of local service delivery and the building of social networks and social capital benefits began its march. The immigrants began to use local services, mainly, clinics, community center enrichment activities, schools and kindergarten, human capital center aimed for employment.

2. Neighborhood connection: The informal meeting among new immigrants and native population whether on the same dwelling block, in school or at the community center influenced to break the worries and fears from both side. Community events where most of the neighborhood’s community met whether to celebrate holidays, school graduation, food testing, weddings or mourning contributed a lot to create social networks and neighborhood connection among major parts of the local and greater community.

3. Family and friend connection: Both ethnic communities - the Ethiopians and the Caucasians have inherent characteristics to build close connection inside their own communities. That virtue was brought with them from their origin country and was kept through all years of settlement in Israel. Therefore, it is not surprising that this factor exists and contributes to the bonding of their social networks. It helps them to cope with problems they have to tackle against the authorities whether local or national levels.

4. Tolerance and diversity: Both populations - new immigrants and veterans - with the consistent supervising, mentoring and guidance of professional staff learnt to know each other and to respect each one unique feature and live with it. The neighborhood, the place where daily life is managed by many factors, institutions and organizations, aiming to build social capital benefits and to establish a sustainable community, has learnt how to live side by side in democratic ways. Tolerance and diversity are integral part of mutual life in democracy state.

5. Work connection: As the professional literature taught us, new immigrants are coping with economic difficulties to find their assimilation in the host community regarding employment and leverage their standard of living. The IIDL program has pay great attention to cope with building human capital base for the new immigrants. The first difficulties were learning the language, to acquire employability skills. This process takes longer time and involved government support as well as steady economy that need working hands and people with professional knowledge. This factor is still need to be pushed forward.

6. Proactive in a social context: We have to distinguish between two kinds of proactive in a social context: the first is dealing with the close family and friends which we may call the close circle and the second deals with the engagement and involvement at the neighborhood arena. The social context of the first one takes shape of helping the relatives of the family and other friends who live outside the neighborhood, whereas the second, concentrate on actions ethnic groups do for the general community like volunteering activity, participating in parents committees in school and neighborhood leadership, persons who are responsible to manage services and deliver them. Thus, the social capital benefits are twofold and in between them there exist mutual partnerships.

7. Feelings of trust and safety: Trust is one of the most frequently encountered elements id definitions of social capital (Fukuyama, 1995) and is an essential ingredient of any successful community building effort. The Ruppin Index of immigrant integration
(2007) reveals that over 50% of ethnic groups are satisfied with their absorption process and over 65% pointed out their new connections with the greater community at the neighborhood level. To the feelings of trust and safety we can add the information sharing element. It is obvious that information has its own power and implications to one self-security and safety. Moreover, during the years of the program operation the levels of tension and intercultural conflicts have dropped down. The institutional infrastructures performing in the neighborhood contribute to the improvement of feelings of trust and safety in that they became the meeting places where the neighborhood populations get to know each one personally.

8. **Value of life**: Both the social capital and the cultural capital benefits together with the physical and environment improvements at the defined locality, as well as the knowledge capital equipped the immigrant with variety of skills to manage his/her life. The process of accumulation enables the individual the value his life in the new country and to become a citizen holding his rights and duties towards the society he/her is part of.

![Figure 3. Social capital networks among ethnic communities in disadvantaged neighborhoods.](image)

6 **Discussion and conclusion**

Integrated Immigrants Defined Localities (IIDL) began in 1998 as an experimental program in the four most populated with new immigrants cities in Israel. The program was further developed nationally during 2006-2008 and today a total of 13 cities and 10,000 people living in 113 building blocks with 156 tenants' committees benefit from the Immigrants Integration Defined Localities program.

The Immigrant integration Defined Localities is operating almost ten years. Newcomers from poor countries, as are the Ethiopians and the Caucasians ethnic groups put heavy burden on the host communities. Their settlement in disadvantaged
neighborhoods throw additional difficulties, namely, coping with a new language; get to know the local culture, norms and values of the veteran populations; building connections with the service suppliers; differences of behavior and culture that create tension, alienation and exclusion; and especially heavy budget burden on the authorities which have to assist them and supply the needed services.

Although the IIDL is relatively a young program, we can point out successful achievements such as building social and community networking, tenant engagement, establishing of local leadership, improvement of housing maintenance, tenants committees, and local services matched to the different ethnic groups.

The program is executed simultaneously along all channels of its principles to achieve the best benefits and impacts. The plans cover a very wide range of fields: Technical courses for residents teaching them how to repair elementary failures and faults of electricity, gas, painting, water taps; Maintaining the common parts of the building; Establishing a building committee; Language classes for non-Hebrew speakers; Basic education skills - writing, reading and arithmetic; Acquaintance with service deliverers: school, kindergarten, day care center, youth club, clinic, health, welfare, community center, local municipality departments, police, employment; Mutual meetings and discussions with veteran neighbors; Problem-solving process by the residents; Employment training; Workshops for mothers and children, Women empowerment; Social activities for children, youth and elderly people; Developing building yards.

The targets of change include four main domains of involvement:

1. The **community-social domain** which aims to create a change in the inter-cultural atmosphere relationships and tolerance among veterans and new immigrants: (a) From confrontation to partnership and mutual acquaintance; sharing in mutual events, developing a sense of tolerance and mutual neighborly relations; (b) To develop loyal relations between residents and local services: service accessibility and to develop new responses to cultural adaptation; (c) To build working models between residents and services representatives; (d) Developing responsibility for mutual property management: creation of self-management organization by the residents, establishing maintenance network of the building included in the defined area;

2. The **environmental-housing domain** dealing with (a) the physical renovation and the development of the surrounding environment; (b) raising awareness in home owners and those renting their responsibility to their physical environment;

3. The **personal-family domain** enhancing residents individually and empowering their families to acquire knowledge, skills and means to help them function independently, integrating them into employment and how to use educational and social services;

4. The **network-organizational domain** aims: (a) Effect a transfer from a collection of different organizations taking care of the defined area to a comprehensive network involvement; (b) Develop multi approach of mutual responsibility such as think-tank networking in order to improve quality of life.

The uniqueness of the IIDL is expressed through the following components: (1) **Targeted population**: individual attention toward every family and its members within the general community that lives in the defined area. (2) **Defined area as a managerial unit**: Enables high level of coordination among staffs, achieving effectiveness and supervision of both residents and services. (3) **Intensive effort**: Investing united efforts among all organizations involved create significant changes individually, socially, physically and communally. (4) **Creation of social networks**: These networks enable mutual assistance in time of crisis, development of recognition among residents,
acquisition of self-confidence, develop social anchors based on the residents' strength as a leverage for developing contacts with other populations in the neighborhood. (5) **Developing the space as service area** includes: services accessibility, develop new services for the population, teaching families how to use these services. (6) **Integrating physical and social aspects** as a stimulus for comprehensive involvement.

Defined areas of immigrants have both difficulties and achievements. The achievements at the national level are: Developing of working concepts and regulations; Strengthen national level partnership; Developing means and skills; Developing programs and organizational infrastructures. And at the local level: Pooling resources; Enhancing residents' involvement in decision making processes; Better coordination among professional teams; Intensive efforts and detailed acquaintance with local residents and their needs.

Besides, there are some difficulties to cope with: Lack of budget; most immigrants (mainly, Ethiopians, Caucasians and Bukharians) remained below the level of poverty; Welfare services are investing a lot of personnel and budget resources to take care of weak families; Social and economic difficulties are put top priority for many households; Big cultural gaps still exist between new immigrants and veterans.

To sum up, we present here a list of both supportive and preventive factors based on the Israeli experiences of building social and cultural capitals among new immigrants arriving to Israel in the early 1990s settled in deprived neighborhoods. We suggest that those factors can be considered elsewhere in democratic countries. It is clear that are differences between Israel and other countries concerning the political system, culture, socio-economic conditions, demographic composition, history of resident participation, policies of absorbing new immigrants, civil society, government priorities and more. The list of factors below is not complete, but it points out the most influential and important variables and factors as experienced and functioned in IIDL and Project Renewal.

**Factors inhibiting success:** Network and political delays at both the national and local levels regarding budge, professional appointment of professional staff; lack of sufficient involvement from municipal mayors; difficulty in showing instant outcomes and results; slowness of decision-making processes especially in big cities; interested groups acting at the local level; difficulty in understanding multicultural processes both among different immigrants groups and between veterans and new immigrant

**Factors of success:** A structured operation model; commitment and readiness of the local municipality to perform the program by the department of social work; building infrastructures based on partnerships at the neighborhood level; creation of new platforms to integrate related programs and services; intimate acquaintance with the residents in the locality; establishing a mechanism that serves the residents in emergency periods; professionalism, enthusiasm and sense of commitment among the personnel at the national and local levels; an innovative program in a process of emergence which enable a dynamic process of learning and changing. These factors contributed to the achievements of the program and slow downed ethnic conflicts between new immigrants and the veteran population living in the same locality.

The key word that best explains the program's success is a deep and fundamental understanding of what does **culture** mean to each of the different groups of immigrants and how the professionals translate and implement the following terms in their daily work: symbols, heroes, ceremonies, rituals, values, habits, customs, manners of eating, happiness, mourning, tradition, history, language, religion, personal-family-community events, respect, tolerance and decision making process.
However, social and community activities are not the only key for success. Performing it alone will raise doubts of credibility toward the authorities. What is needed to achieve maximum impact is the renovation of the neighborhood buildings and developing public spaces and well-designed infrastructures. Visible and tangible properties are the most important evidences which contribute to the residents' motivation and open dialogue with the authorities. Figure 4 shows the four main indices of the program success. The first is resident leaders who represent their communities in the neighborhoods, cities and national forums where decision making processes are taking place. These representatives assumed to lead the social change regarding rights, policy and services inspection. They should be empowered and skilled by professionals. The second is the physical renovations where residents are integrated part of the planning, pay their relative payments and maintain it through processes of community development and social involvement. The third is the development of social networking characterized by cross cultures and the fourth is service accessible. The cohesion of social networking will bring informal support among residents, to enhancing the sense of belonging and personal security.

Figure 4. Principal indices of IIDL program success

The Immigrants Integration Defined Localities identified mechanisms by which Project Renewal influenced social capital formation. Included were:

- Bringing people together who might not otherwise have interacted with each other. These include: members of local Project Renewal managerial staffs; social and community workers; local municipality professionals from the fields of education, health, environment; physical infrastructures; community center; local services; resident volunteers on community boards; sponsoring community agencies; government officials, and members of the general community. Social networks evoked through community mobilizing and participation in priority setting exercises, electing community board members and problem solving.

- Participants improve their social capital by participating in the program. They also saw a potential for enhancing both bonding capital (staying close to home) and bridging capital (access to external assets, skills and information), but also linking capital (cross-class interaction) through the program.
• Identification the opportunities for utilizing diversity for social innovation and better service delivery.

• Leverage existing social capital in immigrants defined neighborhoods through the establishment of social services in the community to be a vehicle for better social infrastructure for ethnically groups who wish to take over leadership and engagement for their own community as well as representatives of the community at large.

• Focusing efforts among young people to achieve access to education, to prevent dropout from schools and to attain skills and abilities for higher education and employment.

• Schools and community centers are the core for institutional vehicles for building community, and cross-cultural bonds to cope with social exclusion.

• Building alliances of common vision and common purpose involving local municipality, nonprofit organizations, foundations, business sector and other stakeholders to address strong social networks and thus to benefit the residents of economic capital.

Based on the second Ruppin Index of New Immigrants (Ethiopians and former Soviet Union) Integration in the Israeli society (2007) concluded the following findings collected and analyzed regarding their social, cultural and human capitals. In regard to the social integration, the Ethiopians reported on feelings of loneliness due to less social networks with veterans Israelis. The Ethiopians and former Soviet Union immigrants were found as the ethnic groups with lower living standard in comparison to immigrants of Western countries origin. Similar findings were found in regard to labor market integration where the language factor and level of education are the explanations to their low participation.

In regard to the aspect of social networks, the finding shows that over 50% of the immigrants emphasized that their close friends are Israeli veterans. The factor that explains it is the fact that more than half of the populations in their neighborhoods are Israeli natives. Both ethnic groups gave high importance to keeping their cultural capital components as a mean to their bonding social capital.

As for the satisfaction integration aspect, the majority of new immigrants from both ethnic groups pointed out that they are satisfied from their institutional absorption process in the host community. This evidence is due to the high level of services developed in disadvantaged neighborhoods aiming to supply both quality and variety of services as well as professionals that are equipped with social, cultural and human skills to work closely with the new immigrants.

The question of continuing the program is crucial. Therefore, several suggestions were offered: Firstly, establishing an economic model allowing access to services for the populations of the locality by paying fees; Secondly, building a networking mechanism of tenants activists with Ngo’s organizations; Thirdly, connecting with other programs operated in the urban space (community centers, supportive neighborhood); Fourthly, continuing mentoring and guidance by IIDL teams; Fifthly, strengthening the local municipality community work; and Sixthly, developing theoretical and practical guidelines to implement the IIDL program in new localities.

These suggestions are being practiced in the neighborhoods included in the program in order to examine and to analyze their practical implementation. As stated above, these factors should be analyzed everywhere in accordance with the particular context. I believe that ethnic groups of multicultural origin working in line with the model can achieve levels that will enable them to become an integral part of society and equal partners in building their own sustainable communities.

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Notes

(1) 'Meesh-ol': Hebrew word which means a narrow path. When writing it as an abbreviation it is translated - Immigrant Integration in Defined Localities (or areas) in a neighborhood.

(2) Direct Absorption - A policy the Ministry of Absorption executed in 1990 due to the increasing waves of immigrants from ex-Soviet union. The policy enables immigrants to choose their preferable place of living. The government transfers money for their first immediate expenses and the ministry of Absorption continue to transfer a monthly sum of money according to criteria variables. This policy is called "Basket Absorption"


References


Appendix 1. Examples of community programs performed in IIDL

1. First domain: Physical and Housing:
   - Improving building infrastructures: lighting, sewage, paths, gardening.
   - Renovations of building blocks.
   - Renovation of elderly apartments (solar heating water, kitchen, doors, water pipes).
   - Maintenance guidance to tenants.
   - Establishing tenants committees.
   - Developing public spaces and play grounds.

2. Second domain: Community
   - House maintenance course for Ethiopian males.
   - Women empowerment workshops.
   - Social club for elderly immigrants from ex-Soviet Union.
   - Community events during Holidays.
   - Community advocacy.
   - Empowerment, mediation and conflicts solving.
   - Community policing.

3. Third domain: Personal - Family
   - Individual treatment by the social welfare personnel.
   - Installation of alarm bells for elderly people.
   - Classes for Hebrew language.
   - Vocational training for women and men.
   - Working with one parent families.
   - Workshops aimed to keep environment quality.
   - Health centers.
   - Establishing women and elderly clubs.

4. Fourth domain: Children and Youth
   - Learning centers for elementary and secondary schools.
   - Mentoring parents to improve parent-child relationships.
   - Organizing youth movements.
   - Sport activity.
   - Day care centers for children whose parents are working.
• Enrichment activities at the community center including use of computers.
• Vocational training for youth as D.J's.
• Young girl at risk (coping with adolescence, strengthening the self).
• Preventing dropping out of school for youth at age 13-18.

Appendix 2. Statistical evidence

During the period began in 1.1.1989 until 30.6.2009 the total number of new immigrants arriving to Israel reached 1,138,199 people. The overall population at that time was 7,363,216 inhabitants. The distribution of immigrants was as follow:

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Ethnic Group</th>
<th>New Comers</th>
<th>% of New Comer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-Soviet Union</td>
<td>Caucasians</td>
<td>879,443</td>
<td>77.2</td>
</tr>
<tr>
<td></td>
<td>Bucharans</td>
<td>53,473</td>
<td>4.7</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Ethiopians</td>
<td>80,769</td>
<td>7.0</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Ethiopians</td>
<td>57,510</td>
<td>6.8</td>
</tr>
</tbody>
</table>


Appendix 3. Cultural codes and customs implications among Ethiopians and Caucasians communities

Cultural codes among the Ethiopian community

The discussion culture: Speaking is always done indirectly; there are many uses of metaphors, proverbs and allegories; dialog is in the form of storytelling and rhymes; proverbs are intertwined. The art of the Ethiopian language is very different from that of the direct "sabra" (Israel-born, referring metaphorically to prickly exterior and tender heart). Words are said in hints which is sometimes seen by the Israeli speakers as evasion from speaking straight and directly.

Respect the other, manners and modesty: Hierarchy defined structure imposes attitude and rules of respect according to age, education, function and position in the community (elder of community, religious role), family authority (father, mother, elder brother), wisdom, gender and capital.

Titles and respect of names: Another way to express respect for the other is by using titles and names. For example, "Ato" is parallel to Mr. in combination with the private name; "Elka" is a title of respect combined with the person's first name denoting a person who is enlightened and educated in secular or natural medicine.

Respect for authority: An Ethiopian person never says "NO" or shows negative feelings like anger and jealousy or express wishes to an authority.

Expectations from an authority: Promises must be fulfilled; answers like "we shall see" and "maybe" are considered as a promise. Insulting or humiliating a new immigrant by service suppliers is strictly forbidden.

Names: The customary manner is to add the first name of the biological father both to males and females even after their marriage.
Keeping secrets and feelings: One of the most important values among Ethiopians is the secrecy code. One who is keeping a secret is praised and respected by the community. Taboo is enforced on sexual matters and disputes in the family.

Patience and time: One cannot cut a conversation in the middle but must listen patiently until the speaker will end his/her saying. Time has no meaning except the natural time that dictates the daily agenda.

Guest reception: Hospitality and guests’ reception are part of mutual respect and praise. A guest that arrives is asked indirectly about the reason purpose of his visit; Guest reception includes a continuing ceremony accompanied with food, drinks and calm conversation.

Mutual help: The community framework used in Ethiopia was that the wider family live together in one place; sometimes it involved up to seven generations. The commitment for mutual help reaches high levels and its expressions are in visiting sick people, new born children, collecting funds in periods of mourning and happiness.

Holistic concept of life: Ethiopians view their life as wholeness. Thus, work, education, children, provision and religion are intertwined each with the other. When professional staff asks about living he will find himself listening to the difficult issues confronted by the family (Bodovsky et. al., 1994).

Cultural codes among the Caucasians community

Caucasians Jews have many unique features stemming from their cultural and community identifications that differ from other population groups. In Caucas they were a separate ethnic group. Coming to settle in Israel they continued to keep part of their cultural patterns. Following are some characteristics of their community.

The family: In their country of origin the family was characterized by patriarchy and endogamy patterns (marriage in within the tribe). When they moved to Israel an integrated pattern of a nuclei family with strong relation to the extended family was created. People of the community tend to stay close together and live in one storey building. Elderly parents live together with their children; a widow mother-in-law moves to stay with her daughter-in-law; Mothers-in-law have special status in the family structure.

Attitude toward women: The Caucasian community is strongly characterized by its control and supervision of women. Girls are getting married young due to the fear of over permissiveness in their behavior.

Respect: Great emphasize is given to personal and respect from the community. The issue has special connotation regarding their immigration process to Israel which sometimes caused severe damage to their self-image.

Employment patterns: Most Caucasians immigrants hold vocational training qualifications. Some have higher and academic education. While in Caucas they worked as wage earners or in independent enterprises but when they arrived in Israel many found themselves working in cleaning and low level jobs which were considered especially by males as an affront to their pride and respect.

Leadership and community organization: Caucasians immigrants lacked legitimate leadership within communal affairs. Past leadership patterns indicate fragmentation among them and the great difficulties in creating an agreed leadership. In recent years a changed occurred in their thinking and the awareness of the significance of ethnic leadership began to filter among them (Baram, 1999).
Housing policy in the Israeli project renewal

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Abstract

Housing policy in the Israeli Project Renewal (PR) is a unique one and differs from other countries like the USA and the UK which run urban regeneration projects in ways of redevelopments and displacement of populations. The policy is based on putting the residents of the neighborhoods in the center of the activity striving to bring local solutions to dense dwellings on one hand and integrating social and community aspects on the other hand. The paper will present the background, policies and achievements of the housing policies as well as the future policies of housing in neighborhoods that are included in PR.

We have used the methodology of the integrated evaluation model which answers the following questions: (a) Does the program operate and aimed to the targeted populations of PR? (b) How are planning and performing decisions accepted? (c) To what extent is the program economically efficient? (d) Does the housing policy program achieve its aims? (Alterman et.al.,1984). The main sources of information were the annual reports published in the years 1980-2010 by the PR physical department in the Ministry of Construction and Housing (MOCH); the department of Information and Economic Analysis at MOCH; and data from available documents of PR neighborhoods such as the annual reports of planning and budget allocations.

As mentioned above, the housing policy of PR did not use policies of urban regeneration implemented in other western countries due to the Project comprehensive policy to integrate between physical and social aspects from the very beginning. Therefore, no displacement actions or destroying of existed communities were implemented. Instead, PR has coped with the existing stocks of housing in the neighborhoods through policies which strengthen the local residents socially and economically, in addition to community, education and developing of local services. These policies aimed at building community capacity and to bring distressed neighborhoods to their take-off point.

Housing policies were implemented in all PR neighborhoods in the years 1978-2004. They included different policies like enlargement of dwellings to cope with density problems; encouraging tenants to become owners instead of being a renter in public housing; special grants for planning enlargements and building renovations. The outcomes speak for themselves: 74% of the apartments in PR neighborhoods are owners' property; out migration process has stopped; flats values has gone up; and new constructions are built in PR neighborhoods which phased out by developers.
Keywords - project renewal, enlargement policy; housing ownership; physical-social interrelationships

Paper type – Academic Research Paper

1 Introduction

Project Renewal (PR) of Deprived Neighborhoods in Israel, which began in 1978 (the formal declaration was in 1977), was an experience of social intervention that focuses on involvement at a definite territory, namely, the neighborhood. In its framework, an effort has been made to enhance social, physical, economical, political and cultural processes of local democracy, decentralization and improvement of services.

Project Renewal is a national project where all ministries are involved. It is performed according to principles of comprehensiveness, coordination, integration, flexibility, citizen participation, bottom-up process. To date, PR includes 104 neighborhoods and cities dispersed in metropolitan areas, new towns and rural areas. Total population in the neighborhoods reaches to one million inhabitants (about 16% of the total Israel population) including Jews, Arabs, Druze and Bedouins.

Underlying the PR approach has been the philosophy that emphasizes the interaction between social and physical factors in neighborhood life and the need to increase the self-reliance of neighborhood residents. Since 1978, special funding from the government and the Jewish Agency has supported a wide range of activities, including physical public infrastructures (paving streets, sewers, drainage, street lightening, play grounds, parks); the renovations of exteriors of apartment buildings; enlargement of individual apartments; the building of community centers and other recreational facilities.

Behind the idea of targeting on particular neighborhood is the notion that only an effective mass physical and social activity can transform declining areas into healthy and viable ones. Physical improvements might be short-lived without accompanying social development. At the same time, social programs might draw little interest from residents unless their own homes become physically more livable. Changes in housing conditions reveal more about the direction in which the neighborhood is improving. A neighborhood in which house owners are willing to invest in physical improvements in their dwellings and where demand to buy apartments is rising, is probably well on the way toward rehabilitation or at least stability. In contrast, where confidence is low and prospects look bleak, we generally find few willing to spend their own money, either to improve their own dwelling or buy another (Alexander, 1988; Carmon, 1992).

This article will focus on the following issues concerning the aspects of housing policy in deprived neighborhoods in Israel included in Project Renewal:

- Housing policy before Project Renewal
- Housing conditions in deprived neighborhoods
- Project Renewal housing strategies and policies
- Mechanism and means to cope with physical deterioration
- Residents role in the housing policy of Project Renewal
- Achievements
- Dilemmas and problems
- The future prospects

The data collected from many sources: It is based on the Ministry of Construction & Housing documentation of Project Renewal; Some hundreds researches done by academic institutions and private agencies; Professional involvement of the author in Project Renewal since 1978; Lessons learnt from programs' evaluations; Israel Statistical Bureau (ISB) (Carmon, 1996).
2 Housing policy before Project Renewal

Since Israel became a state her gates where opened to Jew immigrants from all over the world. During the first three years of its establishment the Jewish population doubled and reached to 1.4 million inhabitants at the end of 1951 due to massive waves of immigrants. Most of them were refugees and survivors of the Second World War's Holocaust, from North African and Middle East countries.

The State has taken her responsibility to supply housing to all refugees. The conditions and reality in the first years of the State were difficult. Since the demand for housing was several times more than the supply could afford, the State faced severe problems. Several solutions were found: Most of the immigrants were housed in camps which were left by the British Army (Israel was under the British mandate in the years 1917 – 1947). Others were located in cities that were left and neglected by the Arab population (Jaffa, Lod, Acre, Haifa) who fled to Arab neighbor countries during the War of Independence in 1948.

When these sites were filled up, the government began to build transit camps ("ma'abarah") made of under standard materials (clothes, wood, tin). They were located next to the big cities, rural areas and in sites planned to be new settlements. The idea was that those locations will supply work places for the new immigrants who were lacked of basic means.

The transit camps were considered as temporary solutions to be replaced by permanent dwellings. But, many years passed before their populations were settled in new neighborhoods. Changing of population in a process of negative selection developed in these transit camps during a short period, had caused them to become deprived and distressed places characterized by distinguish physical and social features of distress.

When the yearly rates of immigration decreased from 20% during the first 3 years of the State to about 4% in the years 1952 – 1964, the building of transit camps stopped and the Housing Authorities began to plan permanent dwellings (public housing). At first, blocks of 24 square meters (sqm) were built; then, one-storey building for two families in a size of 28-32sqm. In 1955 the average house size was 45sqm which composed two rooms; In 1964 the sized grew to 60sqm (2.5 – 3 rooms).

The government housing policy was designated both toward building dwellings for the new immigrants and developing the periphery areas ("New Towns"). Very few resources were invested among the poor veteran populations lived in the central part of Israel where most of the housings were built by the private sector.

Between 1965 and 1977 social and economic changes occurred which influenced the housing policy: The immigration to Israel decreased from 50,000 a year in the early 60's to about 4,000 toward the end of that decade; Economic slowness with high unemployment rates in the building and industry sectors; Growing sensitive to the social gaps among the Jewish society (neglecting of the bonds between communal origin and socio-economic status); social unrest and media awareness involvement which were responded by the public and politicians.

During the decade 1965 – 1975, the government began a mass building policy. More than 400,000 dwelling units were built; the private sector sized one third of the building volume; High building standards were used; and a sharp raising in apartments prices. The Ministry of Housing established partnerships among local governments and government building companies aimed to take care of the dwelling problem of the populations in distressed neighborhoods, including the "Act of establishment the Authority for Redevelopment of Renewal Areas" (1965). Besides, the Ministry has developed new
assisting programs of loans and mortgages to enable young couples and veterans to improve their dwelling conditions.

The significant political change in 1977 pointed out of three new approaches by the new government: Continuing decreased of direct involvement by the government in the building market; Gradual transfer shift from government support in the commodity to support for the needed one; Special public attention to the rehabilitation of old dwellings and less to new buildings.

The year 1977, points out the declaration of Project Renewal in deprived neighborhoods in Israel by the new government and the beginning of a new era in its policy to bridge on deep social and economic gaps between the so-called "first" and "second" Israel, that is to say between those who "have" and those who "have not" (Nachmias and Menahem, 1999).

3 Housing conditions in deprived neighborhoods

Based on the housing policies described above, the first thirty years of Israel's establishment created the poor socio-economic conditions of the so called "deprived neighborhoods". In the mid 70's, 160 distressed neighborhoods were mapped in Israel including 220,000 dwelling units and a population of more than 900,000 inhabitants which composed about 25% of the total population. The existence of such a huge volume of deprived sites after a relatively very short period of Israel establishment is due to the following facts:

a. The housing policies during the first 30 years aimed to achieve two purposes: absorption of new immigrants and population dispersal. No special attention was given to limit the social and economic gaps and inequalities among different groups in the Israeli society.

b. During the 50's and early 60's the government invested in establishing 30 new developing towns which were all populated by new immigrants. These new towns were characterized with severe lack of services, physical infrastructure, temporary dwellings, unemployment, traditional industries, remote from economic centers, big household families, high density (person / room) low income, high percentage of public housing units.

c. According to government policy, resources were invested and allocated mainly to the rural sector and not to the urban sector, due to the Zionism ideology to build a modern society based on agriculture. The result was neglecting of the urban sector and the developing of urban suburbs populated by new immigrants near the urban metropolitans. They all were at the outskirts of the big cities and suffered of social, economic and physical neglecting.

d. The Establishment has given priority to new developments and not for the preservation of the old and raising the level of the old physical, environmental and social networks.

e. Major parts of the new building in Israel, built during the first three decades, were public housing. Most of them were built in a homogeneous mode: similar built area; 2 -3 rooms; 3-4 stories; aimed for young couples; 16 – 36 units per building; housing policy aimed at population with specific characteristics.

f. Public housing units were transferred to the management of public building companies and associations where the government has its own shares. These companies couldn't maintain the units in a proper position under their responsibility due to the fact that many units were housed by elderly people who lived on welfare benefits and were exempted paying the monthly rent and by others who didn't regularly pay their payments.
Building new dwellings under a planned program is done, in most cases, simultaneously with the building and developing of services – educational, social, economic, employment, transportation and communal. These basic services were lacked in most neighborhoods. The gaps between them and the other parts of the urban mosaic grew greater along the years.

Therefore, no wonder, that the sum of housing conditions effects in deprived neighborhoods created an unbearable housing and social characteristics as described below:

a. Homogeneous dwelling units built of under standardize materials
b. Homogeneous population origin composition (80% North Africans)
c. Small apartments (28 – 56 square meters)
d. High percentage of public housing units (65%)
e. High density (3.5 to 6+ person/room)
f. Big families with children (approx. 20% of the total)
g. Dense dwelling blocks (16 – 56 tenant units per building)
h. Inter personal conflicts and lack of families function
i. Lack of basic service infrastructures
j. Cheap value of dwelling units
k. Physical deterioration of both buildings and surroundings

4 Project Renewal housing strategies and policies

Efforts to revitalize a neighborhood's social quality of life and efforts to improve the housing conditions go hand in hand. The recognition of these interactions has helped shaped Project Renewal's policy. In addition to having social and physical projects operate side by side, Project renewal (PR) officials have often tried to stimulate neighborhood residents to become more self-reliant and thereby to overcome the self-perpetuating problems that arise when many residents are too dependent on government institutions. For example, PR's special housing loans have gone only to those willing to use their own money to improve their housing situation.

Under its initial concept, PR was to focus on a limited number of neighborhoods. The program was to undertake a concentrated effort in these neighborhoods over a five years period and only then move to upgrade other problematic neighborhoods. Instead, PR came to operate in a large number of neighborhoods and did not phase out after the five years period (See Table 1).

<table>
<thead>
<tr>
<th>Year Of Inclusion</th>
<th>No. of Neighborhoods(1)</th>
<th>Phased out Neighborhoods(2)</th>
<th>Neighborhoods Remained in PR(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976-7</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1978</td>
<td>19</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>1979-80</td>
<td>36</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>1981</td>
<td>5</td>
<td>-</td>
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<td>1991</td>
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<td>3</td>
<td>18</td>
</tr>
<tr>
<td>1993</td>
<td>13</td>
<td>22</td>
<td>13</td>
</tr>
</tbody>
</table>
Table 1 shows that by 2000 there were 104 deprived neighborhoods included in PR. During the last 32 years, the Project has phased out from 62 neighborhoods in a process that examines socio-economic, physical, communal and organizational structures and indices. The sum of them means the neighborhood's rank compared to national averages variables and a decision regarding its point of taking-off.

The adoption of a neighborhood strategy involving the renovation of existing housing represents a noteworthy shift in government policy. Since the foundation of the State of Israel and during the 1970's, the MOCH has been involved in initiating, planning and establishment of new towns and neighborhoods as well as assisting families, mostly new immigrants, to buy or to rent housing units built by the government in these neighborhoods. Once the neighborhoods were established, the Ministry of Housing had little involvement in the neighborhoods except for managing public rental units on individual units through its public association agencies.

By the early 1970's the general form of assistance shifted toward financial aid, primarily subsidized loans. The assistance was given to the recipients in order to buy apartment by their own choice within the maximum prices and sizes set by the government. The loans could help recipients purchase either a new apartment built with public funds or any apartment, new or old, supplied by the private market. In addition to supplying loans to groups deemed deserving of housing assistance, the government continued to provide rent subsidies to eligible individual families.

The notion behind the assistance programs was "to find dwelling solutions". Yet, there is a significant difference in the housing conditions of families who gained dwelling solutions in the past. A family placed in a solution before PR began may now be living far below today's norms of acceptable housing size and conditions.

Within the framework of Project Renewal, the government has come to recognize the assistance to these families, in spite of the fact that their apartment is under their ownership, and therefore, are not eligible to stand in the criteria which allow them to enjoy the loans for improving housing conditions (Carmon, in Nachmias and Menachem, 1999).

5 Mechanism and means to cope with physical deterioration

The shift in the government policy and the recognition that severe problems of dwelling density and physical deterioration of existing buildings in the neighborhoods may beset individual families even if they are not in one of the program categories presently eligible for housing loans or grants. A decision was made that emphasize will be shifted from new housing to improve the existed housing stocks. Adopting the Project Renewal concept meant, that part of the housing problems lies at the neighborhood level and cannot be attacked simply on an individual basis.
Project Renewal activity to improve conditions of existed dwelling apartments was done alongside with other initiatives performed at the neighborhood level as described below:

1. **Loans for both enlargements and renovations:** Due to special conditions in the 1980's, the loans program (mortgages) for apartment enlargements in renewal neighborhoods has several advantages: (a) Government control on the capital market has limited significantly the ability of families to borrow loans from private sources. Because of that, even when the value of the enlargement justified the cost of loan's repayments, most families couldn't afford achieving the needed investment finance. Credit barriers have probably led families to spend less on housing relative to other goods than they would have under a free capital market. This is because any significant upgrading of housing conditions, either by constructing new rooms or by trading up to new units, involves expenses that cannot be financed directly out of income; (b) The difficulty in overcoming zoning and town planning restrictions put on by local authorities limited the possibility of low-income families to extend their apartments. Under Project Renewal, Ministry of Construction & Housing officials and local project managers helped bring about a modification of these restrictions by making many towns aware of the importance of enlargement and of the fact that their rules may have been preventing families in small units from enlarging them; (c) The saving expenses and economies of scale due to coordination of planning with other units in the same building have reduced costs. Most of the small dwelling units in renewal neighborhoods were located in buildings with multiple and low-income families. Enlargement activity by some families affected the desirability of enlargements by others. Where enlargements in such buildings can be coordinated, the costs for any given enlargement tend to fall and the benefits tend to rise.

2. **Special loans for tenants to buy their public apartments they used to live on rent basis:** The program offered tenants in public housing special loans and level of prices to encourage them to buy their dwellings. It was recognized that without the resident having the responsibility and incentive to maintain and upgrade his home, attitude and dependency and the inadequate levels of maintenance were likely to persist. Since rentals made up about 65% averagely of the total stock of housing in renewal neighborhoods, these problems could influence residents in many apartment buildings or even the entire neighborhood. Although the effort to stimulate purchases of public housing units has not been confined to PR neighborhoods, the government has provided a more attractive package of purchase incentives to these buying in renewal neighborhoods. The loans covered 60 to 90 percents of the unit's value depended on its location (center or periphery site), apartment's size, number of rooms, physical conditions, building age, number of tenants in the building, number rental of years.

3. **Renovations of building facades and infrastructures:** The renovations included water and sewage pipelines, tiled roofs, stairways, electricity networks and common yards development. This initiative was based on the assumption that for gaining the residents confidence in Project Renewal declaration, one has to prove his liability. A decision was made by the MOCH to start with renovation of deteriorated buildings, an activity where the tenants were benefited without paying the cost and their buildings became more modern and cultivated architectural. This policy remained valid for only a short period since the reaction from the tenants toward the improvements invested in the building on one hand, and their concerning for self maintenance of their own buildings, put some questions marks, on the other hand, brought the Ministry to take a new decision in order to overcome future problems.

From the mid 1980's the policy of Project Renewal was changed. From then on, the residents in the neighborhoods were asked to pay part of the renovation cost of their own pockets. The assumption was that, if you pay for the renovation you will take self responsibility to keep it on in a reasonable condition. One thing must be clear: renovations are done once in a life cycle of the neighborhood in Project Renewal.
Residents participate up to 25% of the total cost of the building renovations. The rest is paid by the MOCH. The renovations were usually executed after the units in the buildings were enlarged with exception of buildings that couldn’t be enlarged due to zoning and planning limitations. The procedures for renovations were similar to those of the enlargements. In both cases, tenants had to be organized in a committee, collect their payment share, to bring the contractors bids (Lerman and Burohkov, 1985).

6 Residents' role in housing policy of Project Renewal

Residents in renewal neighborhoods as well as tenants in buildings that were planned to be enlarged and renovated filled significant role in the success of PR activities. It didn't take too much time until tenants became full partners in all the stages of renovations: starting from the planning steps, meetings with the project manager staff, architects and engineers; establishing a building tenant committee; became aware and informed regularly and updated in all the changes of policy Project Renewal was accounted for; paying 25% of the total costs of the building renovations whereas the rest of 75% is paid by the MOCH; the tenants are in charge to bring contractors bids and present them before the project manager; negotiation and contract are done between the tenants and the contractor who won the works of renovations; the costs of the public housing tenants are paid by the Ministry where buildings have mixed population – owners and rentals.

All the above mentioned roles and functions contributed to the decision making processes not only with respect to the physical elements of the project, but to its reflection in domains of everyday life in the neighborhoods: community building, using social services, education achievements, employment etc. By products of these policies and strategies were: high self-estimation, neighborhood pride, end of neighborhood stigma (MOCH, Project Renewal Physical data 1980-2004).

7 The enlargement program

The MOCH has financed through PR more than 40,000 enlargements undertaken by families who own their apartments out of 150,000 units which their status became ownership and private ones. The total amount of rental and ownership units in PR neighborhoods is 220,000 (MOCH, 2010).

We will address several questions regarding the enlargements policy to analyze and evaluate it:
- In what ways did Project Renewal aid families to enlarge their units?
- How much financial assistance did the government offered?
- What was the form of assistance?
- How did the enlargement activity vary across neighborhoods?
- What accounted for the variability across neighborhoods?
- What were the initial and final sizes of units enlarged?
- What have been the benefits and costs of the enlargement policy?

8 The administration of the enlargement program

Project Renewal has encouraged families to enlarge their apartments through loans and through certain types of non-financial assistance. The loan program has been open-ended, so that all who qualify and apply automatically received the amounts for which they were eligible. Each resident in renewal neighborhood, no matter he/she composed a family, or one parent family, or a widow or an elderly person, all were eligible for the enlargement program. The project encouraged enlargements of complete building units or at least complete vertical enlargements of units in each storey or building an additional
storey on top of the building. Besides, the MOCH has counted on the efforts of its physical managers in each renewal neighborhood to help the families through the process of enlargement. These managers are the primarily point of contact between the residents and the MOCH. They help make residents aware of the program; they process the loan applications; they provided architectural assistance to those who enlarge; they coordinate enlargements among owners; they certify that construction has proceeded far enough to release of parts of the loans; they advice residents about how, when, and whether to enlarge.

The services concerning the loans and enlargements were given to the residents at the neighborhood office of the project manager. The nature of planning assistance has varied across neighborhoods, with the MOCH sometimes paying for all of the fees where large share of residents of a particular building decide to enlarge. The planning process usually takes about one to three months to complete. After residents have an enlargement plan they must obtain a building permit from the municipality. The permit takes up to three months. Having the permit in their hands the residents apply for the loans which take less than one month and it is administrated directly by the banks’ networks. The loan was given to the residents in three parts - 20%, 50% and 30% - in accordance with the stages of constructing the enlargement.

9 How much financial assistance did the government offered?

Since the enlargement program started in the early 1980's, many changes occurred in the conditions of the loans. Rates of interests were fixed lower at 2.8% in the years 1979-1990 compared to the regular ones in the free market in order to give some incentives to the residents; the period of payments is for 28 years with relatively very low sums of monthly returns payments. The payments did not exceed the sums of 45$ to 100$ depends on the location of the neighborhood whether it is central or periphery area; the decision on the total sum of loan a family is eligible, is due to the size of the original apartment, the area of the planned new apartment, number of members in the family household. The highest sum of a loan was 20,000$ and the lowest is 7,000 $. Loans weren't given for enlargements less than 10sqm.

In past years the loans used to cover up to 75% of the enlargement cost while today due to changes in the subsidy policy of MOCH which limited the effectiveness of taking a loan. The high difference range is due mainly to economic conditions such as high rate of inflation that ground to dust the value of the money; the buying value of the dollars according to the NIS (New Israeli Shekel); the budget for loans the government allocated in its fiscal year; the number of actual performed enlargements; the crisis in the construction building branch in Israel. The scope of loans the Israeli government allocated up to date for the enlargement program reached to $1.3 billion (MOCH, Department of information and Economic Analysis, 2010).

It must be emphasized that the government has granted Project Renewal with outstanding benefits of high rate subsidy compared to loans and mortgages taken in the private sector. The reason behind this "positive discrimination" was to compensate the poor population in disadvantaged neighborhoods for the very long years of physical and social neglect and alienation and to bring them close to the main stream of society.

10 What was the form of assistance?

There were several forms of assistance given to residents in renewal neighborhoods. As it was mention above, the close and immediate assistance was given by the project
manger and his professional staff including architects, building engineer, bank personal to assist in giving update information about the possibilities and conditions of the loans and to consult with them the detailed building plans and to hear the tenants remarks. All PR offices are located at each neighborhood and are accessible to all residents.

A special person in each neighborhood was nominated for the office of coordination and organizing the tenants of the buildings in committees and to map each potential building for enlargements. Besides, other personnel like community and neighborhood semi-professional residents who were in charge of delivering information to the tenants had an important role in administrating the assistance for the inhabitants.

Each family was accompanying along the road by the project manager staff to overcome different kind of bureaucratic barriers whether at the local municipality or at the regional and even national levels of decision makers to ease the way and coping with difficulties faced the enlargement program.

Another significant assistance was, of course, the network of the loan program, the sums of money targeted by both the Ministries of Treasury and MOCH and the banks for the purposes of reducing housing density and enabling low income families to feel more comfort and spacious for the benefit of their children.

The forms of assistance have tried to be less bureaucratic and less sophisticated and to enable the program to be managed in a smoothly way using systems of direct advocacy and negotiation between residents organizations together with project managers and the official authorities whether they were national, governmental or municipal.

11 How did the enlargement activity varied across neighborhoods and how it accounted for the variation?

Even before Project Renewal, enlargements were relatively common on Israel. Between 1971 and 1978, 75,500 owners reported enlarging their units. This means that enlargements took place in about 13% of all owner occupied dwellings. These facts are not surprising, since, as noted above, government building policies had probably substantially tilted the mix of housing substantially toward small units relative to what would have taken place in a free market setting.

Initially, the pace of enlargements was slow, but the program has picked up considerable steam during the years. Figure 1 shows the development of the enlargements program in numbers according to year of operation. During the decade of the 1980's the numbers of enlargements reached climax of 300 enlarged units per month up to more than 1,750 per month at the end of the decade. The explanations for this unusual phenomenon are due to several reasons, among them: Changes in the loans conditions; Extending the area of the original apartment allowed to be enlarged; The will of families to take the most advantages out of the enlargement program in order to create, once for all, comfortable dwelling conditions for each person in the family; Self awareness of most families living in renewal neighborhoods that their chances to move out the neighborhood and find a better alternative are low and that the enlargement opportunity is more reasonable and feasible to be real. One has to remember, that Project Renewal has invested a lot to develop and raise the level of all services in each neighborhood whether they were social, communal, health, educational, public or vocational training.

Researches and surveys were performed in most neighborhoods to learn about the variation among renewal neighborhoods concerning the enlargement program. Part of the variation was expected due to local neighborhood conditions, such as: Differences in apartment size and density; Number of owners units in the building; Types of buildings (number of stories, architectural type); Duration of planning procedures; Number of
residents in public housing units who took advantage of the opportunity to receive bigger loans when they decided to purchase and enlarge their apartments at the same time; The extent to which the local municipality has encouraged the enlargements; The cost of the enlargement construction; The owner's knowledge of the costs and benefits of an enlargement; The incentive of owners to invest knowing that their enlarged apartment will increase its value after the enlargement and the owner's expectation of the future of the neighborhood; and the project manager whose leadership role to encourage enlargements as part of urban renewal change, at large was most important in the process.

Table 2 shows the differences among regions in Israel where the enlargement program took place. Understanding the location of the regions as well as the type of settlements in these regions will clearly explain the variation across renewal neighborhoods.

### Table 2. Enlargements in regions and districts across Israel: 1980 - 2003

<table>
<thead>
<tr>
<th>Region / District</th>
<th>Total No. of Enlargements</th>
<th>Owners</th>
<th>Rentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galilee</td>
<td>5,660</td>
<td>4,582</td>
<td>68</td>
</tr>
<tr>
<td>Haifa</td>
<td>4,489</td>
<td>4,329</td>
<td>160</td>
</tr>
<tr>
<td>Central</td>
<td>19,267</td>
<td>18,956</td>
<td>311</td>
</tr>
<tr>
<td>Negev</td>
<td>4,136</td>
<td>3,964</td>
<td>162</td>
</tr>
<tr>
<td>Jerusalem</td>
<td>6,828</td>
<td>6,622</td>
<td>208</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40,380</strong></td>
<td><strong>38,453</strong></td>
<td><strong>909</strong></td>
</tr>
</tbody>
</table>


The high rates of enlargements were around the metropolitan areas of Tel Aviv, Jerusalem and Haifa. The Central part region leads the number of enlargements. The reasons for that are: Many medium size cities in the central region encourage residents in renewal neighborhoods to enlarge their small apartments; These local municipalities have eased to large extent the restrictions and other barriers of zoning planning and building permits issues; Encouraging the enlargements meant stopping the out-migration process of stronger families and bringing stability to the neighborhoods; Settlements in the Central region where in accessible distance to the main economic markets, employment sources and entertainment and enjoyed being located near them and benefited from less dense activities as in other urban locations; Central region neighborhoods enjoyed greater access to contractors and had wide range of choice to professionals to be advised comparing to other parts of the country.

The table shows that in the central region the largest numbers of public housing units were enlarged. This fact must be clarified: The real data fact is that in the regions of the Galilee and the Negev were the highest numbers of public housing units compared to other regions due to the fact that most settlements were New Towns populated by 90% new immigrants brought straight from the ports to these locations according to the government policy of population dispersal at the early years of the establishment of the State of Israel.

The year 2003 indicates the beginning of declining number of enlargements in PR's neighborhoods. The tendency has been continuing since then up to date. There were minor changes in the total number of enlargements among the different districts and the central region continued to lead due to the reasons mentioned above.

### 12 What were the initial and final sizes of the units enlarged?

A primary purpose the enlargement program was to relieve high density housing within Project Renewal neighborhoods. But since the program enabled all owners to
benefit the loan program, it helped families who lived in medium density to improve their quality of dwelling conditions.

Most enlargements were employed in units where the initial apartment area were 40 – 54 square meters (35% of the total units in renewal neighborhoods) while those which held area of 70 square meters and more composed only 11% of the total enlargements. Families that were included in the program enlarged their apartment between 80 to 114 square meters (an area equivalent to 3 – 4 rooms per unit). Big families enjoyed both larger loans and enlarged space over 130sqm.

13 What have been the benefits and costs of the enlargement program?

The costs and benefits of the enlargement program may be analyses from several perspectives. The primary goal of the program was to help low income families relieve their housing density. By providing loans to more than 40,000 families, the government did lessen density in about 35% per cent of owner-occupied dwellings in Project Renewal neighborhoods. Moreover, the evidence is that the aid was reasonably targeted toward those families living in the densest housing.

A program's success depends not only on its ability to aid low income families, but on its effectiveness in doing so in constructive ways. A common problem in providing aid to low income families is that by relating support payments to income deficiencies that make easy to misreport income. As a result, one may end raising the incomes of poor families by less than the costs to taxpayers. A second potential problem is that recipient families may use the funds to buy goods that are of little long-run benefit to the family (lerman and Borokhov. 1985:).

The enlargement program has the capacity to avoid both sets of problems. By limiting the aid to upgrading housing in ways that would not have occurred in the absence of the program, the MOCH did insure that the aid went for a socially laudable purpose. The more complex issue is whether the value gained for these families was worth the costs borne by taxpayers and the families themselves.

To determine the benefits and costs of enlargements in PR neighborhoods, two main difficulties could complicate the analysis. The first includes several most significant factors: the estimates of the construction costs per square meter varied widely along the years due to cost of building materials; labor payments; price competition among developers; long years of high inflation during the 1980s when prices were marked by dollars rates and not in relation to the Israeli currency; prices that have changed almost weekly; number of units enlarged in each building; the enlargement size; changes done during enlargement construction by the tenants; market value of units before and after enlargement; and market prices of units sold. A second difficulty was to separate the effects of pure additional space from the renovations that nearly always were part of the enlargement process. Prices varied along the years due to year of construction, the year the unit was sold, location of the neighborhood, the level of the surrounding development and level of local services in the neighborhood.

According to data collected, the prices of construction one square meter during the 1980's was about 350$, while in the late 1990's and beginning of the 2000's the prices reached to 150$ - 200$. The difference is due to the ratio calculation between the dollar and the NIS (New Israeli Shekel) which was subjected to significant changes in the local economy (MOCH, department of information and economic analysis, 2010).
14 Mortgage recipients in enlargements program

As described above, Project Renewal has given assistance for owners' apartments enlargements, self building, renewing buildings tiled roofs and renovations in old housings. The assistance program began in 1980. The number of households units which received mortgages enabled them to renew their apartments and during the years 1980-2003 it exceeded 75,000. Out of that 64% used it for enlargements, 22% for roof renovations, 10% for indoor renovations, 3% for self building, 0.5% for apartment's functional changes and 0.5% for buying adjacent apartment. The year 2004 indicates policy changes which will be discussed in the course of the paper.

The rhythm of making the mortgages feasible has changed along that period. In 2002 the number of mortgages recipients came to the lowest recession point of 909 residents who make 42% of the yearly average for the period between 1989 and 2002.

The enlarged size of apartments after the receiving of the mortgages has grown from 62% to 78% compared to the original area of the households. In the first decade of Project Renewal (1979 – 1989) the Project dealt mainly with apartments built in the early years of the State where the average household area was 28 to 56 square meters, while in the second decade (1989 – 1999) the Project has dealt with buildings built during the early 1960's and their apartment size was between 58 and 65 square meters. The average additional area grew from 38 to 46 square meters. The new enlarged sizes of units were between 98 and 108 square meters.

It must be emphasized that the location factor of the neighborhood was due to the differences of the final enlargement's area. For example, neighborhood located in prioritized areas like developed towns in remote locations from the central parts of the country, had the privilege to add some 25sqm more than other parts in the country.

According to data, more than two third of the total enlargements have been performed in settlements and neighborhoods located in the more central areas (75%), prioritized areas (18%) and 7% in the rest of the country. The average area per person before the enlargement was 12sqm compared to 35sqm after executing the enlargement. That is an average growth of 65.7%. The total mortgage assistance budget in the years 1980 – 2003 was $765 Millions (Physical Department of PR annual report. 2005).

15 The enlargement program achievements

The physical aspect of PR consisted one of the Project's central targets. Before PR began neighborhoods were characterized with housing distressed, environmental neglect, high ratio of small units and high percentage of families living in density conditions. These processes were accompanying by processes of negative selection of residents: strong families that economically and socially became better well-being tended to leave the neighborhoods and thus contributed to their deterioration.

The enlargement program launched at the beginning of the 1980's and continued until 2004 and its achievements are described below:
1) In the framework of Project Renewal, housing conditions of families who lived in severe conditions improved both through the enlargements and the buildings renovations (internal and external). The Project assisted in financing and planning of more than 60% of total units in renewal neighborhoods. Most units have doubled the original area of their apartments from 50 to 110 square meters.
2) The main vehicle was the special loan program and the influence PR implied on the plans confirmation process to achieve building permits from the local municipality.
3) The ability to enlarge dwelling units through loans and the numerous investments in improving infrastructures, were used as incentives to public housing families to buy their apartments and become owners.

4) Project Renewal contributed to the creation of new variation of housing stock in most renewal neighborhoods by using land space to build comfortable units located in blocks buildings and quality units of one story.

5) The enlargement program has been the major contributor for restraining the neighborhoods deterioration, the slowness of negative selection and out-migration.

6) The enlargement program encouraged the young population to remain and continued its residing in the neighborhoods. This is in contrast to what happened in other countries where distressed neighborhoods lost many residents (Alterman and Cars, 1991).

7) Over 40,000 units were enlarged. This number consists 25% of the total ownership of dwelling units in renewal neighborhoods all over Israel.

8) Renewal neighborhoods that phased out of Project Renewal became the target to private contractors to build new housing units in these neighborhoods. This is the best proof of the project's success to attract different populations to the neighborhoods which used to be stigmatized by their surroundings. That unexpected change is due mainly to the social investments and improvements of Project Renewal. High quality of social services infrastructures was set up in the neighborhoods and they gave the new populations the incentives to buy their apartments in what was used to be stigmatized deprived neighborhood.

9) The Project Renewal enlargement program success was duplicated and implemented by mayors of cities and neighborhoods which weren't included in the project. This seems to be the most influential effect of the project on its surroundings.

10) Neighborhoods that passed through the processes of rehabilitation and regeneration became similar to adjacent dwelling neighborhoods of higher socio-economic status. One of the major reasons for that are the external renovations of the buildings in deprived neighborhoods that became similar to other buildings in non-deprived areas.

11) The project has proved the efficiency of individual-public partnerships in order to achieve housing rehabilitation in distressed neighborhoods of the lower class. The PR strategy recommended public involvement to encourage apartment ownership and assistance to accommodate the units to the residents' own updating and priorities.

12) Housing unit values and prices have gone up as a general integrated phenomenon in the housing market in Israel. Hand in hand with it, the capital base of the family has been broadened. When compared to similar units in other parts of the town the prices didn't go up, but still present a significant change compared to the past situation.

13) No vacant units remained in renewal neighborhoods. All housing units are housed.

14) The enlargement program enabled residents to participate in the decision making process and taking over responsibility of their own lives. Being an integral part of the process enabled the residents to have a control over the process and strengthened their self-satisfaction.

15) Significant improvement in the level of residents' satisfaction from renewal processes as a whole and learning how to use and access local services.

16) The raise in apartments' values changed the residents' status as well. The external similarity between renewal neighborhoods and new building areas of the middle class has raised the neighborhood's image and confined the gaps among different populations.

17) The enlargement program became the leverage both for employment and fund raising.

18) Project Renewal residents were exempted by law from land taxes payments which helped them to invest more in improving their housing conditions.

19) The housing achievements in numbers between 1978 and 2009 are: External renovation by public housing company- 42,100 units; and by "Do It Yourself" method – 92,000 units; Apartment renovation for elderly owners – 24,500 units and for elderly in...
public housing dwellings – 7,480 units; Replacement/repair of roofs – 6,900 units; Extensions for owners – 42,000 and for renters – 935 units.

16 Conclusions, dilemmas and future prospects

The enlargement program has reached outstanding successes and achievements. Not all of them could be valued with money. Many of them have contributed more to the other aspects of Project Renewal like upgrading quality of life of families who became less stressed, less alienated and less inferior compared to their neighbors and the surrounding. It caused to deep personal changes concerning the relationships between the owners who enlarged their apartments and their attitude to their life and the ecological environment.

Surveys done by MOCH department of PR among 2750 residents in 15 neighborhoods almost every 3 years (beginning in 1983, 1986, 1989, 1992, 1996 and 2002) found out that the two objectives of PR that obtained the highest scores were housing enlargements and physical improvements of the neighborhoods. This is the best evidence to the successful enlargement program.

Figure 1 shows the changes performed along the years of the enlargements employed in deprived neighborhoods among owners. Most of the enlargements were built during the decade of the 1980’s and the beginning of the 1990’s. From that date on PR witnessed the steady tendency of decreasing in the amount of the enlargements scope.

16.1 Dilemmas and problems

Project Renewal is acting more than 32 years. During this long period, renewal neighborhoods have passed through many changes. Some of them are positive and some represent the negative aspects of post renewal effects. Among them we can identify the followings:

1. Significant changes in population composition. This fact is due to the mass waves of new immigrants arrived to Israel in the early 1990’s. Most of them were new comers from ex-Russia and Ethiopia who settled in PR neighborhoods.
2. Due to their low socio-economic status, many of them preferred to settle where the market offered them cheaper dwelling units. They have found them among neighborhoods included in PR.
3. Many of the new immigrants from Ethiopia brought with them life values and norms that couldn't be matched by them in modern Israel. The results were
devastated for the families: inter-personal conflicts, language difficulties, breaking of old traditions, influence of political parties, low apartment maintenance.

4. High rates of unemployment, especially in renewal neighborhoods caused to economic crises, breaking of families, indifference and social unrest. The consequence was stopping the use of mortgages for the enlargement program.

5. The new program of MOCH dealing with urban redevelopment did not take off although much work of planning and appointing of urban renewal companies have been invested for the last five years, but the results are not seen yet, due mainly to bureaucratic, planning regulations and political barriers.

6. The economic crisis, security and political conditions in Israel caused the government to employ sharp cuts in its budget allocations for Project Renewal at large. Add to this the scarce of budget among many local authorities where PR has been operating and the result of limited resources caused to housing crisis where the demand could not be met.

Under these circumstances a new policy and a new form of Project Renewal must be taken by the government and by the decision makers. We have to learn the best and successful practices and lessons from the generation period of Project Renewal began in Israel as a young state which tries to find quick and affordable solutions along its housing policies.

16.2 The future prospects

Based on the dilemmas and problems facing Project renewal, we can take the privilege and try to predict the future prospects of housing developments in PR's neighborhoods. The government of Israel has established several new programs aimed to overcome the severe need for dwellings units to house young couples and families who are seeking to improve their housing conditions on one hand, and to find alternative solutions to the problem of land scarce and to prevent dispersal and sprawl on green areas, on the other hand. These programs and plans will be presented here:

The first program is redevelopment projects in deprived neighborhood: The plan aimed to involve the private sector in urban regeneration where renewal neighborhoods are integrated as part of the urban mosaic master plan. The MOCH has begun a new policy 7 years ago when it took a decision together with other partners of the Israeli government – the Treasury and the Land Authority – to launch the Urban Regeneration Program. The program has mapped 84 sites which most of them are ex-renewal neighborhoods and where parts of them are to be replaced by new redevelopments, usually high rising buildings with high rate of density of 1 to 4 and more compared to the existed condition in the neighborhood. This type of building construction was chosen due to severe scarce of free land for dwelling uses, land prices, and the state of the national building which came to an impressive slow down because of economic and security reasons and sparse current of new immigrants compare to the early 1990's when over one million of them came to Israel. Obviously, this program has its advantages and disadvantages concerning its relationship to Project Renewal. The MOCH has invested big amounts of money to enhance the program mainly in the organizational framework and planning. PR did not joined the program since another department at MOCH (the department of town Planning) launched it. The redevelopment program did not achieve much of success due to many problems regarding the planning process, the organizational frame decided upon, the relationship between the budgets invested and the results in the field, great objections from the tenants who find the ground suitable for extortion the developers. The developer who began redevelopment projects, chose to start new
constructions in neighborhoods located in areas of high demand without any connection to PR.

The second program is called Master Plan 38: On April 2005 the government approved the national master plan aimed to enable tenants to strengthen buildings which were built before 1980 as a preventive mean against earthquake disasters. The master plan creates a statutory framework enabling issue of building permit in order to execute the necessary changes of constructions in the building. The master plan regulations and planning guides include the whole territory of Israel which contains both periphery and areas with high demand for dwellings. This fact causes great variations among areas with low demand compared to areas with high demand expressed in land values, rent ability and attractiveness for developers to begin that initiative. The main economic incentive of the plan is existed in the additional rights to build new units on the top of the building. That is to say, that the costs of strengthening the construction and the renovation of the building will be financed by selling the new apartments and the income will go to the developer. In this way the tenants will enjoy a massive construction and renovations, enlarging their flats, adding a lift and the developer will enjoy the profits of selling the new units and will have the right to deduct the expenses of the construction (Ministry of Interior, 2005).

Master plan 38 is assumed to give an answer to one of the most bothering problems in planning the housing construction in Israel. Most buildings which were built before 1980 are not ready to stand earthquakes. The initiators suggested a solution to the problem through partnership building with the public sector. According to it the tenants will "sell" the right to build and add new units to be sold by the developers in the free market.

Experts in the real estate sector in Israel argued that the plan is difficult to operate due to four major obstructions: firstly, non-profitability for developers; secondly, high taxation rate; thirdly, psychological difficulties; and fourthly, misinformation expressed in disagreement among tenants and bureaucratic blocks caused by local planning committees at the local municipality level. To overcome these obstacles the Ministry of interior, in charge nationally of the planning and building regulations amended and changed its guidelines to give better incentives to the private sector of developers in order to encourage tenants, developers and local municipality to join the program and benefit of it: Instead of one storey addition it allowed to build 2-3 stories; tenants in demand areas were exempted to pay 90% of the betterment tax whereas the periphery won free of charge tax; The demand for 100% agreement of tenants to execute the plan in their building was reduced to 50% only. To date, only 30 local municipalities agreed to confirm the master plan 38 in their territories out of nearly 150 applications brought to the local planning committees.

The department of physical Project Renewal decided to join the efforts and to encourage tenants in the neighborhoods to get organize for the program of master plan 38 as an alternative to the enlargement program that came to the point of extraction. Furthermore, the Treasury budget cuts left no incentive aimed to families in distressed neighborhoods to improve their housing conditions. Therefore, the program of master plan 38 suited the physical department policy and it enabled residents in the neighborhoods to be entitled and enjoy a loan of $12,000 for a period of 20 years and an interest of 4.5%. Besides, PR mangers in the neighborhoods were asked to locate suitable buildings with at least 12 units in 3 stories. As in previous programs of enlargement, here too, the tenants were responsible to contact directly the architect and the developer.
In spite of all incentives offered to the residents, very few PR neighborhoods joined the new program due to land values in periphery areas in the first place and the low motivation of developers to invest in these less attractive places.

The third program is called "thickening and constructing". It is similar to the master plan 38 in that the tenants sell the developer the rights to build on the roof of the building to enable adding one or two stories to the existed building, the new units are sold by the developer in the free market. In return, the developer in obliged to renovate the building and to add a lift. The plan did not took off (except in four buildings located in one neighborhood) due to difficulties regarding tenants' disagreements, difficulties raised by the local municipality especially in issuing building permits mainly because of lack of enough parking plots for the new apartments, Low land values in neighborhoods located in periphery areas and the non profitable investment of the developer regarding the chances to sell the units.

Another program which is still in a stage of examining and learning its implications is the Affordable Housing plan. The planning authorities in Israel are studying the effects of the program and its economic and social considerations as well as the local market conditions to adopt and its scope of success. Some strong local municipalities in Israel have begun their first steps in this new field, especially as program that could cope with young couples' demands for housing in better off locations. This and other similar programs are operated in other countries like the USA and the UK (Gale, 1990; Hermanuz et.al 1988; RIBA, 1988; Preiser et.al., 1994; Tripple, 2000; wood, 1991).

To sum up the above short survey of new programs aimed at bringing new options to revive the successful enlargement program of Project Renewal in the 1980's and the 1990's, we have to admit that they did not make any progress yet. Future changes in the economy conditions, enhancing economic growth and changes of the government priorities might start the engines of the above programs in Israel.

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Rehovot as a model for knowledge towns in Israel

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Abstract
This practice review paper presents an Israeli town of Rehovot's knowledge-based development story of how the town is being transformed from an agricultural town to a knowledge town.

Keywords – Rehovot, knowledge towns, knowledge-based development, urban development

Paper type – Practical Paper

1 Introduction
Rehovot has been founded in 1890 as a Jewish agricultural settlement on private land in a neglected area in the southern plain, with ideal conditions for citrus groves. Yet for generations it has been called as The Citrus Town, while an Orange branch is still on the town shield, hardly any groves left in the town.

Tow other knowledge towns in Israel: Beer Sheba, the capital of the Negev and Sefad an ancient small town in the Upper Galilee, are rather different in their urban history in size and in the human composition.

All 3 of them will be analyzed and examine the advantages and disadvantages as knowledge town. Then it will be proven why Rehovot is the right model for a knowledge town in Israel, rather than Beer Sheba or Sefad

2 Rehovot - Historical Background
In 1932 The Hebrew University of Jerusalem has founded an agricultural experimental station in Rehovot. In 1942 the station became The Faculty of Agriculture with 22 post graduate students. Now a day it includes Food, Environment, Tourism and Veterinary studies with 2,300 students, 120 senior academic staff, and hundreds of technicians, laboratory and administration workers.

In 1933 a world known chemist Dr. Chaim Weitzman, conceived the Sieff Institute of Scientific Research. Which in 1949 became the Weitzman Institute of Science.

The Institute is one of the world's leading multidisciplinary research centers. Today, around 2500 scientists, postdoctoral fellows, Ph.D. and M.Sc. students, and scientific, technical and administrative staff work at the Institute,. In addition, in 2009 over 700 visiting scientists and their families from 29 countries– and numerous participants in international scientific conferences and symposia, are regularly hosted at the Institute.

When the Institute was conceived in 1933, the embattled Jewish population of Palestine numbered 400,000 and Rehovot was a tiny agricultural community surrounded by orange groves. In this milieu, Dr. Chaim Weitzman, who would later become the first
President of the State of Israel, envisioned the establishment of a world-class scientific research center. Though resources were extremely scarce, Dr. Weitzman, a successful chemist and tireless statesman fortunately, there were others who shared his dream. In 1934, his friends Israel and Rebecca Sieff established the Daniel Sieff Research Institute. Dr. Weitzman had his lab in the Sieff Institute, alongside those of 10 other full-time researchers in organic chemistry and biochemistry.

3 Economic Preconditions

In 1959, the Yeda Research and Development Co. was founded to function as the commercial arm of the Weitzman Institute. The first company of its kind in Israel, Yeda initiates and promotes the transfer of innovations stemming from the research of Weitzman Institute scientists to the global marketplace.

The Weitzman Institute was also a key player in the establishment of the Industrial Park, a 40 acre site housing over 60 hi-tech companies, many based on Institute discoveries, ranging from aircraft instruments, electro-optic, communication, medical equipment, bioengineered drugs.

<table>
<thead>
<tr>
<th>Hi-Tech Companies in Rehovot Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Branch</td>
</tr>
<tr>
<td>Electro-optic</td>
</tr>
<tr>
<td>Electronics</td>
</tr>
<tr>
<td>Bio-technology</td>
</tr>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Medical equipment</td>
</tr>
<tr>
<td>Software</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>Medical drugs</td>
</tr>
<tr>
<td>Miscellaneous</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

There are over 10,000 workers in the park, many of them arriving to work with trains from quite distant places.

No doubt that the extreme demographic growth of Rehovot occurred between 1972 and 1983: from 39,300 inhabitants to 67,900, as result of establishment of the Weitzman Park which, in short course of time, made thousands of high level working places, and made the town what it is nowadays.

The Weitzman Institute, today more than ever, is at the forefront of global science with several Nobel Prize Laureate, the later of them Prof. Ada Yonat (2009).
At Rehovot southern neighborhood havatzelet, The Kaplan Medical Center has been erected in 1953 by the Israeli biggest public health insurance. It is a regional hospital now serving a population of 450,000 inhabitants, with 535 hospital beds. The center became a university hospital affiliated to the Hebrew University of Jerusalem.

Rehovot is hosting several collages, among them: The Ort Technological Collage, Rehovot Collage, Teachers Collage, and some Jewish Rabbinical Institutes. The Jewish orthodox educational institutes, as well as the scientific institutes, are based on leaders, who were in this case The Rabbai Kook and a small group of his excellent scollars.

The supply of vocational and professional available jobs served as a stimulus to the absorption of additional high-quality population, which results in the town size and status. In 1948 at the Declaration of The State of Israel Rehovot consist of 12,500 inhabitants, which turned into 18,000 in 1950, and was the reason for the settlement to be declared as a town. Since then the population growth is enormous remarkable with double in the 70' ties as the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>18,000</td>
</tr>
<tr>
<td>1955</td>
<td>26,000</td>
</tr>
<tr>
<td>1961</td>
<td>29,000</td>
</tr>
<tr>
<td>1972</td>
<td>39,300</td>
</tr>
<tr>
<td>1983</td>
<td>67,900</td>
</tr>
<tr>
<td>1995</td>
<td>85,200</td>
</tr>
<tr>
<td>2005</td>
<td>103,000</td>
</tr>
<tr>
<td>2009</td>
<td>109,500</td>
</tr>
</tbody>
</table>

No doubt that the urban existence of knowledge institutes sucks scientists, professionals technicians as well as others, alike a vacuum cleaner, in the first cycle. In the later the population growth enable further expansion of hi-teck companies, conventional industries and services, which altogether results in additional population growth.

Being located 25 Km. from the heart of the urban center of Israel, Tel Aviv, Rehovot did not developed any cultural means that are significant to knowledge towns: Theater, symphonic orchestra, opera house, museums galleries, public libraries.

Does Beer Sheba duplicate the model?

Some other towns in Israel tried to follow the successful model of Rehovot as a knowledge town. The most significant is Beer Sheba, the capital of the south part of Israel, The Negev.

Ancient Beer Sheba goes back to the 3'rd thousand b.c. the time of the Old Testament relating to Abraham's well mentioned in the Book of Genesis. It is the town located at the site of seven cistern on the bank of Wady Beer Sheba.

Modern Beer Sheba was founded in the doomsdays of The Ottoman Empire, in 1900 as an administrative center for the Bedouin tribes.
During the days of the British Mandate on Palestine, 1918 – 1948, it was a residence of 3,000 population, most of them Arabs, who escaped during the war of independence, and left an empty square Km. of low density houses, most of them in poor situation. This section later on named "The old Town" is becoming entertainment center, art galleries, luxury restaurants. The following table introduces the demographic growth of Beer Sheba.

<table>
<thead>
<tr>
<th>The Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>0</td>
</tr>
<tr>
<td>1955</td>
<td>20,500</td>
</tr>
<tr>
<td>1961</td>
<td>43,500</td>
</tr>
<tr>
<td>1972</td>
<td>86,300</td>
</tr>
<tr>
<td>1983</td>
<td>110,800</td>
</tr>
<tr>
<td>1995</td>
<td>152,800</td>
</tr>
<tr>
<td>2005</td>
<td>185,100</td>
</tr>
<tr>
<td>2009</td>
<td>187,800</td>
</tr>
</tbody>
</table>

4 Economic background

Beer Sheba is centrally located on a big plain in the center of The Negev the half south of the country, that is called also The Desert. The Negev is also the source of some of Israel's most valuable natural resources: phosphate, potash, magnesium, bromide and salt, the later of which from the Dead Sea.

The extracting industries, as well as it's R&D centers for developing agriculture fertilizers and pesticizers are located in the metropolitan area of Beer Sheba, in suburb towns or in the town itself. They demand a large scope of engineers, chemists, physicists, as well as complementary natural science experts. The above mentioned raw materials are, in fact mainly, heavy industry but they are the fertile soil for hi-tech and science based plants.

The urban area of the town is 11.7 sq.km, with density of 1,599 person per km, which means a relative low density, especially if compared to Rehovot with 4,752 inhabitants per sq. km.. Due to many employees in the public sector in Beer Sheba the average month salary is only 5,304 NIS versus 6,465 NIS in Rehovot, while the country's average salary of emploee is 7,466 NIS. The reason is that even a knowledge town can not compete with the high salaries in the financial business metropolis. Another Israeli phenomena that not a few top people live in the central metropolis and commute daily to, both rehovot (25 km.), as well as Beer Sheba (115 km.).

During the war of independence Beer Sheba has been emptied by its habitants. Since 1950 it became headquarter for mineral extracting companies: potash (Dead Sea Works), The Bromide Corporation, phosphate (Israel Chemicals) etc. District offices of the
government, including seat of The South Corpus of The Israel Defense Forces (IDF), and Ngo's, such as The Jewish Agency – rural settlement department and immigrant absorption department

From 1958 Beer Sheba became the residence of the establishing team, as well as the constructors, of the Demona Nuclear Research Center, although it is 60 Km. south east of the town. Most of the senior researchers and operation staff lived in Beer Sheba.

A small district medical clinic that belong to the biggest public health insurance became in the 80'th The Soroka University Medical Center. A small & tiny group of laboratories called The Negev Research Institute, later, in the late 60'th became The Ben Gurion University of The Negev; has nowadays 20,000 students, 1,650 academic staff + 1,250 administration. In addition there are some colleges among them The Sami Shamun Technical College, The Qay College for sport education etc.

Beer Sheba absorbed tens thousands of Jewish immigrants, mainly from East Europe, but also from Mediterranean countries, Ethiyopea, India – many of which professionals. Besides basic heavy industry, there are not a few hi-tech companies, R & D plants, wide diversity of cultural institute: a chamber or chestra, a famous theater, The Beer Sheba Ballet, some musical education institutes.

5 Sefat - Town of Jewish Knowledge

Sefat (Safed) the capital of the High Galilee mountains is located in the heart of mountains 935 – 700 m altitude, physically isolated from regional routs, yet it's fundamentals go back to the 2'nd thousand b.c. A legend related the foundation of the town to one of Noah's sons after The Great Flood. Since the time of the Jewish Talmud (post Bible) it has been known as a town of priests. In the Middle Age, the 16' century Safed absorbed some of the most prominent Jewish Rabbis that has been escaped from Spain in 1492. The most famous of them were Isaac Luria (Ari – zal), Moshe Kordovero, Joseph Caro and Shlomo Halevi Alkabetz

Together with Jerusalem, Tiberias and Hebron they were the 4 Holy Cities in Palestine, Safed has become the center of the Kabala – Jewish mysticism. Several studying groups founded Jewish Colleges in the town, as well as in it's surrounding Being a mixed town Arab-Jews while the Ottomans conquered Palestine in 1517, Safed was declared the district town, which upgraded it's economy. In addition in 1577 the first Hebrew Printing Press has been founded in Safed by Eliezer Ashkenazy and his son Isaac of Prague. It was the only press in the whole Ottoman Empire. At the end of the 16' century Safed population reached 13,000 inhabitants, half of them Jews.

Riots, plagues and 2 earthquakes: the first in 1759 with 300 dead, and the later on January 1'st 1837 with 2,158 dead, most of them in the Jewish Quarter, caused a sharp decline to the town

The 1946 census counted in Safed 12,610 inhabitants. 9,780 Muslims, 2,400 Jews and 430 Christians. The 1948 War of Independence ended the Arab communities of the town, and left Safed with only 2,317 Jews. The town called upon artists: painters, sculptors, poets and musicians that founded the Artists Quarter. This was the trigger for the foundation of museums, art galleries and workshops that put Safed on the rout of tourism in the Galilee.

The following table introduce the demographic changes in Safed population in the 20'th century.
<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Muslim</th>
<th>Jews</th>
<th>Christians</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>8,671</td>
<td>5,431</td>
<td>2,086</td>
<td>343</td>
</tr>
<tr>
<td>1931</td>
<td>9,438</td>
<td>6,465</td>
<td>2,547</td>
<td>426</td>
</tr>
<tr>
<td>1946</td>
<td>12,610</td>
<td>9,780</td>
<td>2,400</td>
<td>430</td>
</tr>
<tr>
<td>1948</td>
<td>2,317</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1955</td>
<td>9,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961</td>
<td>11,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>13,965</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>15,853</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>21,480</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>25,200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>28,400</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The considerable contribution to Safed population in the last 2 decades followed the 1 million ex-Russian immigrants to Israel from October 1989.

6 Occupational Background

Till the middle of the 17th century Safed was famous in it's 3,000 weaving mills which enabled a reasonable standard of living, especially in the Jewish sector. Due to a strong competition with the industry of Great Britain it vanished.

In 1910 The Rothschild hospital has been founded in Safed center as a general district hospital. In 1972 it moved to the new site as Sieff (Ziv) Medical Center that was erected on one of the hills south of the town as a district middle size hospital with 304 bed, 37 units, departments, institutes and laboratories. Among them a Trauma unit, ICU Children center, Oncology Unit and a School of Nursing. In 2005 it reached 100,000 hospitalization days, 120,000 ambulatory treatments, and 60,000 patients admitted Emergency service.

The Ziv center is celebrating this year it's 100 anniversary, being affiliated with the Faculty of Medicine at The Technion Haifa. Moreover, the Ziv Medical Center is the biggest employer in Safed, yet the Cabinet decided, in 2010, to erect a fifth Medical School in Israel, in Safed, next to the Ziv Medical Center – which will be turned into a university hospital. Rough economic estimates say that it will add the town and it's surroundings some 1,500 new jobs.

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Safed Academic College has been founded as a northern regional branch of the Bar Ilan University of Ramat Gann 30 years ago. It is now an independent state college in the Galilee where no university exist, and enable high education and social mobility to the town inhabitants as well as to the region's residents. It is currently in the process of building 3 full faculties: Humanities and social sciences, Law and Health. The annual number of students is growing by 10% and is now 2,000. The college is unique in the combination of both Jewish studies and general studies.

Safed Regional College has a school of engineering sciences, a school of Jewish art and ethnic music, department for healing staff, and external courses of regional studies of the Galilee and Safed.

In addition Safed hosting several institutes for teachers, especially for women, as far as rabbinical institutes for Jewish Rabbis.

In the early years of the young State of Israel, 1950 – 1960, it was looking after employment opportunities in the peripheral districts. Some industrial plants were moved to Safed, mainly Textile and food. The most famous of which was Nescoffee, that made a great deal of air & smell pollution, apart from low salaries in this low-tech industries. All industrial plants were moved later to the Tzahar regional industrial zone in the Hula Valley, as Safed left only with medical service, education institutes and the tourist industry.

7 Qualitative Analytical Comparison

No doubt that Safed in the Upper Galilee with it's historical and traditional background has a big advantage as a knowledge town upon, both Beer Sheba, as well as Rehovot.

Belonging for ages to the 4 Holy Towns in The Holy Land, beside being the birthplace of the Jewish Mysticism (Kabala), with many Jewish famous synagogues – made Safed the Diamond in The Crown upon the two others.

Safed and Beer Sheba were both mixed towns Arab – Jews till 1948. After The War of Independence they became Jewish towns, but in peripheral districts of the country, while Rehovot founded as Jewish settlement in the urban center of the country.

Both Beer Sheba as well Rehovot has been located in the heart of big plain. They do not have hardly any limits to expand, while Safed settled down on high mountains with deep wady among them. Such topography is a natural limit towards further expansion, and development.

Beer Sheba and Rehovot are easily accessible by road or rail almost from any direction, while Safed was always isolated from transportation aspect, with only west east road no 85.

Beer Sheba is the metropolis town of the Negev, Rehovot is in the outer ring of the central metropolis of Tel Aviv, while Safed was surrounded only by rural settlements, and therefore out of any urban growth center.

High quality professional population, especially from immigrants, always concentrate in metropolitan areas or big towns. Being the main source for demographic expansion, it exists only for Beer Sheba and Rehovot.

Safed population is the poorest of all 3: according to 2008 socioeconomic ranking by The Central Bureau of Statistics, it reached only grade 3 (out of 10), while Beer Sheba is ranked 5 and Rehovot 6.

Beer Sheba is much more equipped with cultural institutions, than Rehovot, Safed served for many years since 1950 as artists hub of Israel, is still an important center of Traditional Jewish music and focus of annual Festival.
8 Summary

The urban development of Rehovot was possible due to its central location, accessibility, public money investments, waves of immigrants with professional high level, and the existence of enough land that changed land use from agriculture to, industry and housing. Those criteria enable Rehovot to become a model to knowledge town in Israel.

Beer Sheba got many of the same condition, yet its peripheral location, heavy industry in its south and lower socio economic structure, keeping it still behind Rehovot as a knowledge town.

Safed with all glorifying history, fascinating natural location, and a rich cultural structure, was left far behind Beer Sheba and Rehovot as a Knowledge town.

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A new paradigm in knowledge-based urban development: from knowledge to creativity economy, Qatar urbanity transformed

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Structured Abstract

Purpose – The purpose of this paper is to explore the knowledge and creative city concepts in depth to relate it to the ongoing process of creating knowledge-based economy developments in major Middle Eastern cities and especially in Doha, Qatar. Qatar as the paper illustrates is doing so much to capture the world imagination1. In light of that it is an exemplary case study for examining contemporary Gulf urbanity.

Design/methodology/approach – Doha is considered by many indicators as the most advanced city within the Middle East to adopt knowledge economy as a conceptual base for its 2030 vision. The paper will analyze the shift over the past decade which reveals how numerous cities view creativity as essential vehicle to survive in the globalized world today. It will shed some light on the paradigm shift from knowledge to creativity economy and will illustrate the major principles of creative cities and its urban development. Some case studies from Doha will be analyzed to articulate the future of creative cities in the Arab world.

Originality/value – The necessity of creative cities in the Middle East was not scientifically or even intellectually explored. This paper is an attempt to fill the academic and research gap in implementing the creative city principles within ME context. For the establishment of contemporary creative cities in the Middle East, two integrated conditions are required. The process of constructing Middle Eastern creative cities should be shifted from focusing on creating isolated and separated creativity centers to a process by which a knowledge and creative networks are established and shared by different sectors of the community. Research is also a prerequisite of a creative city. It requires infrastructure of research, an issue which has not been developed in the Middle East. Hence, an inclusive initiative to prepare the grounds for a major transformation must be translated into strategy. The paper will also argue that creative cities should be perceived as the opportunity for new sustainable growth and prosperity in the global knowledge-based economy. Therefore, the emerging knowledge and cities in the Middle East should be seen within a regional and global knowledge network.

1 For a better understanding of Qatar’s global investment strategy beyond its borders see White, Andrew. 2010 How Doha’s Dollars are changing the World. In Arabian Business Vol. 11 issue 28.Pp: 26-34.
Practical implications – The ultimate goal is to increase the innovation and creative capacity of cities based on a new set of knowledge patterns. The making of a creative city is a long and complicated process, but for sure it is the path to follow for achieving sustainable urban development. A focus on Doha as an emerging knowledge and creative city amid the Middle Eastern cities will be construct the core case study to examine the main hypothesis of the paper. The ability to analyze such an example can be of benefit to ongoing process of development in Gulf States. The paper will articulate a solid model to be followed by Gulf cities seeking a transformational change similar to Doha. A change from recourses and industrial economies to a creative and knowledge economy. A transformation which has been seen as inevitable change for Gulf cities in a rapidly approaching post carbon paradigm.

Keywords – creativity economy, knowledge-based urban development, creative city, Doha, Qatar, Gulf Urbanity.

Paper type – Academic Research Paper

1 Introduction

The 21st century will be the era of cities, and that cities will succeed or fail by their ability to understand that they – even more than countries or provinces – are the locus where the great economic, community and cultural issues will be played out. And there will be cities that can grasp this future and others that can’t.

The last 20 years of the 20th century in Gulf urbanity was mainly characterized by a commitment to use oil revenues to allow primitive, small and simple Gulf cities to rapidly transform into modern status. A process of massive transformation of the endless deserts into real estate mega projects coupled with qualitative upgrade of cities’ infrastructure to get them ready for a new modern condition. During the first decade of the 21st century major Gulf cities have emerged as rapid growing knowledge economy localities. Unique for this region is the phenomenon of extremely fast urban development. Observing skylines of cities in the Gulf or tracing their geographical boundaries during the last two decades would prove what different researchers have considered unprecedented momentum of development. More significantly, emerging cities on the Gulf have gained global importance in terms of connectivity with other prominent cities in global knowledge economy networks in a very short timeframe (Schein, 2008).

2 Research hypothesis

Emerging knowledge cities in the Gulf, mainly Doha, Manama, Dubai, Abu Dhabi and more recently Riyadh are transforming from their previous status as oil producing economies to Knowledge and creative economy. They are attracting knowledge-based developments and workers from around the globe. For this process to thrive, a different kind of city urbanism is required. The needs of knowledge workers moving to the new cities will change the spatial contents, boundaries and qualities of these cities. Knowledge-based urban development (KBUD) can be an appropriate vehicle towards a new planning paradigm for Gulf cities. More specifically, establishing a creative city implies its ability to affect the spatial properties. New patterns of urban spaces should be articulated. Qatar in its thrive to transform its recently constructed identity as a knowledge to a creative city should look into major changes that would form the appropriate environment for creative and knowledge workers.
3 Theoretical approaches and essential definitions

Three fundamental theoretical approaches with associated definitions will be investigated in this section. Defining the term knowledge economy and its impact on creating a new paradigm of urbanism is articulated. Then I will give a background on the topic of knowledge-based urban development in the international and then the regional context of Gulf cities. Finally I will relate this new type of urbanism and to constructing urban utopia. As it was stated in the paper’s hypothesis, knowledge and creative city will be seen as a manifestation of an urban utopia based on the principles of knowledge-based urban development.

3.1 Post globalized world: cities connecting the world

Globalization was made possible with the advent of the digital revolution and has turned the world into a global village; and, in this era of globalization, cities are regarded as arenas of accelerating change. Needless to say, cities themselves should likewise change dramatically. Sassen (1991) once referred to the four major interrelated functions that cities should perform in their attempt at becoming global. In her words, they should become “highly concentrated command points in the organization of the world economy; second, as key locations for finance and for specialized service firms, which have replaced manufacturing as the leading economic sectors; third, as sites of production including production of innovations, in these leading industries; and fourth, as markets for the products and innovations produced” (pp: 3-4). The third function implies the inevitable partial transformation of cities, within its globalization process, into knowledge cities. Castells (1996&1998) has argued that a new type of society is rising in our contemporary cities due to the consequences of the information revolution. Since the late 20th century World cities have struggled to construct its global identities. Castells argued that the global city is not a place, but a process. The relational worlds of non-physical functional inter-locking networks of knowledge-intensive firms is to be conceptualized as ‘spaces of flows’, while the physical side of localized urban nodes of these same inter-locking networks are to be considered as ‘spaces of places’. From a sociological point of view, Sassen (2000) has argued that cities in the information age should be re-perceived as nodes of an immense network of cultural, commercial and political transactions. Giving these points of view, it is obvious that the classical planning process and design guidelines of contemporary cities need a substantial revision. In a world which is best described as a global village with less and less boundaries, Knowledge and its physical representation in the built environment creates a major challenge and invite us to vision and predict the main aspects of the cities of a new millennium.

Sassen (2002) focused on two key issues. First, she looked at how information flows have bound global cities together in networks, creating a global city web whose constituent cities become "global" through the networks they participate in. Second, she investigated emerging global cities in the developing world-Sao Paulo, Shanghai, Hong Kong, Mexico City, Beirut, the Dubai-Iran corridor, and Buenos Aires. She showed how these globalizing zones are not only replicating many features of the top tier of global cities, but are also generating new socio-economic patterns as well. In global cities, urban and regional planning has displayed a recent interest in designing policies to attract international investment and encourage economic growth in Knowledge Cities (KCs). These policies also focused on creating social amenities and communities to attract knowledge workers (Martin 2001; Chen and Choi 2004). The key factors in attracting
knowledge workers to KCs are mainly social relationships and quality of life of these cities (Mathur 1999; Leamer and Storper 2001; Robinson 2002; Santagata 2002).

3.2 Global knowledge economy vs. industrial economy

The world has been moving through three distinguished types of economy. First, resources driven economy where the prosperity of a specific country was essentially related to the quantity and quality of resources it has. Second, the industrial economy resulted from the industrial revolution or better known as industrial economy. The ability of a country to use technology to transform resources into new products which can exported to the rest of the world marked this type. Finally, knowledge economy has emerged as a dynamic process where knowledge and innovative ideas are used as vehicle for development.

Interestingly, Qatar’s economy has experienced the three transformations. It has been 39 years since the British left Qatar and much has changed during the last four decades. Hydrocarbons have replaced pearls as Qatar’s main source of revenue, bringing previously unimaginable wealth to the former British protectorate as White (2010) rightly argued. With a per capita income of $83,000, second in the world, the tribesmen of Qatar are building a new future for their country.

In 2005, Qatar Investment Authority (QIA) was established with a vision to reinvesting oil and gas revenues and building a diversified international asset portfolio. According to financial analysis done by RGE Monitor New York, Qatar has around $75 bn worth of investments outside the country.

3.3 Place, utopia and happiness

The ideal place for human to live in is right in the core of numerous philosophical and intellectual discourses. Different definitions and interpretations of utopia were provided since the Greek philosophers debate crystallized by Plato’s concept of the “Ideal City”. Utopia is largely based on Plato's Republic (More, 1989). What really constructs a Utopia? Is it a complicated process which needs sophisticated principles to be achieved? Or can it be a very simple yet we are drifted away from this simplicity with the illusion of utopianism is definitely a difficult thing. Thinking about an appropriate answer to these questions, I came to a hypothesis stating that human happiness is the credible condition for constructing an Utopia setting morally or physically. Emerging from this hypothesis was yet another question which I have added to my list of unanswered quarries. Is there a strong relation between people’s happiness and their cities? In other words, if you live in a place which gives you energy, which inspires you, which stimulates you to think and pose questions, would you consider it a Utopia? Are you going to be happy in such a place to the extent that you would describe it as a utopia? Being familiar with Richard Florida’s valuable research gave me an excellent opportunity to substantiate my ideas. Florida who is famous for his bestseller the Rise of creative class (200), focused primarily on the idea of happiness and place in his extensive research published in his latest book who’s your city (Florida, 2008).

4 Knowledge and creativity as emerging city development pillars

As Landry (2000) rightly argued associating creativity with a city is hard to be articulated. Conceiving creativity in individuals is easier than in a city which is, by definition, a complex blend of diverse people, interest groups, institutions, business sectors, social concerns and cultural resources. Landry (2000) investigated why some
cities seem to have adjusted to even surfed the wave of change over the last two decades. Analyzing examples like Barcelona, Sydney, Seattle, Vancouver and Rotterdam, where fundamental social and economic developments were achieved, he concluded that they must have some common principles. Interestingly, Landry stated that successful cities seemed to have in common visionary individuals, creative organizations and a political culture sharing clarity of purpose. “They seemed to follow a determined, not a deterministic path” (Landry, 2000. P: 3). The qualities that these cities have exhibited include open-mindedness, and willingness to take risks, a clear focus on long-term aims with an understanding of strategy; a capacity to work with local distinctiveness and to find a strength in apparent weakness; and a willingness to listen and learn (p: 4). Landry stated that these are some of the characteristics that make people, projects, organizations and ultimately, cities creative.

How can a city differentiate itself? I think the most successful creative city of the 21st century will be much more than sidewalk cappuccinos and film festivals. It will be the creative City, the city government that most imaginatively, efficiently and beautifully provides needed services and infrastructure. That city will be more than just a space in which creativity flourishes; its whole organization and management will be creatively designed (Berridge, 2006). What are the conditions that could give rise to that civic creativity - and how could the principles of creativity evident in the arts and the creative industries be applied to the public management of the city? (Berridge, 2006). When you deconstruct artistic creativity you find four principles:

Flexibility – the ability to see things differently and act accordingly.
Innovation – the ability to apply an original solution to a long-standing problem.
Risk-taking – the ability to accept the consequences of failure.
Leadership – the ability of one person to set a direction for the whole.

5 Emerging urbanity in the Middle East: the evolving new centers

The importance of strategic location of regions as well as cities changes over time. Furthermore, cities can gain and lose their significance within the regional and global city networks. This is simply a question of time. Many historical examples are supporting this view. The growing importance of Gulf cities from a strategic geography point of view is evidence. Arab cities in a post-globalized world are characterized by the emergence of new centers. Cairo, Baghdad, and Damascus used to be the intellectual, cultural, social, and political centers for the Arab and Islamic world. These cities have structured the models of development to be followed in the Middle East. Even after the Gulf’s oil boom back in the early seventies, they have been able to maintain their leading capabilities. Historically, Cairo exercised strong influence on the whole region of the Arab world. This influence can be traced culturally, politically, socially and architecturally (Mitchell, 2002; Sakr, 1996). However, the city is losing its regional leading role. Cairo’s status is a reflection of Egypt struggles to cope with problems caused by massive population growth, urban sprawl, economic failures and growing poverty rates. Due to long conflicts and the complexity of their recent political and economical situations, both Baghdad, and Damascus lost their capability of sustaining their sense of leadership. Hence Cairo is left alone as the only old center struggling to maintain and develop its previous status. Alternatively, in the last two decades new centers in the Arab/Middle Eastern region are emerging. New cities are flourishing within the context of the Gulf. In the last ten years,
and at a remarkable pace, cities like Dubai, Doha, and Manama emerged as what might be considered the new replacement of the old centers. They are creating new models of development which are so fresh, prompt and dynamic. Besides Dubai several other emerging cities on the Arabian Peninsula have developed to highly attractive locations for the knowledge economy in the last decades.

6 Doha, Qatar: an examination of a Gulf creative city

Historically, Doha, State of Qatar Capital city, was a fishing and pearl diving town. In the present day, the City is home to more than 90% of the country’s 1.6 million inhabitants, the majority of whom are expatriates from other countries seeking better working and living environment. Strategically, Qatar has been on a $75bn spending spree to acquire assets across the globe. Yet, the country’s leaders fully acknowledge the importance of development from within. So, while Qatar is spending a fortune on foreign shores, it is not forgetting to invest at homeland. As part of this development the face of Doha will change immeasurably over the coming years. So far, Doha is a more successful example in incorporating knowledge within the city. Governments in the Gulf need to develop the “social infrastructure”-educational institutions and environments that foster innovation- on which knowledge economy is based. People must be given a platform from which to innovate. In this direction, Qatar’s experience can be seen as a very positive example. Both of its mega projects in the knowledge economy paradigm, as will be explained, are creating interactive centers for knowledge production and transfer. Science and Technology Oasis and Education city are two projects which deserve considerable understanding and analysis.

Knowledge-based urban development (KBUD) represents a new driving force in Gulf cities development: KBUD includes services, high tech parks, education, and distinguished by the presence of knowledge workers or global citizens. In this section an examination of KBUD main projects in Doha will be conducted to evaluate the current effort to establish the city as a knowledge creative model within the Gulf and Middle East. Doha developed in an exceptionally short timeframe from a small fishing village to a global city attracting international knowledge economy firms. Until late 1950s, it was a small town with no more than 20,000 inhabitants. The city developed on a reasonable pace throughout the following four decades till the end of 20th century. Finally, since the beginning of the new millennium, the city is becoming a global hub with more than 1.3 million inhabitants (United Nations, 2009). Doha has gained global significance through the growth of knowledge economy related projects. New city urban development and its spatial qualities contribute to the global attractiveness of Doha for knowledge economy investments, firms and people. These urban developments fulfil the requirements of

2 While oil has historically been the main trading commodity of the region, the UAE recognized that this natural resource would not last indefinitely. A new direction was required. The Crown Prince of Dubai, His Highness General Sheikh Mohammed bin Rashid Al Maktoum, initiated an economic transformation by launching several ventures to diversify the economy. His initiatives created high-tech, zero-tax business environments for the world's leading companies.

3 According to Arabian Business Editor Damian Reilly Qatar GDP growth this year is forecast at over 16%. Arabian Business Vol. 11 issue 28 P:6

4 According to finance minister Yousuf Hussain Kamal, state-owned companies plan to spend around $100bn on infrastructure projects within the next four years.

5 Today there are an estimated 300,000 native Qataris; a number dwarfed by the ever-growing worldwide workforce residing in Qatar.
Knowledge workers coming to the city from literally every spot of the globe anticipating an attractive smooth quality of life which would foster their creativity and innovation.

"The sharing of knowledge, ideas and values is the noblest way to transcend barriers. In this sense, globalization is the architect, which constructs academic bridges across cultural and geographical landscapes."

Her Highness Sheikha Mozah Bint Nasser Al-Missned

During the last decade, Qatar adopted a new vision in economic development based on a comprehensive understanding of the different consequences of globalization. This vision which was crystallized in the doctrinal document Qatar Vision 2030 is structured around huge investments in education, science, and research. In other words, knowledge economy was explicitly declared as the selected economic platform for the country’s future. To pave the way for this process to be implemented, a previous effort was made. In 1995, Sh. Hamad authorized the establishment of Qatar Foundation (QF) as a non-profit organization headed by Her Highness Sheikha Mozah Bint Nasser Al-Missned.

While Doha’s position is radically different from cities like Manama and Dubai when it comes to oil and Gas reserves yet, Qatar leaders were convinced that post oil paradigm is becoming a reality. Hence, moving from industrial economy to knowledge economy is a global and inevitable transformation which requires understanding and better engagement. Qatar Foundation is a comprehensive and dynamic knowledge structure which includes all level of educational services from basic to university education. More importantly, QF accommodates creativity and innovation forums, leadership academy, sports academy, research centers, intellectual debates and state of the art conference facilities. For the sake of this paper, I will focus on some specific projects from within Qatar foundations. These projects are education city and science and technology oasis. I will use the two projects with other projects from outside QF to evaluate Qatar’s effort to construct its identity as a knowledge and creative city within the Gulf’s emerging urbanism.

"The sharing of knowledge, ideas and values is the noblest way to transcend barriers. In this sense, globalization is the architect, which constructs academic bridges across cultural and geographical landscapes."

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6.1 Education City, Qatar

Qatar Foundation is headquartered in a unique Education City, a 2,500-acre campus on the outskirts of Doha which hosts branch campuses of some of the world’s leading universities, as well as numerous other educational and research institutions. Supported by abundant residential and recreational facilities, Education City is envisioned as a community of institutions that serve the whole citizen, from early childhood education to post-graduate study. Moreover, Education City is envisioned as a hub for the generation of new knowledge; a place that provides researchers with world-class facilities, a pool of well-trained graduates, the chance to collaborate with likeminded people and the opportunity to transfer ideas into real-world applications. The pace of development in the city is so remarkable. A tangible growth in the facilities at Education City is accelerating. Year 2005 witnessed the establishment of student and staff housing, along with a ceremonial court for holding graduation ceremonies and other official functions.

Texas A&M University at Qatar will be ready to occupy its purpose-built facility, designed by the Mexican architects Legorreta & Legorreta. And Qatar Foundation staff will be working in a new headquarters building.
During year 2007, a central library, a student center, a club for staff and faculty and a ceremonial entrance were opened. Carnegie Mellon University in Qatar teaching classes and conducting research in its new building, also designed by Legorreta & Legorreta. Georgetown University's School of Foreign Service have its own building, too. Further down the road, Education City will welcome a 350-bed, all-digital Specialty Teaching Hospital -- a world-class facility offering general care and specializing in women's and children's health. A golf course and other sports facilities will further enhance Education City's recreational amenities.

At Education City, Qatar Foundation supports elite educational institutions offering a full range of programs, from early childhood education to postgraduate studies, all of which are committed to preparing students to take leadership roles in an increasingly global society. Qatar Foundation understands that the future of Qatar and the region depends on well educated citizens, actively engaged in the international marketplace of ideas, creating and finding uses for new knowledge. At Qatar Foundation, we believe that today's investments in education will make Qatar a hub of innovative education and cutting-edge research, ensuring Qatar's prosperity far into the future.

Some interesting points emerged from the evaluation of Education City which can be highlighted in the following:

All the selected universities are not only among the world best in their specific domain and they weave together a kind of global university. More importantly, the philosophy of the universities’ presence at EC is based on having a real campus not just an affiliation or agreement with the mother university. This affect positively the educational and research level, admission criteria, quality of education, success requirements and the overall academic environment. According to Ministries of education in The GCC countries, an invasion of second and third commercial educational institutions to Gulf cities damage the credibility of international education.

Research activities and publications are essential parts of university education and therefore all faculty members are encouraged to be engaged in international level research which can add qualitative knowledge and can be considered a contribution to the different fields’ body of research. Education city as part of QF allow faculty members and resident researchers to get generous funds for their research on the condition that local and young researchers will be fully engaged in any of the funded projects. This will help in creating innovative and creative research environment with a tangible contribution from local young and ambitious researchers. Getting good people to work together following the lead of a bold individual is crucial. Yet without engaging the locals and prepare them for being positive contributors in their country’s future, any development strategy would fail. Therefore, an important condition is to get the best people, because people are everything. In addition to the necessity of moving young people into power early. Flexibility, innovation, risk, leadership all together will lead to urban creativity and hence, a creative city.

Unlike a lot of new buildings in Gulf cities, Education City’s buildings deserve praise and commend. The architectural and urban language of the city’s different universities is a creative language which was written by a selected group of internationally known architects and planners. All of them succeeded in creating a very stimulating environment which encourages creativity and innovation and invite the users and the visitors alike to ask question and be engaged in an interesting culture of curiosity. More importantly, all Education City buildings provide important lessons and case studies in the concepts of sustainability, green architecture, local culture respect and harmony with local community without compromising the aesthetics or ignoring the contemporary time.
6.2 Qatar’s science and technology oasis

The objectives of “turning Doha into a vibrant science and technology hub” and “attracting and retaining highly skilled employees” are outlined in the Qatar Strategic Plan 2030.

Dynamic and still expanding, the Qatar Foundation's Education City is set to become a self-contained community in an environment designed to the highest standards - an extraordinary place in which to live and work, a kind of intellectual polis for the twenty-first century. The third master plan for the City, unveiled in early 2004, envisages major new developments with completion targeted for 2009. It has grown from the original 500,000 square meters to some 10 million square meters (2,500 acres) according to current plans. Allowing for expansion of the Science and Technology Park, this could well increase in the future. By the end of 2007, the first phase of Qatar Science and Technology Park will be open for business and populated with tenants. A massive, state-of-the-art convention center -- another signature piece of architecture by Arata Isozaki -- will be nearing completion. A shopping center at the north end of Education City will serve the growing number of students, staff and faculty living on site. The new Science and Technology Park provides facilities for commercial giants such as ExxonMobil and European Aeronautic Defense and Space Company (EADS), and is the latest stage of the development.

QSTO was established with the intension that it will provide the ideal environment to develop and market hi tech intensive innovations and products. Providing services and locations with international standards for global companies to incubate new technological projects. The fact that QSTO is allocated within close proximity with education city’s top universities is adding positive elements particularly when it comes to research collaboration, innovation and creativity. In September 5th 2006, a special fund called Proof of concept was launched to provide grants for researchers who decide to reside in Qatar to conduct their research. In addition, two investment funds were established to emphasize the new initiatives towards knowledge economy. New enterprise Fund and Technology Venture Fund with a total of 130 million US $ considered as a qualitative shift in Qatar economy paving the road to Doha to act as one of the favorite destinations for emerging knowledge intensive development projects and investments6.

QSTO is supposed to play a pivotal role on an international level to incubate innovation and creativity in scientific research and provide facilities and initiatives to transform it into applied projects to be implemented locally, regionally and internationally. It is expected that QSTO will form a creative and innovation center for global researchers and will be the right platform for researches planned by multi-national companies. It will work on expanding Qatar economy to the knowledge arena by providing endless opportunities in Knowledge and creative development. Therefore, the decision was made to consider the whole zone as the prime free trade area in Qatar.

6.3 Doha: A new arts capital for the Persian Gulf

On the night of Nov. 22, some of the brightest stars in the world of art and architecture converged on the grand opening of the Museum of Islamic Art, a ziggurat-like structure of white stone said to be the last cultural building by I.M. Pei, the 91-year-old architect. It was the kind of red-carpet treatment that might have christened the

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Louvre pyramid in Paris or the Guggenheim in Bilbao. But it took place far off the art-world grid, in a corner of a globe known more for its religious fundamentalism than its embrace of cutting-edge art. And that is precisely the challenge set by the Museum of Islamic Art (www.mia.org.qa), which glistens along the waterfront corniche in Doha, Qatar — an oil-rich capital that juts into the Persian Gulf across from Iran. Housing one of the world’s most encyclopedic collections of Islamic art, it is the cornerstone of a monumental effort by Qatar to transform itself into the arts hub of the Middle East Qatar Museums Authority (QMA) which constructs the umbrella underneath MIA and other museums are covered has its own cultural development strategy for Qatar. First, QMA is so interested in incorporating all museums of Qatar within the overall cultural vision of the country. Hence, constructing museums would substantiate Qatar’s vision for Doha as an emerging knowledge city amid other Gulf Cities. Second, QMA is planning to have a partnership with educational institutions; locally, regionally and internationally, to enhance the cultural capabilities of children and youth. One of the main pillars of QMA vision is the creation of new learning experiences. Museums can be directly connected to lifelong process of learning. In addition, museums can support structured or institutional education in schools by focusing on creating positive experiences for students. Hence, enjoyment and positive memories cherished should come first as Graham (2005) rightly argued.

In the occasion of hosting Global Art Forum (GAF) at MIA premises, Abdulla Al Najjar, CEO of Qatar Museum Authority told his audience that:

“The Global Art Forum is the leading platform for cultural debate and discussion in the Middle East focusing on key issues that bring together the art scenes of this region with the rest of the world. Qatar Museums Authority has keenly hosted the Global Art Forum at the Museum of Islamic Art as it closely ties in with our vision as a vehicle for sharing culture and heritage through education and community interaction.”

The Museum’s education programs are housed in a wing to the east of the MIA main building across a fountain courtyard. The Education Wing includes the Museum library, classrooms, workshops, study spaces, and technical and storage facilities. The MIA education center opened for public in October 2009. It was established as a core component of the museum since the stress on the educational role was highly emphasized from the early stages of design. The center is providing variety of activities, public lectures, interactive workshops all of which geared towards enhancing cultural life and raising local community’s awareness of art and cultural issues.

MIA education center managed to organize an introductory conference where the concept of education within the museum was introduced. The conference title “Partnership in Arts education: The Museum, the School and The community” is suggesting a positive understanding of the new museums role in not only enhancing

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7 Marking the next stage of its program to develop Qatar into a hub of culture and communications for the Gulf region and the world, the Qatar Museums Authority (QMA) revealed its plans for the new National Museum of Qatar, as expressed in a striking and evocative design by Pritzker Prize-winning architect Jean Nouvel.


cultural life but creating a strong bond between main stakeholders. Driven by such initiative, MIA invested substantially in building bridges with community members from different age and gender and social categories. More importantly, children were seen as the main focus when it comes to issues related to raising awareness about art and culture. The typical gap between school and museum where the later was only perceived as one of the typical destinations for school trips needs to be bridged. That was precisely one of the MIA initiatives well declared intentions and goals.

6.4 MIA as a branding catalyst for contemporary Doha

The vision of His Highness the Emir of Qatar, Sheikh Hamad bin Khalifa Al Thani, is to mold the State of Qatar into a capital of culture. The royal family’s plan is to make Doha a cultural bridge between the Middle East and the rest of the world. All this activity is testament to the fact that Qatar’s enormous oil and natural gas reserves have provided it with the highest per capita income of any country in the world. It is also a mark of the cultural changes that the Amir Hamad bin Khalifa Al-Thani has brought about since he took the responsibility in 1995. Central to the Amir’s vision is the recognition that, as plentiful as Qatar’s natural resources may be, their value will one day be significantly diminished by the emergence of sustainable forms of energy production (Woodman, 2008). The country is therefore seeking to diversify its economy and, to that end, is investing vast sums in the development of its human capital. The creation of a world-class set of cultural facilities is a key element of this strategy, and includes the hugely ambitious plan to build 10 completely new museums.

As explained earlier, under the umbrella of Qatar Museums Authority, MIA is the leading project of His Highness’s vision. As stated in the vision, The Museum of Islamic Art, Qatar, is a museum for the world. It will bring the world to Doha, but it will also connect Doha to the world. MIA is dedicated to being the foremost museum of Islamic art in the world, and as well a centre of education and information in the field of the arts of the Islamic world. Through the vision of its leadership and the dedication of its staff, the Museum of Islamic Art will manifest this commitment by establishing, preserving, and documenting a collection that reflects the vitality, the complexity, and the diversity of the arts of the Islamic world.

The well known phenomena called “Bilbao Effect” have created a new benchmark for cultural facilities’ impact on cities. The Museum of art at Bilbao, Spain designed by architect Frank Gehry was envisioned by Bilbao city officials as their only salvation after years of economic crisis. An assumption which was proven to be right after the new museum helped the city to regain its vitality and became one of the top destinations for tourists visiting Spain.

Qatar vision 2030 is suggesting four pillars for a more developed and prosperous Qatar. Human and Cultural development is a core element in this vision. A pillar which constructs a reasonable justification for a tedious effort to promote Qatar and Doha as an emerging center for culture and knowledge. Cultural facilities are proved to be a viable tool by which cities can be marketed. It can also be seen as a catalyst for development and progress transforming cities from side to side and from rank to rank on progress scale.

Recent statistics published by Qatar museum authority have showed that MIA, Doha was visited by more than 300,000 visitors on its very first year. Speaking of people visiting cultural facilities in Gulf countries, this number is considered extraordinary. The accelerated recognition of MIA is substantiated by hosting international events.

throughout the first year after its inauguration. The objective of MIA hosting these cultural events is to educate the community and bridge the gap between popular and elitist culture. The first Doha Tribeca film festival (DTFF), one of the most prominent cultural events in the Middle East was among these events which have used the fascinating setting of the Museum to intensify the drama of its opening. A magnificent ceremony was held and attended by over 4000 people enjoying MIA acting as DTFF major venue.

7 Conclusion

I shall conclude by affirming that The Doha’s knowledge and creative based projects are not only contributing in sustaining local and ideological identity of Qatar, but more critically it contributes positively to the country’s strategic aspiration to transform Doha into a knowledge and creative city. A quest for identity, in the contemporary moment, implies twofold pursuits. First, it would speak to the locality and relate to the community heritage and roots. The second should respect the global aspirations and each city’s compelling desire to accommodate a place on the global stage and to brand itself as a global city attracting tourists, workers and global citizens.

Knowledge-based urban development should be perceived by Gulf cities as the most appropriate answer for their quest to overpass the oil economy era and moving vigorously towards post-oil one. A large part of the motivation behind the projects is clearly the desire to establish Qatar as both a tourist destination and as an ideal place where knowledge workers might be prepared to relocate. Making global and knowledge workers happy by innovating and creating might be the new definition of 21st century urban utopia.

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Structured Abstract

**Purpose** – The purpose of this paper is to give an example of how the flow of knowledge and the circulation of information can transform urban design and architecture, and rapidly change the nature of a city. It also shows how this transformation can produce an environmentally sustainable city through collective intelligence gained from interactions with geographically dispersed cultures. The city under consideration is the Persian Gulf city of Bushehr during the 18th and 19th centuries. During this time the city transformed from being a naval base into a trading and information hub, and this had a strong impact on its popular culture and architecture.

**Approach** – The approach is to examine how the flow of knowledge affected urban design and architecture before the emergence of rampant globalisation. The changes in Bushehr are interpreted in the light of Deleuze and Guattari’s rhizomatic view of knowledge as being unstructured, cross-disciplinary and serendipitous. For example, it is suggested that the encroachment of modernist architecture has not completely destroyed the rhizomatic nature of Bushehr because the ‘asignifying rupture’ ensures that the city continues to grow and develop along new and existing lines. The position of Bushehr as a trading port and information hub led to its adopting architectural styles from east Africa, the hinterland of Iran and India.

**Originality** – The work is result of the syncretisation of history, architecture and engineering, and from this point of view it is itself rhizomatic. The paper represents a very brief distillation of a book on the history and architecture of Bushehr written by one of the authors (SK) complemented by engineering inputs provided by the second author. The research highlights the development of a Middle Eastern knowledge city in the 18th and 19th centuries that lies beyond the European context.

**Practical implications** – The practical implications of the work are several. The paper presents a methodology to interpret the development of knowledge cities in various parts
of the world. It describes a range of methods and techniques that have developed as a result of the flow of knowledge to ensure that cities can provide human comfort even in extremely harsh climatic environments. Such cities are environmentally sustainable, they consume very little energy and they have very small carbon footprints. It is quite possible that some of these methods can be used in the development of new cities with similar climates. Modern design techniques and materials are likely to make this a reality.

Keywords – collective intelligence, knowledge-based urban design, sustainability, flow of information, bushehr

Paper type – Academic Research Paper

1 Introduction

The forces of globalization and developments in information technology are leading to the ready access to, and a democratization of knowledge. This is reflected in the design of urban spaces that draw on the capabilities of a collective intelligence. Before the emergence of globalization the flow of information and knowledge was much slower, and it occurred mainly as a result of trade and military conquest. There have been some cities in the world that formed communications hubs. Many, but not all of these cities were located in coastal areas which naturally led them to be a source and repository of knowledge of itinerants from the known world. One of these locations is the port of Bushehr. Bushehr grew in importance about three centuries ago as one of principal ports in the Persian Gulf. The port of Bushehr was established in 1736 by Nader Shah (King Nader), King of Iran, as the main base for the Iranian navy in the Persian Gulf (Sistani, 1990). Despite the town being established as a naval base, shortly after its establishment its function changed and it became a very active trading port. From the 1700s to 1900s Bushehr town was the main trading port in the entire Persian Gulf for the Dutch and British East India Companies (Carter et al., 2006, de Planhol, 1990). The new status transformed the town to a trading and communication hub linking the Persian Gulf, the Arabian Peninsula, India, the east coast of Africa and Iran’s hinterland. The knowledge circulating between these regions through Bushehr was more of an empirical type rather than theoretical and it impacted on several aspects of the lives of Bushehr’s residents. It was reflected in language, music, dance, architecture and urban design in ways that can still be recognised. Although the residents of Bushehr speak Persian they use some Indian, Arabic and Swahili words and phrases that are current nowhere else in Iran (Sistani, 1990). When Bushehr was established as a naval base it was named eponymously Naderieh after the then ruling monarch Nader Shah. But after its transformation into a trading port its name gradually changed to Abushahr (Kazeruni, 1988) that has two components, namely, Abu and Shahr. Abu is the Arabic word for father and Shahr is a Persian word that means city. As a result Abushahr is thought of as the father of cities which reflects the importance of this port in the Persian Gulf at this time. The name of Abushahr was gradually anglicised to Bushehr under the influence of the British. Evidence of this is provided by Carsten Niebuhr who travelled to Bushehr in the mid 1700s and remarked on the changing pronunciation of the name of the town (cited in Kashuk, 2005). Bushehr has specific types of music and dance which share many characteristics with those found on the east coast of Africa and they are distinctive from Persian main stream music and dance (Kashuk, 2005). This flow of knowledge also influenced the architecture and urban design of Bushehr and it transformed the hierarchically designed naval base into an urban design that displays a high degree of rhizomaticity. This will be discussed in some detail, and Bushehr’s development as a knowledge city will be interpreted in the intellectual context of Deleuzian and Guattarian
philosophy. The influence of this flow of knowledge and the resulting collective intelligence on the sustainable development of Abushahr will be presented.

2 The Port of Abushahr

2.1 Location, Area and Climate

The old town of Bushehr is situated on the northern end of the Bushehr peninsula in the eastern coastal area of the Persian Gulf. It is located at a latitude of 28° 59’ N and longitude of 50° 51’ E and its altitude is 5m above mean sea level (Sistani, 1990). It is one of the 30 provincial capitals and Bushehr province is located in the south west of Iran as indicated in Figure 1. Figure 2 shows the position of Bushehr old town (Abushahr) on the Bushehr peninsula. In this paper Bushehr old town is referred as Abushahr the total area of which less than one square kilometre. The region has a very hot and humid climate between May to November and but the climate in July and August is particularly harsh (Hatamipour and Abedi, 2008). Figures 3 and 4 respectively show the average monthly temperatures and humidities of Bushehr over the last 40 years. As Figure 4 indicates, the humidity is high in all seasons and Figure 3 shows that the annual temperature range is quite small. Sea and land breezes occur in summer as a result of the large differences in temperatures between the land and the sea (Najafabadi et al., 2006).

![Figure 1. Location of the Bushehr Peninsula in the Persian Gulf](image_url)
Figure 2. Location of Abushahr on the Bushehr Peninsula

Figure 3. The average monthly temperature in Bushehr (From Hatamipour 2008).
Emergence and Development of Abushahr

Before the establishment of the port of Bushehr in the early 1700’s, Rishehr was one of Iran’s leading ports in the Persian Gulf for many centuries after the Sasanian Empire (Carter et al., 2006). Rishehr is located in the west of Bushehr peninsula 12 kilometers from Abushahr. The location of Rishehr is shown in Figure 2. After the formation of Bushehr residents of Rishehr gradually moved to the new town and even some of them demolished their houses in Rishehr and used the material of their houses to build new houses in the new port (Eqtedari, 1969). One of the main reasons for this was because life on the Persian Gulf was insecure due to presence of pirates in the region and their attacks on the south west coasts of Iran (Kashuk, 2005).

Nader Shah established the port of Naderieh (Abushahr) as the main base of the Iranian navy in the Persian Gulf (Sistani, 1990) because of its strategic position. It has good harbor facilities, it is very well positioned in the Persian Gulf to control the region using the navy, the peninsula is very defensible and the ground is sufficiently firm to support buildings and elevated enough to avoid inundation (Carter et al., 2006). Figure 5 presents the map of Bushehr peninsula drawn by Carsten Niebuhr in the 1970s. In the north of peninsula, Naderieh (Abushahr) is drawn showing ramparts on the west and south sides. As shown on the map the town was formed with a triangular plan with ramparts on two sides and the third side of this triangle was accessible by a canal which is located to the north-east of the port. This map shows a very closed and defensible naval base rather than a typical coastal town. Based on this map the main entry of the town was placed in the eastern end of the south rampart.

The Persian Gulf gradually became safer and consequently, Naderieh transformed from a naval base to Abushahr, a commercial port, and more people migrated to the town for business and trading; this led to the of Bushehr and the displacement of the old ramparts to make more land available for new houses (Kashuk, 2005). On the new site plan of Bushehr the inland side of the triangle was defined by a tall wall with the main gate in the middle of it and two other sides were open to the sea without any barrier in order to welcome to commercial ships (Kazeruni, 1988). Figure 6 shows an aerial view of Bushehr in 1956. This site plan scarcely changed until 1970s when some parts of this site were replaced by wide streets and new buildings because of the demand for modern architecture in Iran (Kashuk, 2005). Figure 7 shows the comparison between Bushehr when it established and after its development.
Figure 5. Map of the Bushehr peninsula drawn by Carsten Niebuhr in the 1760s (From Kashuk 2005).
Figure 6. An aerial view Bushehr in 1956 (From Kashuk 2005).
3 Abushahr as a Trading, Communications and Information Hub

After the transformation of Bushehr from a naval base the town gradually became the main trading port of the region. Bushehr grew and not only were many Iranian businesses established but soon it became the main trading port in the entire Persian Gulf for the Dutch and British East India Companies. This reinforced Bushehr’s position as a hub. Abushahr had been established as a naval base with a predefined site plan that was strongly hierarchical to accommodate a military system for operating in the Persian Gulf. After the transformation of Abushahr from a military base to a commercial port and
information and communications hub, the town started to grow very rapidly as a nonhierarchical system. Several aspects of Abushahr’s development in the last three centuries show that this development occurred rhizomatically. The idea of the rhizome was introduced by Deleuze and Guattari (1987). They suggest that knowledge has traditionally been thought of as being arborescent and highly structured, but Deleuze and Guattari (1987) propose that this view should be complemented by a view that knowledge is essentially unstructured and that it can flow unobstructed from discipline to discipline, or simply from notion to notion. The underlying thought is to break down structures and barriers, and it is therefore somewhat subversive. The idea of the rhizome is not too far removed from Lyotard’s (1979) concept of paralogy that refers to the creation of new ideas that may be irreverent or at odds with prevailing doctrines. Paralogy also has a subversive element, and its advocacy by Lyotard is motivated by its effectiveness in maintaining freedom. According to Deleuze and Guattari the rhizome has several principal characteristics that their readers are free to interpret rhizomatically. They are “connection and heterogeneity”, “multiplicity”, “asignifying rupture” and “cartography and decalcomania”. These principles can be seen to be embedded in Abushahr’s development in the eighteenth and nineteenth centuries.

“Connection and heterogeneity” are two important principal characteristics of the rhizome. That is, any point in a rhizome can be connected to any other point, and its traits can be linked to other traits of a quite different nature (Deleuze and Guattari, 1987). In Abushahr each part of the site can be replaced by another part without any damage to their relationships or to the behaviour of the system. The geometry of this site does not follow hierarchical rules; the geometry is defined by the connection of spaces between two elements. In this context each element consists of complexes of two or three buildings. The elements are very close together but they are not attached to each other; in some cases the distance between two elements (buildings) at a specific point reduces to less than twenty centimeters. Therefore, any element can be connected to any other element and the geometry of the site does not change. This principle did not exist in Abushahr when it was established as a naval base and it was not possible to replace one part of the site with another because of the hierarchical urban design of the town necessitated by the military (Kashuk, 2005). However, after communications between this port and other regions were established through trading Abushahr’s urban complexion changed. This principle can be observed in other ports with which Abushahr was in communication during the eighteenth and nineteenth centuries such as Lamu old town and Zanzibar’s stone town in on the east coast of Africa. Figures 8 and 9 show aerial views of these two towns respectively that were formed at about the same time as the development of Abushahr, and they were two of the main destinations for imports and exports with Iran through Abushahr. For example, most of the doors and windows for buildings were imported from Zanzibar through Bushehr (Kashuk, 2005).

Two other principal characteristics of rhizomatic knowledge are “multiplicity” and “asignifying rupture”, which are encapsulated in the architecture of Abushahr. According to Deleuze and Guattari (1987), the rhizome does not have a beginning or end, but it is always in the middle of the objects of attention; the objects from which a rhizome grows and the object “which it overspills”. As mentioned above, Abushahr was built to a specific site plan but the hierarchical design transformed into a rhizomatic development. This did not happen at one specific time, but it gradually occurred and transformed the urban design so there was no hierarchical growth.
Therefore, for the rhizomatic growth of Abushahr was spontaneous and there is no specific end point as the town could continue to grow if necessary. When modern architecture began to encroach on this site, the rhizomatic features of the town did not suddenly cease. Even when this site was divided into separate parts by wide streets, the rhizome did not disappear, but it continued and re-emerged from different points. This shows another principal characteristic of rhizome, namely “asignifying rupture”. The idea
here is that even if a rhizome is broken or shattered, it will begin again on an old line or a new line (Deleuze and Guattari, 1987); this suggests the ultimate impermanence of given hierarchical systems.

Deleuze and Guattari (1987) highlight “cartography and decalcomania” as two other principal characteristics of rhizome. That is, a rhizome is not a reproduction or a tracing but it is the formation of a map that will lead into unexpected territories. The term decalcomania can be interpreted as indicating flexibility, adaptability and a resistance to doctrinaire stances – again there are shades of paralogy. These features exist in different aspects of Abushahr’s architecture and they reveal that rhizomatic nature of Abushahr’s development. In this site architecture and environmental conditions play the role of orchid and wasp in Deleuze and Guattari’s example. The architecture and environmental conditions do not follow from each other, but they form the total environment and even define how they function together. Abushahr was not designed as a trading port but because it became safer and more secure, and because of its location it became one. As a result of the job opportunities that arose immigrants needed houses. Because Abushahr became a communications hub connected to other ports many of these migrants eventually emigrated and the demand for houses fell. These are the forces that drove architecture and urban design in Abushahr. This type of development is redolent of the analogy of the orchid and the wasp in the rhizome in which a tracing of the wasp is not generated by the orchid, but the orchid and the wasp make a map together (Deleuze and Guattari, 1987). In this specific site the architecture and urban environment transformed as Abushahr’s function changed from a closed naval base to a port open to merchant ships. Abushahr’s architecture did not trace any pre-designed map related to the changing conditions or special rules but it formed a map with its own conditions and rules. Even when the pirates again started to attack this commercial port it did not become a closed port but it formed an open self-defensive architecture. The form of the buildings changed from being single-storey with wind towers which were of the same type found in inland Persian architecture, to multiple story buildings without wind towers, which were a type of coastal Persian Gulf architecture (Kashuk, 2005). All buildings had similar façades and even mosques did not have domes and minarets; the lanes became narrower and the buildings had only one entry so they were more defensible (Kashuk, 2005). All these developments resulted in very special spaces in which strangers, including pirates, could not find their direction and led them to get lost in the narrow and meandering lanes. The environmental conditions and architecture made the map of Abushahr, which was open and defensible and it was completely different from first pre-designed map. Figure 10 shows old buildings in Bahrain and Figure 11 presents the old city of Kuwait. These two towns are located on the Persian Gulf and were developed contemporaneously with Abushahr. In the 1700s and 1800 it was not common in Iran to build multi storey structures but because of the connection between Abushahr and India it occurred in Bushehr. To construct multi storey buildings wooden beams were required and residents of Abushahr imported sandalwood beams from India by sea (Kashuk, 2005).
Figure 10. Old buildings in Bahrain share many aspects with those of Abushahr (From Google image).
4 Environmentally sustainable Abushahr - implicitly a knowledge city

Abushahr developed as an environmentally sustainable city due to its connection with the mainland of Iran, India and the east coast of Africa. Through trading and the flow of empirical knowledge Abushahr adopted technology from its trading partners to develop an architecture and urban design that enhances human comfort using of almost no external sources of energy. As mentioned above, the region has a very hot and humid climate and several techniques have been used to make Abushahr an environmentally sustainable town. Two of the main aspects that can be observed in environmentally sustainable Abushahr are protection of buildings from the harsh temperatures and evaporative cooling.

4.1 Heat mitigation

There are three main sources of unwanted heat in summer in Abushahr: direct solar radiation on building envelopes including windows, heat transfer and infiltration of hot outdoor air through the structure and the internal heat produced by appliances, equipment, and inhabitants.

Solar radiation can result in heat loads on surfaces up about 1kW per square meter, and depending on the solar absorptivity of the surface most of this can be absorbed. Due to the high external temperatures this additional heat flux can increase the problem of overheating for people and buildings in the hot and humid climate experienced in Abushahr. A first line of defense is to limit the size and number of openings in buildings to cut down the solar gains. However, even in the climate of Abushahr there is a conflict between desired daylight illuminance and solar radiation. Heat gains in a building cannot be solved just by a single measure. The loss of daylight arising from the limited areas of windows or because of a fixed highly efficient shading devices during hours of indirect
solar radiation would lead to a lack of natural light inside the buildings. To solve this problem an architectural feature found in Bushehr is that all the openings are between 700mm to 1000mm deep and have two layers of windows. The interior layer of windows has sufficient glazing to enable light to penetrate the building. In contrast the window installed near the exterior surface has no glazing and functions as an external blind. By using this system residents could control the amount of light entering the building. Figures 12 and 13 show this type of window in Abushahr.

To maintain indoor and outdoor areas comfortable plenty of shade is provided and external surfaces are painted in light colours to reflect solar radiation. Even heavy walls and roofs exposed to solar radiation for long periods accumulate heat and either conduct it to the interior of the building or reject it during the night to the surroundings, increasing the night heat island effect. Therefore different methods of shading have been used. During summer the sun angle approaches the zenith angle and this demands that horizontal surfaces be shaded, but there is still scope for fixed systems such as overhangs on vertical walls with southerly, easterly and westerly orientations. Specific types of wooden balconies known as shenashirs have been used to protect vertical surfaces. Also very deep balconies are integrated in to buildings wherever possible. Different types of vertical and horizontal wooden shading devices have been used to cover the surfaces. These balconies, shenashirs and shading devices in principle and form are similar to the ones that have been used on the east coast of Africa and in India and on the Arabian Peninsula ports in the Persian Gulf. Figure 14 shows a shenashir in Abushahr.

![Figure 12. Openings in Abushahr have external operable windows as well as internal windows (From Kashuk 2005).](image-url)
Figure 13. External operable windows consist of upper and lower parts (From Kashuk 2005).

Figure 14. A shenashir provides shading on walls (From Kashuk 2005).

4.2 Evaporative cooling

When water evaporates it absorbs a large amount of heat from its surroundings. The most familiar example of this is the cooling effect of evaporating water on human skin experienced after taking a shower. In hot and arid climates body temperature is largely
controlled by the rapid evaporation of perspiration from the surface of the skin. In hot climates with high humidity levels as in Abushahr the cooling effect is reduced because of the high moisture level of the surrounding air. However, the evaporation rate is increased as air movement is increased. Cross ventilation by a breeze is the simplest passive cooling strategy as it increases the amount of evaporation. It is based on the increase of the convective heat transfer coefficient adjacent to the human skin, reducing the thickness of the boundary layer and therefore increasing the transfer of water to the ambient air. For the heat transfer not only the air velocity but the intensity of turbulence of the air flow is an important factor, and it allows people to be more comfortable even at high air temperatures. This remains valid if the air temperature is higher than the room temperature. People accept higher room air temperatures if they can sit in a breeze. During a significant portion of the year night temperatures are below the room temperature and therefore cross ventilation at night can work as a natural cooling mechanism, which also promotes the cooling of the building fabric.

As mentioned above, when Abushahr was first established its buildings had wind towers that exploited the cross ventilation effect for evaporating cooling inside the building. That is the buildings were single storey with wind towers located on the roofs. This is very common type of use of cross ventilation in the Iranian mainland and towns located in Iran’s south west costal area. However, because of Abushahr’s role as a trading and communications hub a more efficient cross ventilation system was adopted using ideas and knowledge gained from other parts of the world. Buildings had multiple stories with many windows on all four sides of the rooms. Thus by opening the windows on opposite sides of a room breezes would traverse the room. Windows in Abushahr extend from the floor to about 2500 mm in height from the floor and in many cases they consist of lower and upper parts. By opening the lower part of the windows through which air enters and the upper part of the window through which air exits on the opposite side of the room very efficient cross ventilation can be made to occur. In this way wind towers were made redundant. Another technique that has been used to facilitate cross ventilation in the streets in Abushahr is to ensure that the streets are very narrow. Normally the width of streets in Abushahr is between one to two meters and the buildings adjacent to the street are two or three stories high. The upper two stories of buildings on opposite sides of the street can be as close as 20cm but they never contact together. This makes air flow from lower part of the street to upper parts (chimney effect). Figure 15 shows how this system works. These aspects can be found in other ports on the east coast of Africa and coastal ports on the Arabian peninsula in the Persian Gulf. Figure 16 shows a typical street in Abushahr.
Figure 15. The typology of streets in Abushahr facilitates natural ventilation through the chimney effect.

Figure 16. In Abushahr streets are narrower at the upper levels (From Kashuk 2005).
5 Conclusions

Modern communications have resulted in knowledge flowing rapidly and freely around the world. The rapid rate of knowledge transfer did not begin in earnest until the 19th century with the introduction of the telegraph and steamship. Before that time knowledge transfer occurred much more slowly. In this paper we have considered the growth of Bushehr as a knowledge city in the 17th-19th centuries as a result of its strategic location in the Persian Gulf.

The town of Bushehr rose to prominence when Nader Shah established a naval base there in the fourth decade of the 18th century. The town was laid out so that it could be easily defended, and its urban design exhibited a well planned, hierarchical structure. However, as Bushehr transformed into a trading port this structure became much more rhizomatic in the senses used by Deleuze and Guattari; that is its connections became more spontaneous. A rhizomatic view of knowledge also implies that knowledge is more than arborescent, hierarchical, disciplinary and reductionist, it is also serendipitous and free flowing across traditional boundaries. Bushehr’s role as a port and communications hub led it to become a repository of empirical knowledge that influenced its music, dance and architecture. Another feature of rhizomatic knowledge is that cartographic and decalomaniacal that suggest exploratory and provisional characteristics. This latter feature is consonant with Lyotard’s idea of paralogy that is one of the features of scientific enquiry. These features can be seen in the development of architecture and urban design in Bushehr. For example its architectural style of windows was adapted from one found in east Africa, and multistory buildings were inspired by Indian architecture. The buildings in Bushehr were also fitted with windows that have elements of double glazing, namely an opaque shaded layer and glazing.

It can be seen that Bushehr was a knowledge city in the 18th and 19th centuries, and it arose because of its assimilation and adoption of knowledge from its geographically dispersed trading partners.

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Using knowledge spillover theory in enhancing the entrepreneurship in Syria

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Structured Abstract

Purpose – The purpose of the paper is to analyze the main factors that affect on entrepreneurship in Syria.

Design/methodology/approach – this study proposes a quantitative approach by using the knowledge spillover theory. Multiply regression was run and based on data over the period (1993-2008).

Originality/value – This methodology puts in evidence that Syrian economy needs more effort in enhancing R&D in starting up new entrepreneurial activities. The results also show that urban environments are particularly conducive to entrepreneurial activities, as well as government expenditure which serve entrepreneurship in infrastructure building, while direct taxes pose a barrier to entrepreneurship.

Practical implications – There are several implications of these findings for management. First, these results help us sort out theories of entrepreneurship. Second, more micro-economic studies are required to fully understand the channels and mechanisms through which knowledge spillovers occur from corporate R&D as well as from academic research, and to measure spillovers more directly.

Keywords – knowledge spillover, entrepreneurship, R&D, urban enterprise, Syrian economy.

Paper type – Academic Research Paper

1 Introduction

For thousands of years Syria shows has been one of the great trading nations of the world. Business and commerce is in the blood of the Syrian people. Damascus and Aleppo have always been great mercantile cities. In South America expatriate Syrians provide the commercial drive for many regions of the continent. There is a tradition in Syrian culture of entrepreneurship and commerce at all levels of society. And yet when you talk to school children and students you get a very different picture. Ask “what is your ambition?” and you will hear “I want to be a doctor; I want a job in government; I want to look after my family”. It is very rare to hear “I want to become an entrepreneur.” One cannot criticize people for wanting to contribute to the well being of society or their family through government jobs. But if there is no drive among young people to create and grow business in a flourishing private sector, that society, however caring and secure,
will find its wealth steadily wasting away. Entrepreneurs and business people are a vital
element of a healthy society. For Syria to create the wealth needed to support its people,
for it to compete in a global economy, it needs entrepreneurs.

This does not mean entrepreneurs in any narrow sense. Many people think that
successful entrepreneurs can only be found in developed economies and high-tech
specialized businesses. When people are asked to name an entrepreneur Bill Gates
invariably comes up. He is certainly an excellent example and, yes, many fortunes have
been made in high tech fields. But this is far too narrow an understanding of what is an
entrepreneur. Entrepreneurs are found in all levels of society and in all types of economic
activity – farmers, tourist guides, taxi drivers, manufacturers and all sorts of small
enterprises. The vast majority of entrepreneurs are operating in familiar established
business sectors. For any economy to prosper it needs entrepreneurial thinking and
flexibility at all levels and in all parts of society.

2 Syria in Global Entrepreneurship Monitor (GEM 2009 report)

Syria is a central planning country with diversification economy in terms of the
structure of GDP. The Syrian economy has a diversified GDP structure in terms of
sectors. In addition, it could be noticed from figure 1 that main sectors on average during
the period 1990-2008 of the Syrian economy are the mining and manufacturing 35%, the
agriculture 20% and the trade 13%. Thus the economy does not depend on one or two
sectors which give it more ability to absorb the external and unexpected shocks.

The main change in the structure as is shown in figure 1. decreasing in the share of
agriculture and increasing in the mining and manufacturing share during 90’s. on the
other hand, manufacturing and agriculture decreased during the period (2000-2008) while
the trade and constructing increasing in the same period.

Syria is classified in GEM 2009 and other international reports such as Global
competitiveness report 2009 according to economic development as a factor-driven
economies. Economic development consists of changes in the quantity and character of
economic value added. These changes result in greater productivity and rising per Capita
incomes, and they often coincide with migration of labor across different economic
sectors in the society. Countries with low levels of economic development typically have
a large agricultural sector, which provides subsistence for the majority of population who
mostly still live in the countryside. This situation changes as industrial activity starts to
develop, often around the extraction of natural resources. As extractive industry starts to
develop, this triggers economic growth, prompting surplus population from agriculture to
migrate toward extractive and emergent scale-intensive sectors, which are often located in
specific regions. The resulting oversupply of labor feeds subsistence entrepreneurship in
regional agglomerations, as surplus workers seek to create self-employment opportunities
in order to make a living.

Table 1 lists several GEM indicators concerning individuals’ own perceptions toward
entrepreneurship for Syria and some neighborhood countries. It shows that there is no
difference, in Syria, between entrepreneurial perceptions and entrepreneurial intentions,
while in other countries with factor-driven and efficiency-driven economies the difference
between entrepreneurial perceptions and entrepreneurial intentions is relatively small, or
even negative. This suggests lower opportunity costs for entrepreneurial activity. It is not
surprising therefore that these countries have relatively high proportions of necessity-
driven entrepreneurship. On the other hand table 1 shows that in factor-driven and
efficiency-driven countries, those with the highest fear of failure rates have the lowest intention rates like Syria. In order to grasp the importance of the “fear of failure” effect, it makes sense to examine how prevalent this view is among those who perceive good opportunities for setting up a business. If fear of failure is particularly prevalent among these people, interventions to reduce fear of failure may be justified. In most countries, the fear of failure prevalence rate is lower among those who see good opportunities to start a business than among the population in general.

According to the entrepreneurial activity in Syria the GEM 2009 shows that the nascent entrepreneurship rate in Syria (3.4) is weak in comparing with the average factor-driven economies (10.2). In addition the new business ownership rate in Syria is less than the average factor-driven economies. For this reason this research analyze the main factors affect on entrepreneurship by using the knowledge spillover theory.

3 The knowledge spillover theory of entrepreneurship

The Knowledge Spillover Theory of Entrepreneurship challenges two of the fundamental assumptions implicitly driving the results of the endogenous growth models. The first is that knowledge is automatically equated with economic knowledge. In fact as Arrow (1962) emphasized, knowledge is inherently different from the traditional factors of production, resulting in a gap between knowledge and what he called economic knowledge. The second involves the assumed spillover of knowledge.

Why should entrepreneurship play an important role in the spillover of new knowledge? In the Romer (1986) model of endogenous growth new technological knowledge is assumed to automatically spillover. Third-party firms and economic agents, resulting in the automatic spillover of knowledge, automatically access investment in new technological knowledge. The assumption that knowledge automatically spills over is, of course, consistent with the important insight of Arrow (1962) that knowledge differs from the traditional factors of production in that it is non-excludable and non-rivelrous. When the firm or economic agent used the knowledge, it is neither exhausted nor can it be, in the absence of legal protection, precluded from use by third-party firms or other economic agents. Thus, in the spirit of the Romer model, drawing on the earlier insights about knowledge from Arrow, a large and vigorous literature has emerged obsessed with the links between intellectual property protection and the incentives for firms to invest in the creation of new knowledge through R&D and investment in human capital.

Arrow also emphasized that knowledge is characterized by a greater degree of uncertainty and asymmetry than are other types of economic goods. Not only will the mean expected value of any new idea vary across economic agents, but the variance will also differ across economic agents. Thus, if an incumbent firm reaches the decision that the expected economic value of a new idea is not sufficiently high to warrant its development and commercialization, other economic agents, either within or outside of the firm, may instead assign a higher expected value to the idea. Such divergences in the valuation of new knowledge can lead to the start-up of a new firm in an effort by economic agents to appropriate the value of knowledge. Since the knowledge inducing the decision to start the new firm is generated by investments made by an incumbent organization, such as in R&D by an incumbent firm or research at a university, the startup serves as the mechanism by which knowledge spills over from the sources producing that knowledge to the (new) organizational form in which that knowledge is actually commercialized.
The knowledge spillover theory of entrepreneurship is depicted in figure 2. The production of new knowledge and ideas in the context of an incumbent organization, such as the research and development lab of a large corporation, or the research laboratory at a university, creates knowledge embodied in an individual knowledge worker, or team of knowledge workers. If divergences in the expected value or outcome from this new knowledge lead to the decision by the incumbent firms not to commercialize the new knowledge, the economic agent could remain employed by an incumbent firm and expect to earn incremental additions to her income over time, as depicted by the positive, linear incumbent earnings profile.

The degree to which economic agents recognize entrepreneurial opportunities emanating from knowledge spillovers and the decision to commercialize them through the startup of a new firm is captured by the equation reflecting occupational (or entrepreneurial) choice,

\[ E = \gamma(\pi^e - w) \]  (1)

where \( E \) reflects the decision to become an entrepreneur (generally stated in terms of probabilities), \( \pi^e \) is the profits expected to be earned from entering into entrepreneurship, \( w \) is the wage that would be earned from employment in an incumbent enterprise and \( \gamma \) represents all other variables that influence entrepreneurship (Parker, 2004; Evans and Jovanovic, 1989).

Since the expected profit opportunities accruing from entrepreneurship are the result of knowledge not commercialized by the incumbent firms, entrepreneurial opportunities will be shaped by the magnitude of new knowledge but constrained by the commercialization capabilities of incumbent firms. Knowledge opportunities can be expressed as \( K^\theta \), where \( K \) is the aggregate stock of knowledge and \( \theta \) (0<\theta<1) refers to the share of knowledge not exploited by incumbents,

\[ E = \gamma(\pi^e - w) \]  (2)

The opportunity space for potential entrepreneurs is thus dependent on the efficiency of incumbents in exploiting new knowledge who are assumed incapable of fully exhausting the opportunities provided by new knowledge.

Equation (2) implicitly assumes away any institutional or individual barriers to entrepreneurship. Yet, as a rich literature suggests (Parker, 2004), there is a compelling array of financial, institutional, and individual barriers to entrepreneurship, which result in a modification of the entrepreneurial choice equation,

\[ E = \gamma(\pi^e(\theta K^\theta) - w)/\beta \]  (3)

where \( \beta \) represents those institutional and individual barriers to entrepreneurship, spanning factors such as financing constraints, risk aversion, legal restrictions, bureaucratic and red tape constraints, labor market rigidities, lack of social acceptance, etc. While we do not explicitly specify these specific entrepreneurial barriers, we note that they span a broad spectrum of institutional and individual characteristics, which, when taken together, constitute barriers to entrepreneurship. The existence of such
barriers, i.e., a high value of $\beta$, explains why economic agents would choose not to enter into entrepreneurship, even when confronted with knowledge that would otherwise generate a potentially profitable opportunity.

Based on this simple model, originating in standard assumptions applied in microeconomics, we present the following three propositions, given that the entrepreneurial activity exceeds zero:

**Proposition 1:** An increase in the stock of knowledge has a positive effect on the degree of entrepreneurship. The extent of the impact is however determined by the efficiency of incumbents to exploit knowledge: the more efficient incumbents are, the smaller is $\theta$ and the smaller the effect of new knowledge on entrepreneurship.

Proof: From equation 3 taking the partial derivative of entrepreneurship with respect to knowledge yields

$$ E_K = \frac{1}{\beta (e^{K^2} - e^y)} > 0, \quad E_{kk} = \frac{1}{\beta e^{K^2} e^{K^2 - e^y}} < 0 \quad (4) $$

implying that an increase in the stock of knowledge ($K$) positively affects entrepreneurship, albeit at a decreasing rate, as suggested by the second derivative. Hence, there are diminishing returns to scale in knowledge with respect to entrepreneurial activity.

**Proposition 2:** Entrepreneurial activities are decreasing in higher regulations, administrative barriers and governmental market intervention.

Proof: The impact of such barriers to entrepreneurship – increasing $\beta$ - can be derived in the following way,

$$ E_\beta = \frac{-1}{\beta^2 (e^K - (\frac{e^y}{\beta}) - w)^y} < 0, \quad E_{\beta\beta} > 0 \quad (5) $$

i.e., given that entrepreneurial activity exceeds zero, an increase in $\beta$ has a negative effect on entrepreneurship. In addition, the second derivative reveals a convex association between the extent of such barriers and the level of entrepreneurship, i.e. increasing barriers will deter entrepreneurship at an increasing rate.

**Proposition 3:** A higher wage level can be expected to monotonically reduce entrepreneurship.

Proof: The partial derivatives with respect to the wage level imply a monotonically negative effect on entrepreneurship in this simple model according to equation 3,

$$ E_w = \left( \frac{-1}{\beta} \right)^y < 0, \quad E_{ww} = 0 \quad (6) $$

Hence, our model explains entrepreneurship as a function of the following factors: the knowledge stock ($K$) and the efficiency of incumbents to exploit knowledge which both influence the knowledge opportunity space, the barriers to entry captured by $\beta$, and the level of wages $w$,

$$ E = f(K, \theta, \beta, w) \quad (7) $$
4 An Empirical Test of the knowledge based entrepreneurship Model in Syria

Entrepreneurship is influenced by culture, traditions, and institutions, i.e. more or less non-measurable factors, together with strictly economic factors that are more easily identified. “Inherited” and persistent customs and legal frameworks drive the first set of factors, often quite different across countries. To capture these differences this study estimates the following equation using a fixed effect panel regression technique,

\[ \text{Ent}_j = \alpha + \alpha_2 \text{Kstock}_j + \alpha_3 \text{Bar}_j + \alpha_4 \text{Wage}_j + \alpha_5 \text{Tax}_j + \epsilon_j \]  

Where \( j \) denotes country, \( t \) represents time and the error term is expected to exhibit standard properties; that is, \( \epsilon_\text{t} \) is assumed to be independently and identically distributed with a zero mean and variance \( \sigma^2 \) for \( t \). The dependent variable – entrepreneurship (\( \text{Ent} \)) - is approximated share of self-employed as a percentage of the labor force. This is the best available measure that can be implemented in a cross-country analysis and serves as an acceptable approximation for entrepreneurship.

Turning to the explanatory variables, our main focus in explaining entrepreneurship is on knowledge endowment within an economy. It is defined as a stock measure, where the flows of R&D in Syria have been accumulated to obtain knowledge stocks (\( \text{Kstock} \)). In accordance with the theoretical framework outlined above, we expect an increase in the relative knowledge endowment to increase the profitability of entrepreneurial activity by facilitating the recognition of entrepreneurial opportunities. The knowledge variable is normalized by GDP.

Regarding to capture the extent of barriers to entry in an economy the study uses two variables: first, as an alternative we include the tax share in GDP, both individual (\( \text{Taxincome} \)) and corporate (\( \text{Taxcorp} \)). Second, direct taxes (\( \text{directax} \)). If incentive structures are distorted through high taxes, entrepreneurial start-ups are less likely to occur (Kirzner 1997; Fölster, 1998). For these reasons the study expects these variables to be negatively associated with the level of entrepreneurship.

For the individual the wage level represents the opportunity cost of starting a new venture. A higher level of wages implies a smaller relative reward of starting a new firm, presumably deterring entrepreneurial activities. Thus, this study expects a negative sign. The wage variable (\( \text{Wage} \)) is defined as the annual average wage at the economy level.

In addition to the above variables, which closely relate to the model, the study also inserts a number of control variables where previous research has shown an influence on entrepreneurship. First, part of public sector expenditure is devoted to education, and education has been shown to be positively associated with entrepreneurship. The education variable is defined as public expenditure on education (\( \text{EDU} \)) in relation to GDP.

A more educated population should be more able to identify entrepreneurial opportunities, suggesting a positive relationship to entrepreneurship. Still, it is conceivable that the effect of education may go either way. In the technology-based sector it should have a positive effect, but in less skill-intensive activities it is likely to have a negative impact. The more advanced, high technology sectors are generally small
even in developed countries. Moreover, institutional factors may affect the distribution of more educated people across sectors and occupations.

Another variable assumed to influence entrepreneurship is GDP growth. Higher growth is linked to increased market opportunities. Therefore, the study control for growth, defined as a three-year moving average (Growth) in order to smooth out business fluctuations. Higher growth rates are expected to positively impact profit opportunities, reduce risks and enhance the propensity for individuals to engage in entrepreneurial activities.

Numerous studies also claim that urban environments are particularly conducive to entrepreneurial activities, innovation and growth (Acs and Armington, 2004). Information flows are much denser in cities, different competencies and financial resources are more accessible, and proximity to the market is obvious. All of these features work to widen the opportunity set in urban regions. This study therefore includes a variable that captures the share of a country’s population that lives in urbanized regions (Urban). It was expected a higher degree of urbanization to be reflected in higher entrepreneurial activities.

Similarly, studies using demographic variables conclude that individuals in the age cohort 30 to 44 are most likely to undertake entrepreneurial activities. To account for this, the study regress the share of the population in the age cohort (AGE) 30 to 44 on self-employed. A large share of the population belonging to that age cohort is expected to relate positively to the share of entrepreneurs within an economy. Finally, time-specific effects are controlled for by implementing a time dummy for the 1990s (DUMMY-90).

The regressions are based on data over the period 1993 to 2008. The data sources from the Central Bureau of Statistics in Syria. Table 3 summarizes some statistics of the variables used in the empirical analysis.

5 Regression results

The regression results estimating the entrepreneurship rate, ENT, are presented in Tables 4. The result in regression 1 indicates that the knowledge spillover theory in Syria needs more effort to enhancing R&D in starting up new entrepreneurial activities. Where the sign of knowledge stock coefficient is negative while in the most relevant studies (Acs, Z. et al 2005) refer to a positive and statistically significant coefficients of the knowledge stock suggest, entrepreneurial activity tends to be greater in those countries where knowledge is more prevalent. These results are certainly consistent with the knowledge spillover theory of entrepreneurship. Entrepreneurial opportunities do not appear to be exogenous but rather systematically created by a high presence of knowledge. The interpretation for negative sign of knowledge stock is that most of start-up or incumbent firms don’t depend on high technologies which reflect on R&D expenditures in Syrian economy.

There is also at least some evidence that a larger presence of the government, as measured in terms of public expenditures, this serves entrepreneurship in infrastructure building and other facilities can be done by government. While the negative and statistically significant coefficient of the direct taxes rate indicates that taxes pose a barrier to entrepreneurship.

The coefficient of the wage rate is positive and statistically significant for the entire period, suggesting that higher wages do not serve to deter the decision to become an entrepreneur. However, the sign of the coefficient of the wage rate actually reverse in
regression 2, which might indicate that entrepreneurial higher wage levels in fact reduced activity. This is likely to reflect two forces: first, for already employed individuals the alternative costs of starting a new venture increase and, second, high wages may be interpreted by potential entrepreneurs as an obstacle to future expansion of the firm.

Regarding the urban activities the results indicate that there is evidence linking the degree of urbanization to entrepreneurial activity.

Thus, the empirical findings that entrepreneurship tends to be systematically greater in the presence of knowledge are strikingly robust. While the significance and even sign of some of the control variables are more sensitive to the time period and the specification, entrepreneurial activity is found to respond positively to economic knowledge regardless of the specification and time period estimated.

6 Conclusions

The field of entrepreneurship has been defined as the study of how, by whom and with what consequences opportunities to produce future goods and services are discovered, evaluated and exploited. However, it can be argued that entrepreneurship research has focused on discovery, exploitation, and their consequences without much attention to the nature and sources of opportunity itself. The most common theories of entrepreneurship view entrepreneurial activity as arising from either differences among individuals in attitudes toward risk or differences in individual capabilities. This paper has developed a knowledge spillover theory of entrepreneurship in which the creation of new knowledge expands the technological opportunity set. Therefore, entrepreneurial activity does not involve simply the arbitrage of opportunities, but the exploitation of new ideas not appropriated by incumbent firms.

There are several implications of these findings for management. First, these results help us sort out theories of entrepreneurship. Entrepreneurship theories need to be able to explain where opportunities come from, how knowledge spillovers occur and how occupational choice arises in existing corporations that lead to new firm formation. Prevailing theories of the firm are not able to answer these questions. Second, more micro-economic studies are required to fully understand the channels and mechanisms through which knowledge spillovers occur from corporate R&D as well as from academic research, and to measure spillovers more directly.
Figure 1. Structure of GDP for Different Sub-period during 1990-2008


Figure 2. Entrepreneurship and Growth

Table 1. Entrepreneurial Attitudes and Perceptions in Syria and other neighborhood Countries in 2009

<table>
<thead>
<tr>
<th></th>
<th>Perceived Opportunities</th>
<th>Perceived Capabilities</th>
<th>Fear of Failure</th>
<th>Entrepreneurial Intentions</th>
<th>Entrepreneurship as a Good Career Choice</th>
<th>High Status to Successful Entrepreneur</th>
<th>Media Attention For Entrepreneurship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lebanon</td>
<td>54</td>
<td>77</td>
<td>21</td>
<td>22</td>
<td>85</td>
<td>79</td>
<td>65</td>
</tr>
<tr>
<td>Syria</td>
<td>54</td>
<td>62</td>
<td>18</td>
<td>54</td>
<td>89</td>
<td>89</td>
<td>55</td>
</tr>
<tr>
<td>Jordan</td>
<td>44</td>
<td>57</td>
<td>39</td>
<td>25</td>
<td>81</td>
<td>84</td>
<td>70</td>
</tr>
</tbody>
</table>

Source: GEM Adult Population Survey
Table 2. Definition of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ent</td>
<td>Dependent variable. Non-agricultural self-employed, as percentage of total non-agricultural employment.</td>
</tr>
<tr>
<td>Kstock</td>
<td>Gross domestic expenditure on R&amp;D as percentage of GDP. Each new year add its value to the existing stock.</td>
</tr>
<tr>
<td>Gexp</td>
<td>Government expenditures as percentage of GDP.</td>
</tr>
<tr>
<td>wage</td>
<td>Mean wage rates in the total economy at constant 2000 prices, divided by 1000. Wage rates are wages and salaries.</td>
</tr>
<tr>
<td>taxincome</td>
<td>Taxes on personal income, as percentage of GDP.</td>
</tr>
<tr>
<td>Taxcorp</td>
<td>Taxes on corporate income, as percentage of GDP.</td>
</tr>
<tr>
<td>saving</td>
<td>Saving in the total economy at constant 2000 prices, as percentage of GDP.</td>
</tr>
<tr>
<td>eduspend</td>
<td>Public spending on education, as percentage of GDP.</td>
</tr>
<tr>
<td>urban</td>
<td>The share of the total population living in urban areas.</td>
</tr>
<tr>
<td>age</td>
<td>Share of population between 30 and 44 years of age.</td>
</tr>
<tr>
<td>directax</td>
<td>Direct taxes in the economy, as percentage of GDP.</td>
</tr>
<tr>
<td>Growth</td>
<td>Three year moving average of gross domestic product growth (at the price levels of 2000).</td>
</tr>
<tr>
<td>Dummy 90</td>
<td>Time dummy that assumes the value one if year&gt;2000 and zero otherwise.</td>
</tr>
</tbody>
</table>

Table 3. Descriptive Statistics of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ent</td>
<td>20</td>
<td>29.18</td>
<td>24.958</td>
<td>2.603</td>
</tr>
<tr>
<td>Kstock</td>
<td>0.031</td>
<td>0.822</td>
<td>0.307</td>
<td>0.314</td>
</tr>
<tr>
<td>Gexp</td>
<td>0.214</td>
<td>0.391</td>
<td>0.292</td>
<td>0.049</td>
</tr>
<tr>
<td>wage</td>
<td>0.004</td>
<td>0.013</td>
<td>0.008</td>
<td>0.003</td>
</tr>
<tr>
<td>taxincome</td>
<td>0.002</td>
<td>0.007</td>
<td>0.005</td>
<td>0.002</td>
</tr>
<tr>
<td>Taxcorp</td>
<td>0.03</td>
<td>0.098</td>
<td>0.059</td>
<td>0.022</td>
</tr>
<tr>
<td>saving</td>
<td>0.112</td>
<td>0.197</td>
<td>0.149</td>
<td>0.029</td>
</tr>
<tr>
<td>eduspend</td>
<td>0.017</td>
<td>0.065</td>
<td>0.036</td>
<td>0.018</td>
</tr>
<tr>
<td>urban</td>
<td>0.501</td>
<td>0.535</td>
<td>0.511</td>
<td>0.013</td>
</tr>
<tr>
<td>age</td>
<td>14.19</td>
<td>18.01</td>
<td>15.731</td>
<td>1.194</td>
</tr>
<tr>
<td>directax</td>
<td>0.042</td>
<td>0.115</td>
<td>0.071</td>
<td>0.023</td>
</tr>
<tr>
<td>growth</td>
<td>0.005</td>
<td>0.19</td>
<td>0.082</td>
<td>0.052</td>
</tr>
<tr>
<td>Number of observation</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: case study, data analysis

Table 4. Regression results

<table>
<thead>
<tr>
<th>Dependant variable: Ent</th>
<th>Reg1</th>
<th>Reg2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-33.924</td>
<td>-63.277</td>
</tr>
<tr>
<td></td>
<td>(-3.708)</td>
<td>(-4.947)</td>
</tr>
<tr>
<td>Kstock</td>
<td>-7.613</td>
<td>42.638</td>
</tr>
<tr>
<td></td>
<td>(-3.479)</td>
<td>(2.988)</td>
</tr>
<tr>
<td>Gexp</td>
<td></td>
<td>1786.594</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.134)</td>
</tr>
<tr>
<td>wage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>taxincome</td>
<td>705.244</td>
<td></td>
</tr>
</tbody>
</table>

Source: case study, data analysis
### Table

<table>
<thead>
<tr>
<th>Dependant variable: Ent</th>
<th>Reg1</th>
<th>Reg2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(6.256)</td>
<td></td>
</tr>
<tr>
<td>Taxcorp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>saving</td>
<td>-44.804</td>
<td>(-4.925)</td>
</tr>
<tr>
<td>eduspend</td>
<td></td>
<td></td>
</tr>
<tr>
<td>urban</td>
<td>337.608</td>
<td>(8.966)</td>
</tr>
<tr>
<td>age</td>
<td>3.661</td>
<td>(-8.058)</td>
</tr>
<tr>
<td></td>
<td>(2.611)</td>
<td></td>
</tr>
<tr>
<td>dirctax</td>
<td>-163.824</td>
<td>(-5.848)</td>
</tr>
<tr>
<td>Growth</td>
<td>-49.113</td>
<td>(-7.326)</td>
</tr>
<tr>
<td>Dummy 90</td>
<td>6.046</td>
<td>(4.978)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.790</td>
<td>0.973</td>
</tr>
<tr>
<td>adj $R^2$</td>
<td>0.738</td>
<td>0.943</td>
</tr>
<tr>
<td>F</td>
<td>15.092</td>
<td>32.048</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>2.101</td>
<td>2.713</td>
</tr>
</tbody>
</table>

*Note: t-statistics in parentheses*

### References


Analysis of creative industries policy and strategy in creative economy in the context of improving sustainability based on knowledge-based society

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Structured Abstract

**Purpose** – This study focuses on analyzing the relationship between creative industry and regional development upbringing policy and strategy in the aspect of sustainability. Even though many East Asia cities adopted creative industry as upbringing creative industry policy, it still exists as a block box. This research focused on Korea case to evaluate creative industry specialization in 16 cities in Korea. Moreover this research probe creative industry’s complex structure using causal diagram.

**Design/methodology/approach** – The limitation existed to East Asia cities have different classification of creative and culture industry. Moreover each country has different upbringing creative industry strategy. It evaluates policy as upbringing regional economic condition, social culture benefits and sustainability in terms of creative industry policy and function in each city. To evaluate policy and strategy in Korea case this research conduct hearing survey and specialization index 16 city which municipality level of Korea.

**Originality/value** – The comparative case studies are dimension into three respects in the city level: economic, social -culture, and industry structure aspects. As delineating the creative industry, it shows the how it contributes to city competitiveness with sustainability, the role of creative industry and contribution to GDP, growth and employment.
Regarding economic, social culture, and sustainable development aspects, this study probed a creative industry as regional development engine of East Asia cities in the case of Korea and Japan cities. Moreover, the policy in Korea and Japan elucidates the dynamic relationships between the key related variables. In specific, it examines the effectiveness of creative industry and regional development as rising new leading economy sectors as structure diagram.

**Practical implications** – Judging from a series of analysis, each representative cities have different characteristic depends on policy and strategy. This research recommends policy and strategy as the reference of upbringing creative industry policy in Korea. This study stresses that creative industry and it’s strengthened in the East Asia cities as a engine of regional development.

**Keywords** – creative industry, regional development, sustainability, creative economy, East Asia

**Paper type** – Academic Research Paper

## 1 Introduction

### 1.1 Background

In the contemporary world, a new development paradigm is emerging that links the economy and culture, embracing economic, cultural, technological and social aspects of development at both the macro and micro levels. Central to the new paradigm is the fact that creativity, knowledge and access to information are increasingly recognized as powerful engines driving economic growth and promoting development in a globalizing world. In broad terms, the sources of economic growth are well understood, but relatively few countries have succeeded in effectively harnessing this knowledge for policy purposes so as to sustain high rates of growth over an extended period of time (Commission on growth and development 2008; Yusuf 2009a).

![Figure 1. Establishing effective network and cluster supported by cultural assets, creativity and technology](image)

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Creative industries are becoming increasingly important components of modern knowledge-based economies. Not only higher than average city economic growth and job creation, they are also utilization of cultural identity that plays an important role in fostering cultural diversity. In the most advanced countries, the creative industries are emerging as a strategic choice for reinvigorating economic growth, employment and social cohesion harnessing its characteristics. In this respect, this research focuses on East Asia which have experiencing dynamic economic change. Moreover through creative industry strategy and policy, not only economic but also sustainability effect considered as promotion effectively. As meeting policy and strategy as national level, this research try to detail watching in Korea case.

1.2 Methodology

This research focused on creative industry and regional development in East Asia focused on Korea case which initiates to promote creative related industry. Moreover, specialization idex shows the relationship creative industry and social-cultural, economic, and environment aspects. For explaining Korea creative contents policy this research conduct having survey in SMEs (Small&medium business administration), Design Seoul, KOCCA (Korea Creative Content Agency) and Ministry of Culture, Sports and Tourism.

1.3 Creative industry classification

Table 1 show that the industries included in each model. The UK DCMS model is defined creative industry as those requiring creativity and innovation in a globally competitive world. Symbolic texts model is the approach to the cultural industries seeing core cultural, peripheral and orderline cultural industries. Concentric circles model divided core and other core creative arts, wider cultural industries and related industries. Reference these models I choose 11 industries added to R&D. R&D parts are critical to explain East Asia creative industry in terms of cluster and network.

<table>
<thead>
<tr>
<th>International classification</th>
<th>Creative Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Symbolic texts model</td>
<td>Creative industry as those requiring creativity and innovation in a globally competitive world.</td>
</tr>
<tr>
<td>3. Concentric circles model</td>
<td>Cultural, peripheral and orderline cultural industries.</td>
</tr>
<tr>
<td>4. Concentric circles model</td>
<td>Concentric circles model divided core and other core creative arts, wider cultural industries and related industries.</td>
</tr>
</tbody>
</table>

Revised and reference: UNCTAD (2008), creative economy report
2 Creative industry and regional development

2.1 Creative industry and regional development with sustainable way

Creative industries are both knowledge intensive requiring specific skills and high-level qualifications of their workforce and labor intensive those with a high concentration of creative inputs. The contribution of the creative industries to employment is usually significant role as leading sector in the world within creative economy. The job creation potential of these industries is important in policy implication. The strategies aimed at redeveloping depressed industrial regions in a number of countries have looked to the establishment of creative industries as an effective way to boost employment. Furthermore, it is sometimes noted that the quality of jobs generated by the creative economy may provide greater levels of employee satisfaction than more routine occupations because of the commitment and sense of cultural involvement engendered among participants in a creative endeavor.

Figure 2. Environment evolution to creative economy with sustainable development approach

Creative industry market model presents key reinforcing and balancing loops of the creative industry and creative class. Their theoretical concepts come from diverse sources including J. D. Sterman’s book (2000), Business Dynamics. It indicates that creative product attractiveness would yield a positive impact on the market share of a creative industry product. Furthermore, this market share would increase sales and expand expected market size which would lower unit fixed cost and price of creative product. In contrast, the balance model stresses the fact that creative product attractiveness would create creative industry demand which would again increase sales. Moreover it exemplifies the typical WOM (Word of Mouth) pattern. That is, word of mouth would increase relative attractiveness level, sales volume, market share, all of which would contribute to increasing brand awareness. As presented in this model, brand awareness is positively related to relative attractiveness level of cultural product. Also it emphasizes investment loops on human resource- and R&D technology-oriented cultural programs,
respectively. Regarding human resource development and technology development are explains how investment on human resource-oriented creativity programs would demonstrate meaningful impact on the volume of creative class and market size. The latter explains the reinforcing pattern, in which technological investment programs in the creative industry would render to expanding creative class. Lastly, the fact that creative class is basically attracted to places that cultivate an urban environment of tolerance that is open to new ideas and to newcomers.

Figure 3. Black-box, Grey-box, Black-box of creative industry function and structure

3 Creative industry in East Asia cities

3.1 Creative industry policy and strategy in East Asia cities

Through East Asia cities, a number of trends during twenty-first century dynamically changed especially the rural sector, regarded as an ever-smaller share of GDP, the drivers of growth are mainly urban activities. Moreover the urban sector shifting economic center of gravity of the leading cities from manufacturing to dominated services activities that increase GDP and value-added. A contribution of market incentives and proactive government policies is behind the increasing salience of creative industries in Singapore, Hong Kong and Taiwan(Center for cultural policy research, 2003).
Table 2. Creative industry in East Asia Cities

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy Public Office</th>
<th>Promotion Institution</th>
<th>Concept</th>
<th>Initiative</th>
<th>Government Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea (Seoul)</td>
<td>MCST (Ministry of culture, sports and tourism)</td>
<td>KOCCA, KCIPC</td>
<td>Culture industry</td>
<td>1998</td>
<td>Publishing, Film and video, Television and radio, Software and computing, Information service, Advertising, Architecture, Design, Photography, Social and Industry policy administration, Arts, Antiques and crafts, Leisure services</td>
</tr>
<tr>
<td>Japan (Tokyo)</td>
<td>MITI (The ministry of Economy, trade and industry)</td>
<td>DCAI (Digital content association of Japan)</td>
<td>Content industry</td>
<td>Late of 1990</td>
<td>Advertising, Architectural design, Crafts, art, Antiques and crafts, Design, Architecture, Digital Entertainment, Film and video, Radio, Music</td>
</tr>
<tr>
<td>China (Shanghai)</td>
<td>CI upbringing policy as 11th China comprehensive planning for 5 years</td>
<td>Shanghai creative industry complex center</td>
<td>Culture and creative industry</td>
<td>2001</td>
<td>Culture arts, Broadcasting information and publishing, Radio, Television and radio, Film and video, Music, Performing arts, Design, Architecture, Industrial design, Fine art</td>
</tr>
<tr>
<td>Singapore</td>
<td>“creative Singapore” policy as 21st strategy industry</td>
<td></td>
<td>Creative industry</td>
<td>1998</td>
<td>IT and software services, Advertising, Broadcasting media, Publishing industries, Interior, graphics and fashion design, Architectural services, Art and Antiques trade and crafts, Performing arts, Cinema services, Photography, Industrial design</td>
</tr>
</tbody>
</table>

4 Analysis of creative industry upbringing policy and strategy in Korea

4.1 Creative industry policy change in Korea

The ministry of culture tourism and arts conducts main cultural related policy which protects cultural properties such as development and use of historical sites, promoting conservation of national heritage and manage national museum. In addition, it is devoted to arts and culture held in metropolitan area and regional place. Moreover Small & Medium business Administration employs to upbringing creative industry with policy and strategy. However, the institution has expanded its programs and budget for creative-cultural related industry and activities such as contemporary performing arts, music, R&D and arts. These are all linked to the national policy changing and paradigm.

The period of 1960, to a great extent the conservation and management of cultural heritage conducted management and conservation with cultural investment. It changed to the policy as establish identity through culture heritage conservation. The late early of
1980, it connect with cultural development considering as economic development included in 5 year national plan. It starts to consider culture as social welfare from 1990. Since 2001, it utilized for improving quality of life through culture upbringing focused on culture ripple effect and regional development with culture and creativity asset.

Table 3. Creative and culture related policy change in Korea from 1960 to present

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<thead>
<tr>
<th>Country</th>
<th>Regional</th>
<th>City</th>
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<tbody>
<tr>
<td>MOST</td>
<td>MOST</td>
<td>MOST</td>
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</table>

4.2 Creative industry related policy and strategy in Korea with specialization index

In particular, the creative and culture industry upbringing plan significantly expanded in scope and budget since Kim DaeJung government. The policy and strategy become more vital to the promotion of performing culture as regional development with sustainable way. As a result, it plays a pivotal role in nurturing creative industry.

However, the government policies do not constitute an industry clustering policy with functional methods. It focused only for support and subsidies for activities and regional event in short term policy at the local government. In terms of creative industry specialization index, Seoul, Daejeon and Gwangju is over 1 that this cities can called as creative industry spexialized city. Moreover, creative industry employment, Seoul and Daejeon is specialized for creative workers.
4.3 How to creative industry interruption as policy and strategy

Creative industry is intimately connected to the cluster policy because it consists of creation, production, distribution industry as value-chain. The cluster strategy which acts as intermediary between urban area and the region is required to support implementation. In major cities university, R&D center and creative industry agglomerates as infrastructure of regional development. In the other hands, small-medium enterprise located in the regional area prefer to area with low land price and incentive program. Convergence strategy conducted in the area which has competition with similar industry.
5 Conclusion

The limitation was existed to East Asia cities have different classification and policy and strategy of creative industry. Moreover each country have different representative item among creative industry such as Japan is animation industry and Korea is more R&D oriented industry. In terms of national level, Korea has also limitation such as lack of facilities for poverty and elderly and lack of connection with regional human resource and industry. It required policy interruption as upbringing regional economic condition, social-cultural and sustainable aspect.

Judging from a series of analysis, cluster and network system required in East Asia city to raising policy and strategy. In case of Korea, creative and cultural related policy and strategy are oriented to social welfare, regional development, culture conservation and sustainability. It closely related with national development policy from 1960 to present. This study stresses that creative industry and its policy should be strengthened not only in the East Asia city but also Korea as the strategy of the engine of economic development in the context of creative economy.

References

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**Appendix**

<table>
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<tr>
<th>Metropolitan area 5+2</th>
<th>16 Municipalities in Korea</th>
<th>Creative industry in Korea</th>
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### Metropolitan area 5+2 Municipalities in Korea

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<th>16 Municipalities in Korea</th>
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<th>2008 creative Industry</th>
<th>Share</th>
<th>All industry</th>
<th>% in all industry</th>
<th>Specialization index</th>
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### Creative industry employment in Korea

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<th>% in all industry</th>
<th>Specialization index</th>
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Neighbourhood environment and ubiquitous planning implications

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Structured Abstract

Place-based intervention has become an important strategy for the ubiquitous city initiative. However, the role of the ubiquitous built environment in determining urban quality of life has not investigated fully. Using place as a relational space where people access u-infrastructure, u-health and u-services this paper examines the relationship between spatial variations in the provision of ICTs and the spatial reconfiguration of quality of life operating at different geographical scales across Australia. Based on a case study of the state of Queensland in Australia, we emphasise the need for a place-based approach to ubiquitous technologies and infrastructure provision in different socio-economic hierarchies of space and place.

Purpose – The aim of the paper is to examine the relationship between ubiquitous technologies and quality of life.

Design/methodology/approach – This paper is not designed to provide a new definition of u-service or characterise the u-service, but emphasise a place based approach to linking u-services to the local neighbourhood environments and physical infrastructure in order to enhance the urban quality of life. The outcomes of this paper will help bridge this current research gap by examining the relationship between ICT infrastructure provision and quality of life using the case study of the Queensland Australia.
Originality/value – The work is a first attempt to investigate the ways of adapting ubiquitous technologies to improve the quality of life within the Australian context.

Practical implications – The study will contribute to the ubiquitous technology implications to improve the quality of neighbourhood environment and its accessibility.

Keywords – U-City, neighbourhood environment, quality of life, internet, place-based, ICT, spatial variation, Australia

Paper type – Academic Research Paper

1 Introduction

The rising cost of urban infrastructure provision and management have become one of the major urban policy issues in many countries. In Australia the cost of urban infrastructure provision (public transport, housing, telecommunications network and health services etc.) is likely to significantly increase over the next few decades. In particular, Information and Communication Technologies (ICTs) such as wired/wireless broadband connections and its infrastructure provision have become a focus of government policy in Australia (ABS, 2006a). The Australian government has commitment to a national broadband network costing AUD$4.7 billion and servicing 98% of the homes and businesses across Australia. In addition the Australian Broadband Guarantee (ABG) funding program of AUD$270.7 million over the next four years currently provides the basis for this improvement (Queensland Government, 2008). Along with reduced broadband costs and new plans that offer alternatives to hefty overage charges, the capabilities of the telecommunications service have heightened the already strong interest in Australia and New Zealand (Johnson et al., 2009). The Australian Government’s plans for urban development have also been extended along with ICTs move from systems based on wired technology to wireless digital network systems (Dourish, 2004). This high speed National Broadband Network was designed to primarily promote health, education, and emergency services in rural and remote communities (cf. Digital Regions Initiative). U-health (generally referred to e-health in Australia), for example, will support inclusive health systems by enabling regional health workers to provide real-time health information and diagnoses in rural and remote areas such as remote data collection and monitoring (Dearne, 2009).

Studies examining the relationship between neighbourhood environment, socioeconomic status and quality of life in a specific geographic area have become increasingly common (Macintyre et al. 2002; Travaglia et al 2006), but its association with ICTs has not been fully investigated. Curtin (2001) highlighted this “digital divide” between populations located within urban conurbations have improved level of connectivity in comparison to their regional and remote counterparts. However, Curtin (2001) also demonstrates that while this division is present, socio-economic factors are also important in explaining the spatial patterns of Internet connectivity. ICT networks are rapidly evolving and in the near future are likely to transform into a network supported by convergence technologies that facilitates urban management (Yigitcanlar and Han, 2009). Wieman (1998) pointed out how localised high-tech economic activity, supported by early examples of technology convergence (such as a business call or media centre) has the effect as to increase the demand for telecommunications infrastructure. In a more recent study, Han (2009) investigated the evolution of the ICT development in Korea, a country which is experiencing rapid change in ubiquitous computing technologies. Han (2009) argued that technologies convergence supported rather than
degraded the quality of life in a U-City setting where personal mobile phones have been integrated with various urban services including public transport, u-government, u-learning and u-health services. It is largely attributed to the effect of the technologies convergence has been to improve access to urban services and utilities, for example, by providing mobile phones with other communication technologies such as SMS, G3, MP3, GPS, smart card and digital camera.

Despite these significant telecommunications infrastructure advancements, the question of how the new ubiquitous computing technologies (for example, Wi-Fi, WiBro, WiMax and 4G1) will interweave with existing place-based services and the physical infrastructure, and how these places provide quality of life outcomes remain unanswered. The aim of this paper is to review the needs of a placed based u-technology implications in association with its neighbourhood environment and quality of life, which often neglected in the u-City planning. This paper is not designed to provide a new definition of u-service or characterise the u-service, but emphasise a place based approach to linking u-services to the local neighbourhood environments and physical infrastructure in order to enhance the urban quality of life. The outcomes of this paper will help bridge this current research gap by examining the relationship between ICT infrastructure provision and quality of life using the case study of the Queensland Australia.

2 A place-based approach to U-City: neighbourhood effects

Recent research in a number of disciplines has begun to highlight the interrelationships between a place, the people living there and neighbourhood environments (Macintyre, et al., 2002; Bernard, et al., 2007). In particular, it has been noted that the underlying spatial inequalities can be hidden by national and population-level data and that the focus on the effects that place has on spatial inequalities is an important consideration. Bernard et al., (2007) conceptualised the nature of neighbourhoods as they contribute to the local production of spatial inequalities in everyday life. This paper argued that neighbourhoods essentially involve the availability of resources and are characterised by accessibility to resources in a geographically defined area such as U-City.

Research in 'place-based ubiquitous technologies' vary greatly from the existing studies which deal with exclusive participant networks or isolated individuals rather than broad networked learning communities (see for Dodge and Kitchin, 2009). These studies typically measure technological impact for cities: The ‘cybergeography’ (Aoyama and Sheppard, 2003); 'automatic production of space' (Thrift and French, 2002); or ‘architecture and pervasive computing’ (McCullough, 2004). A limited amount of research has investigated the potential of ubiquitous built environments to alleviate the negative consequences of social determinants of quality of life (see for example Mackenzie, 2009). Chaudhry, et al., (2006) asserted that published evidence of the information needed to make informed decisions about acquiring and implementing ICT in community settings in nearly nonexistent.

The proliferation of wireless services, devices, and products recomposes shape-shifting urban spaces they inhabit (Mackenzie, 2009) a place-based approach assumes that the social determinants of quality of life are spatially oriented: i.e. constantly

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1 A mobile phone technical standard provided with Internet-protocol based voice, video, and data connections
determined in reference to a specific geographical area and lived reality. Lloyd and Bill (2004) demonstrated that socio-economic factors such as income, health, education, family composition and indigenous status also affect the likelihood of having access to ICT. For instance, the ‘wiring’ of cities with the latest fibre optic networks is also extremely uneven. On that point Graham (1999) writes:

“...It is characterised by a dynamic of dualisation. On the one hand, seamless and powerful global-local connections are being constructed within and between highly valued spaces, based on the physical construction of tailored networks to the doorsteps of institutions. On the other hand, intervening spaces – even those which may geographically be cheek-by-jowel with the favoured zones within the same city – seem, at the same time, to be largely ignored by investment plans for the most sophisticated telecommunications networks. Such spaces threaten to emerge as ‘Network ghettos’, places of low telecommunications access and concentrated social disadvantage” (p.929).

In terms of social implications of telecommunications network Hanafizadeh et al. (2009) highlight the digital divide as one of the key issues to be dealt with in telecommunication infrastructure provision. The digital divide is the differences between individuals, households, companies, or regions related to the access to and use of ICT (Vehovar et al., 2006). The various factors may cause the divide such as historical, socio-economic, geographic, educational, behavioural, generation factors, or the physical incapability of individuals (Curtin, 2001). Whitacre and Mills (2007) argue that as residential internet access shifts toward high-speed connections, a gap emerges in rural high-speed access relative to urban high-speed access, and the potential causes of this high-speed ‘digital divide’ include rural-urban differences in people, place, and infrastructure.

Although it is widely acknowledged that in Australia’s rural and remote communities potentially stand to gain the most from ubiquitous technologies applications, there are place specific determinants of its effectiveness that may not be addressed. Perhaps the most simple argument that geographical place still defines an effectiveness is that spatial variations in internet accessibility between Australian cities and towns and between socio-economic areas drastically affect access to digital platforms (Pickett and Pearl, 2001). The proposed place-based approach to U-City are significant and innovative in which it investigates U-city platforms as an intervention focused on broad urban quality of life in a geographically defined place. The place-based approach is based on a multi-layered model of the U-city (Lee and Leem, 2008) including built and mobile ubiquitous computing environment such as broadband wireless communications infrastructure, through to broad environmental and social factors such as socio-economic status, and social support. This approach to place-based ubiquitous technologies accord with contemporary shifts in public policy and funding toward settings based approaches to U-City (Lee, 2009).

To demonstrate the place-based approach to ubiquitous computing technologies, we provide a case study of internet accessibility, socioeconomic status and neighbourhood proximity to urban infrastructure in Queensland, Australia. This case study highlights spatial inequalities across the region in terms of physical accessibility to urban infrastructure, internet services and the effect of socioeconomic status. The spatial inequalities associated with the neighbourhood environment based on this case study lead a reasonable argument to promote the need for placed-based approach to U-City.
Spatial variation in ICT and internet accessibility in Australia

With the advance in technology comes the ability for technological convergence which Rheingold believes alters the ‘social-side effects’ in that ‘the virtual, social and physical world are colliding, merging and coordinating’ (Rheingold, 2000). The use of the Internet as a means by which communication, access to health information and the capacity to undertake health education has significantly increased in the last decade. Australia’s has experienced substantial change in the number of people who have access to the internet in their home over recent years. The Australian Bureau of Statistics (ABS) has reported that between 2001 and 2006 there was a 28% increase in dwellings with internet connections, rising from 35% in 2001 to 63% in 2006 (ABS 2006a). However, the spatial distribution of internet access was found to be highly skewed with the major cities having much higher access (66%) in comparison to remote regions (42%) (ABS 2006a) – see figure 1 showing Australia and its classification degree of remoteness.

The greatest numbers of dwellings that have an internet connection were located in the Australia Capital Territory (75%), of which 53% are broadband. In comparison, Queensland also has relatively high levels of connectivity (64% in 2006 of which 41% were broadband connections), a rise of 30% since 2001 – However, a closer inspection of the spatial patterns of connectivity at a finer geographical scale in Queensland, (i.e. at the suburb level) reveal large difference across the State (figure 2). To some extent these reflect the changing levels of remoteness shown in figure 1 in which dwellings located in more remote areas (e.g. the regions classified in figure 1 as “remote Australia” and “very remote Australia”) are less likely to have an internet connection. This is also supported by a regression analysis that highlighted that dwellings located in the “regional” and “remote” categories are 40% less likely to have broadband connections when compared to those dwellings located in the “major cities” class (ABS 2006a).

Figure 1. Australia by remoteness class

The greatest numbers of dwellings that have an internet connection were located in the Australia Capital Territory (75%), of which 53% are broadband. In comparison, Queensland also has relatively high levels of connectivity (64% in 2006 of which 41% were broadband connections), a rise of 30% since 2001 – However, a closer inspection of the spatial patterns of connectivity at a finer geographical scale in Queensland, (i.e. at the suburb level) reveal large difference across the State (figure 2). To some extent these reflect the changing levels of remoteness shown in figure 1 in which dwellings located in more remote areas (e.g. the regions classified in figure 1 as “remote Australia” and “very remote Australia”) are less likely to have an internet connection. This is also supported by a regression analysis that highlighted that dwellings located in the “regional” and “remote” categories are 40% less likely to have broadband connections when compared to those dwellings located in the “major cities” class (ABS 2006a).
There is duplicated access to advanced fibre optic telecommunications in many metropolitan areas, but gaps in infrastructure provision to most outlying and more remote areas. Fibre optic cable is still considered to be the optimal technology to provide the next generation broadband. However, other technologies, such as asymmetric digital subscriber line (ADSL) and wireless technology, will also be used in particular situations to satisfy quality health care service, particularly in regional and remote areas (Queensland Government, 2009).

Here we use two data sources the Australia Bureau of Statistics (ABS) Census and Socio-Economic Indexes for Areas (SEIFA). The Census of Population and Housing is collected nationwide every five years and includes a question regarding the presence and characteristics of an individual dwelling’s internet connection. The SEIFA classification is a set of ABS indexes that measure the socio-economic well-being of areas across Australia (ABS 2006b). In this paper, we used the SEIFA index of relative advantage and disadvantage – this particular index represents advantage and disadvantage as a continuum using a number of census variables describing both advantage and disadvantage, for example households with low income and people with a tertiary education (ABS 2006b).

Using the SEFIA index for Statistical Local Areas (that approximate equate to suburbs in metropolitan areas) across Queensland, figure 3 demonstrates the effect of socio-economic status on the percentage of dwellings possessing an internet connection.
The boxplots in figure 3 show the distributions of the percent of internet connections on the ten scores of the SEFIA index. The boxplot method represents the distribution of the SEFIA index. Each box represents the major portion of the distribution and the extensions (e.g. whiskers) to the extreme points of the distribution. This method is simple but is useful in making comparison of the different socioeconomic groups by the ICT accessibility. Here, a strong trend can be observed with those dwellings located within more disadvantaged neighbourhoods are less likely to have an internet connection than dwellings in more advantaged suburbs.

**Figure 3.** The relationship between socio-economic and internet access

4 Neighbourhood environment and ubiquitous computing technologies

There are a number of studies that have examined the complex relationship between place and quality of life (Chhetri et al. 2009; Baum et al., 2008). These studies have primarily focused on neighbourhood socio-economic characteristics, however here we extend this analysis to include accessibility of public transport, schools and shopping centres, and the proximity of employment and public parks across the study region. Through this analysis we are able to demonstrate the degree to which spatial inequalities exist in the access to urban infrastructure and use this as the basis to justify the need for a place-based approach to ubiquitous technologies.
Within the ubiquitous built environment it is critical to know what actions could be undertaken to address the spatial inequalities in such disadvantaged areas (for example, those areas that are long distances away from schools and shopping centres). Each of the maps in Figure 4 shows the availability of, and accessibility to, neighbourhood resources such as transport, shopping centre, schools and public or recreational parks across cities and towns in the South-East Queensland (SEQ), a region that accounts for 75% of Queensland’s population growth (and is Australia’s fastest growing region including the state’s capital Brisbane and the metropolitan regions of the Gold and Sunshine coasts). Figure 4 highlights that within the SEQ region there are a number of disadvantaged areas in terms of access to resources particularly within the peri-urban or hinterland areas. This outcome is largely evident across each of the resource dimensions shown. A place-based approach to U-city may bridge these gaps by providing the ubiquitous technologies in which interventions must be designed to embed with the pre-existing neighbourhood resources. The U-service concept creates environments in cities where residents can enjoy access to high-speed networks and enhanced information services at anytime regardless of location through a ubiquitous computing network (Tan and Han, 2009). Kirkwood (2008) pointed out the significance of the U-City is to generate a larger service market for next-generation communication technologies as well as establishing a range of cities of ‘good life and happiness’ for citizens. In line with this the u-service market in those remote areas of Australia can be significantly enhanced by the provision of the wireless telecommunication technologies such as wireless internet network technologies (WiMAX), 3G-network, global positioning system (GPS), voice over IP (VoIP) and with ‘Bluetooth’ technologies (VoWiFi).
Some advanced telecommunications can be advantageous, particularly, to remote areas, although not necessarily for use directly by business. The major applications of the...
placed based ubiquitous technologies are likely to deliver a higher quality education, transport and health services as to the need of neighbourhoods. Opportunities to use new ICTs to extend one’s social and economic actions across space are thus being configured highly unevenly within and between the material geographies of U-Cities.

5 Conclusion

The place-based approach in this paper assumed that the social determinants of quality of life are spatially oriented and the ubiquitous computing technologies embedded in this place could improve its urban quality of life. The case study of internet connections across Queensland, Australia has provided a useful insight into the rapid increased usage of ICTs and the role of socio-economics in explaining the lack of spatial uniformity in these increases. Unlike Korea and Japan the ubiquitous computing technologies have yet to be investigated in many countries. In particular many western developed countries have used ‘e’ concept such as e-Health (US & Canada), e-commerce (Europe) and e-government (Australia) while recently Korea and Japan launched u-concept. We found that the US led e-concept that has been evolved and developed for the past decade is quite similar to the key elements of u-concept (anytime and anywhere). There is no such clear definition we can clearly differentiate between ‘e’ and ‘u’ because of its vague and complex concept. While the Korea led U-City development is unique and innovative, many cities in the world also have been developed their own planning strategy based on an innovative approach, for instance, eco-city, healthy city, creative city, tele-city and smart city. The case study of Australia has yet to use the ‘u’ concept but there is a reasonably good chance to adapt the u-City concept in the years to come. In particular the remoteness of the Australian towns most seeks such technologies. In this paper we argued the need of place-based technology to the segments of urban physical elements (shopping centre, transport, school and park etc.) and existing nieghbourhood environment (quality of life and human capitals) between/within U-Cities.

However, of greatest concern is the fact that existing spatial inequalities in socio-economically disadvantaged areas may actually be exacerbated by inequitable distributions of ICT use. U-City planning strategies need to be formulated to respond to the specific target population, reflecting the changing demography and neighbourhood socioeconomic characteristics. In the cities and towns of Australia like other developed countries, Canada, Norway and Sweden with a higher standard quality of life it was evident that the quality of life is closely related to the use of, or accessibility to the urban telecommunications infrastructure within the urban system. In particular the ubiquitous computing technologies with a seamless digital network have been embedded in the existing urban built environments such as schools, shopping centres, public transport and public parks, and therefore create a newly characterised place with a certain degree of the quality of life. For example, in the area of health service provision, u-health technologies such as home monitoring services, rapid diagnostic testing, clinical outreach, and health coaching help improve individuals’ health and wellbeing. On the other hand localised ubiquitous computing technologies could improve the overall quality of life for those socio-economically disadvantaged people such as low-income or disability providing equally accessible telecommunication services or information technologies in the disadvantaged area. The ubiquitous technologies need to be incorporated to the spatial variation in the accessibility of ICTs, neighbourhood socio-economic characteristics and community resources available. There is little doubt that those spatial determinants are
likely to have significant implications for how, where, and when u-services should be delivered in future. This study has provided a brief and useful insight into the need for a place-based approach to the U-City development that drives a high standard of quality of life in future. Further investigation is now needed to address the question of whether the ubiquitous computing technologies change could result in a high quality of life in neighbouring suburbs using a geographically weighted regression.

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A preliminary study on the data sharing between urban management systems of local government - case of Sejong City, Korea

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Abstract
During a few decades, lots of computer systems for urban management have been developed and applied to many fields of urban activities. Recently, integrated systems such as u-City management platform are trying to connect existing systems and provide more convenient services not only to the public servants but also to general citizen. Sharing of the data between systems can help efficiency of services by reducing operation cost and raising accuracy of information.

The purpose of this paper is to analyze the data structures of urban management systems such as GIS, administrative information system and U-City management system, and establish the linking and sharing policy direction of these data between systems. For this purpose, data code of each services of 3 major urban management systems planned to installed in Sejong City were categorized and the possibility of sharing was examined. Finally, policy implications were suggested for future information and communication management in urban area.

Keywords – intelligent land information system, administrative information, U-City service, information sharing

Paper type – Practical Paper
1 Introduction

1.1 Background and objectives

Development in ICTs provided the foundations for implementation of urban management systems in the recent cities. In Korea, lot of IT systems such as KLIS(Korean Land Information System), Sae-ol Administration System, and BPS(Building Permit System), etc. are under operation by central and local government. However, because these systems are designed for some specific work and implemented for certain range of customers, the problems about the use of resources, time-consumption and data accuracy are being raised seriously.

Ubiquitous system, which is being recently presented, organically combined with the existing administrative information systems and GIS systems, is expected to make it possible for forming the groundwork that can be applied to diverse services for urban citizens to possibly enjoy within city.

As to the implementation of ubiquitous system to physical urban spaces, problems about data linkage and sharing between systems are one of the most important ones. However, there are lots of difficulties for linking and sharing data between systems due to diverse reasons such as institutions or business feasibilities and so on. The purpose of this study is to analyze possibility of data sharing and linkage among administrative information system, U-City service and GIS out of various systems, which are operated within the local government in the u-City environment of Sejong City.

1.2 Methodology and research scope

Sejong City, Korea is a new city that is under development by a comprehensive planning, not an old city where the existing system is settled. Also, it is selected as the project target site for test-bed of 2 national R&D projects; intelligent land information project and U-Eco City project. Accordingly, it is judged to be the optimal location for researching into a plan for integrating data of urban management systems. Due to the construction status, research scope is limited on the administrative information system, NGIS system, and U-City services which will be implemented in this city.

Also, one of the aims is to analyze the linkage level with other system by analyzing unit service and data layout in each system, data linkage concept would be suggested for both the early and the long term. These contents have significance as a prior research on establishing direction of data linkage in each system hereafter, and will be able to be utilized as basic research.

2 Relevant researches

2.1 Linkage between GIS-systems

According to this, given examining relevant research, Kim Eun-hyeong(2007) defines it as follows. GIS integration-linkage in the local government can be divided largely into the narrow perspective and the broad perspective. Given seeing GIS integration-linkage of the local government in a narrow concept, it implies a case of connecting the relevant agency, the central authorities, and administrative information system in order to enhance task-based efficiency centering on GIS(or UIS), which is being driven by the local government. As the broad integration-linkage is what the relevant agency, the central
authorities, the administrative information system, and 31 tasks of the e-government as well as UIS were integrated centering on services in order to enhance task efficiency and services for citizens in the local government, it can be said to be ideal direction. GIS integration-linkage of the local government in the broad concept hereafter can be seen to be a concept that will need to be driven. In other words, it means what connects each of systems in order to enhance task efficiency in the short term, and implies that every system is integrated and linked with one platform, which is now implemented or plans to be implemented, centering on task, in the long term. Also, even a research on GIS integration-linkage in the local government was progressed. In this study, the main issues for the integration management are being taken the overlapping and management in the basic space information by project, the derivation of theme information based on mutually different basic space information, the difficulty for grasping the general present status for space information within the local government, a drop in connection rate given information linkage, the difference in architecture of GIS application system, the absence of guidelines for specific organic management in space information, and the limitation of horizontal communication within the local government. To overcome this, it divided the integration stage into 4 phases, and then suggested the short-term linkage, the formation of the integration-linkage base, the development in integration infrastructure, and a method of the operating system maintenance by each phase. And, the integration-linkage development model was set for 7 strategic goals. These goals are being, respectively, taken the examination of data sharing plan, the maintenance in the local-government GIS common-based data, the improvement into the architecture production system based on the local-government GIS-integrated DB implementation and linkage structure, the improvement in integration linkage of the existing system, the new-system development and DB implementation, and the maintenance in the GIS DB integration infrastructure standard, and the formation of the local-government GIS integration-linkage information foundation.

2.2 Data standardization

The joint application of administrative information is being defined as 'sharing and reusing between internal and relevant agencies to Sejong City, Korea, by mutually connecting between systems the information that Sejong City collects, stores, and manages with the aim of performing task.'(Multi-functional Administrative City Construction Agency, 2006)

Given examining a research on data standardization, a basic research(Song Hun et al., 2003) can be taken for connecting KOSIDC, which is the standard for exchanging drawing data in the construction field, and GIS data. This is analyzing on a plan for making it available for the integrative use of drawing data in the construction field, which was implemented on the basis of CAD, through OGC technology, and a plan for the domestic and international standardization through this.

Also, the existing system transfers by forming data with binary, namely binary system. The data reception program knows where there is which information from the transferred stream, reads this and decodes data. Generally, this data processing leads to being able to reduce capacity and to making it easy even for implementation in system. However, there is necessity for sharing information on data technology, thereby being unreasonable to expand unspecified individuals into the subjects. Thus, to standardize this, a method is being taken that standardizes by prescribes protocol profile and
proclaiming this. Given trying to analyze requirements for implementing a plan for standardization, firstly, a problem needs to be solved about which the capacity in the header part gets bigger than the actual data. Secondly, interpretation needs to be possible regardless of data format or system. Thirdly, it is analyzed to be unnecessarily complex and easy for implementation. (2007, Nam Sang-gwan et al.)

3 Analysis of system-based service/data linkage

3.1 Division of information system in Sejong City, Korea

3.1.1 Basic plan for administrative information for MAC (Multi-functional Administrative City)

To grasp necessary issues for implementing administrative information system for Sejong City, it analyzed national system and local system based on a survey of the present status for information system in the local government, which was carried out by Ministry of Public Administration and Security in April of 2008. In case of national system, it carried out a survey centering on a case of local government, which is judged to be probably similar to legal position and economic-social environment, and interviewed the relevant central authorities and project team, thereby having analyzed system. The mainly analytical contents were included the physical position of system components, the operation of system security and backup system, the capacity and version in system, a plan for managing performance, and system management organization and other matters. Also, it analyzed the relevant policy and a case in the local government for implementing network for administrative service in Sejong City, Korea, and surveyed the present status for other relevant local governments such as legal system and information resource management system. As for other matters, it carried out side by side even a case survey on information service necessary for offering to residents as the local government.

The aim was to grasp common office work by grasping large city, province and Si-gun-gu, as well as analyzing the organization and administrative task targeting the local government that is similar in the legal position to Sejong City and that is similar to economic social environment such as population and area. As for this, it drove with a method of mapping with national system by dividing the administrative office work, which will need to be performed by Sejong City, into metropolitan council and local government(chief office·Eup-myeon-dong office and affiliated organization). It grasped even on the demand for administrative information, which is expected according to residents' number who will come to increase hereafter, based on development plan for Sejong City, Korea.

The subjects, which will need to be connected while MAC implements administrative information, are classified roughly into administrative information system, GIS(geographic information system, and U-City information system when classifying from the linkage perspective. The administrative information system implies 'the set of information systems, which were implemented in order to timely offer necessary information by integrating information for supporting the operation, decision-making and service handling in administrative organization.' GIS implies 'the set of the general processing systems available for collecting, inputting, storing, managing, manipulating, analyzing, modeling, and displaying diverse geographical materials on the surface of the earth, in line with spatial location according to their characteristics.' Finally, U-City
information system implies ‘the set of information systems that MAC implements in order to offer ubiquitous service.’ At this time, the administrative information system and GIS can be again divided into national system and local system. Given arranging this, it is as the following Table 1. (Multi-functional Administrative City Construction Agency, 2009)

Table 1. Division of Sejong City’s Information System

<table>
<thead>
<tr>
<th>Division</th>
<th>Definition</th>
<th>Subject</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Information System</td>
<td>Administrative operations of an organization, Decision making, Business Processes and information system to support</td>
<td>National Standards</td>
<td>Sae-ol System, City-State System Etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Build</td>
<td>Electronic Billing System</td>
</tr>
<tr>
<td>Geographic Information System</td>
<td>Geographic data management and utilizing</td>
<td>National Standards</td>
<td>National Base Map, KLIS Etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Build</td>
<td>Road management Program</td>
</tr>
<tr>
<td>U-City Information System</td>
<td>U-services related to gathering information, processing and utilization of information system</td>
<td>National Standards</td>
<td>Possible future introduction (U-Life21 Etc)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self Build</td>
<td>5 Control System</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 Application System</td>
</tr>
</tbody>
</table>

Given examining the external linkage subjects, it is formed in order to be possibly utilized by connecting relevant services between the vertically subsidiary system in the central authorities, which makes it possible for reporting the administrative information available for several kinds of civil-complaint information, report and statistics to the central authorities, and the horizontally administrative information system in other city and province Si-Gun-Gu. Also, there is system available for connecting with the related agencies such as National Emergency Management and National Police Agency. (See Fig. 1)
3.1.2 Analysis of linkage-targeted system

**Administrative information system**

The administrative information system in the nationwide Si-Gin-Gu of including Yeongi-gun, which is changed into Sejong City, Korea, is largely divided into national system and local system. In detail, the national system is divided into the centralized type (central web-based system) and local-government decentralized type (local-government implementation system). The local system can be divided into wide-use system (local-government wide-use system) and local-government specialization system. Given examining the Sae-ol administration system, which is expected to be likely applied to Sejong City out of these things, it was offering largely 28 kinds of services such as internal administration, residents, family register, finances, tax administration, personnel affairs, audit, planning, official report, and legislation, and was analyzed to offer unit task for public duties rather than services for citizens.

**Intelligent land Test Bed service**

As the intelligent land information technology innovation project is one of 10 R&D projects (VC-10), which is intensively driven by the Ministry of Land, Transport and Maritime Affairs, it is R&D project that is performed from 2006 to 2012 through convergence in space information technology and information communication technology. As this R&D project is what secures ubiquitous space information-based technology through 21C-typed land location management system and u-GIS software development, and what develops u-GIS space-information application technology available for being applied to the land/city/construction field through this, it consists of five core tasks. Test Bed implementation project is examined the performance of the intelligent land project, which was progressed now as region for directly experimenting this research result, and is scheduled to be served the system for keeping and managing data along with the direct indirect production system in 29 kinds of data as project for experimenting the results, and the experimental management center. Data direct product
system is existed the systems of offering to other system by directly producing data such as the video information-collection sensing system, the land information monitoring system of using vehicle, and the river-basin monitoring support system. Data indirect production system is existed the systems of extracting, processing and serving data, which was provided from other system in addition to the directly-collected data such as the underground-facilities detection equipment and space information system, the next-generation digital map management system, and the real-time Aerial Monitoring System.

**U-City implementation design service**

In ‘service of execution plan and preliminary design for constructing MAC U-City,’ under 3 kinds of large classification such as U-happy city plan, U-happy city preliminary design, and U-happy city integration implementation plan, the preliminary design was completed for constructing U-City. Based on this, the current U-City implementation design was completed.

In the first basic plan, each of the detailed service items was decided through 4 kinds of large classification in urban administration, urban safety, urban environment, and urban culture. Through this, U-City standard system was proposed. However, for several reasons such as the insufficiency of technological level, which was expected in the plan phase, or as others, the phenomenon is being shown that is biased to the transportation field available for the currently immediate implementation in the implementation design. The implementation design project in Phase 1 targets the 1, 2 neighborhood in happy city, and is including the contents on the public-information situation room within city-integration information center, the public-information communication network, U-city service, U-street, and integration implementation plan. Given examining U-City service, it consists of the general traffic-information offer service, the traffic-information management and linkage, the accidental-situation management, the mass-transportation information offer service, and U-green transportation.

### 3.2 Analysis of system-based service linkage

**Analysis of linkage between administrative information service and U-City**

The services related to the internal administration of administrative information system are mostly what is applied to task of public servants who work for public office, thereby being difficult to find linkage with C-City service of centering on service of offering to general people. However, a case of the task for residents and family register is linked to U-happy portal service, thereby being judged to be likely applied to issuing several kinds of civil-application documents. In the above linkage analysis results, the road traffic section, the general traffic information offer service, and the mass-transportation information offer service were analyzed to have deep relationship. This was indicated to be accredited to what the service in light of U-City implementation design for Sejong City is biased to the U-traffic service. The sections for assembly, legislation, civil defense, and disaster & calamity, which Sejong City needs to give notice to citizens among several kinds of administrative information, can be provided through U-happy portal service. Thus, many linkages are analyzed to be likely available hereafter. Especially, several kinds of services for approval and permission through internet come to be possible. Thus, even the linkage in the architecture and construction section is judged to possibly get higher.
Analysis of linkage between intelligent land information system and U-City

Intelligent land information system mostly performs a role of offering basic information for U-City service, thereby having been shown to be relatively high in possibility of linkage between the relevant tasks such as Data implementation and update for preparing digital map, and U-City service. However, most of data except basic information such as digital map among U-City services are analyzed and judged to be necessarily directly acquired and processed by the U-City based facilities. This is analyzed to be accredited to the relative restriction to the supply of other data while offering and updating digital map according to the initial aim of the intelligence land information system of having the main aim as manufacturing and updating the digitalized map.
Analysis of linkage between intelligent land information offer system and administrative information system

Space information, which was prepared in the intelligent land information offer system, is stronger in character for offering data to other different system of including administrative information system, rather than service, which is provided independently. Accordingly, it is judged to be likely available for being offered over several fields in the administrative information system. Especially, it is judged to be likely available for being linked with several fields in the administrative information system.

Given seeing the linkage situation of two systems, a case possesses the majority that receives and uses data, which was produced in the intelligent land information offer service in the field related to construction, architecture and land registration of administrative information system, rather than the currently mutual linkage. It has mainstream as systems with high possibility of being formed the one-way linkage or two-way linkage hereafter.
3.3 **Analysis of linkage possibility by service hierarchy between information systems**

**Analysis of linkage between large classifications in service**

This study analyzed with the center on Sae-ol administration system out of administrative information system, and on 9 services of being included in implementation design out of U-City service. A case of intelligent land project is divided into the data direct production system, data indirect production system, and the management system for managing this. However, in the Test Bed implementation plan, Table Layout in production data by section was not fixed. Thus, a part that is possible conceptually was included.

In case of administrative information system, the tasks in section for ‘road traffic,’ ‘architecture,’ and ‘construction’ among 21 tasks can be seen to have lots of linkage with U-traffic service out of U-City service. These services require space information in common. This comes to rely upon data that was produced by direct indirect production system in data of the intelligent land system.

As a result of analyzing according to this process, the task of ‘residents’ welfare’ was analyzed to be linked to some extent with U-Safety service out of U-City service, but to have no relation to space information except extremely some cases, in these cases.

Also, the data management system of the intelligent land project was analyzed to be linked with U-portal to some extent in U-City service, as the service of managing and offering data hereafter.
Given examining more minutely the section available for linkage, the function of 'traffic provider management,' which is the unit service of the road traffic section, can be known to have linkage with 'general traffic-information offer service,' 'mass-transportation information offer service,' and 'traffic-information management and linkage service' out of U-traffic. Data, which are required for these services, are those that were implemented by 2D and 3D digital map acquired and processed by the intelligent land information system project, and by several kinds of monitoring and sensing systems, thereby having mutual correlation. (See Fig. 6)
**Linkage analysis between unit services**

As seen in the large classification, given examining the traffic-provider management service in the road traffic section, and several kinds of unit services in the mass-transportation information service section in U-traffic, the administrative information system has information on bus line history by bus line, bus-line information, the present status for accident occurrence, and provider-targeted bus line. This can be known to be linked with basic data such as bus information management, bus terminal management, bus-stop terminal management, bus-company management, bus-stop inquiry service by bus line in the general traffic-information offer service. Data, which is related to space information such as location of each bus stop, the present location of bus, and the location of several kinds of sensors for non-stop information inquiry according to bus line out of this, is implemented on the basis of Serial Cadastral Map that was implemented by the intelligent land information system.

![Diagram of Linkage Analysis](image)

**Figure 7.** Analysis of linkage possibility between unit services

**Unit analysis of Data Level**

As for the data configuration necessary for administration related to bus-transportation provider in the road traffic section of the administrative information system, and the information, which is required in the mass-transportation information offer service of U-traffic, the bus-line management number, the existing terminal name, the dispatch interval and operating form, and the accident-related matter, as Figure 7), are judged to be data available for direct linkage/sharing between two systems. The coordinate value of location necessary for each data is judged to be likely to be possibly used by directly updating data, which was implemented by the intelligent information system. Still, data, which is necessary independently for administrative information
system or U-traffic service, is analyzed to be likely to be necessarily acquired by its production and other system.

Figure 8. Unit analysis of Data Level

4 Sharing direction of service linkage between information systems

4.1 Linkage scope

A plan was suggested, for which Sejong City, Korea proceeds with being developed step by step. According to the phase of its plan, even the linkage scope needs to be varied. Accordingly, in the initial phase of Sejong City, Korea, the data linkage and sharing are expected to be likely formed on the basis of the current system. In other words, out of the administrative section with the center on the administrative information system, and of U-administrative service based on U-service, some task linkage is judged to be probably made in the form of offering service after being approved by the administrative information system such as issuing the civil-application document through Kiosk.
In the long run, it is judged to be likely desirable to be converged the administrative information system and U-City service based on the intelligent land service of producing data.

4.2 Code system standardization for linkage

To link and share information that is produced in administrative information system, U-City service and intelligent land information system, it is judged to be likely to be
necessarily secured possibility of its linkage and compatibility through analyzing data that is produced and offered. Namely, Mapping Table is prepared for linking UOID information in Sensor Data of several kinds of space information, which is produced in the intelligent land information system, a type of data, which is produced in other GIS system, and information required by U-service or administrative information system. Key Code system is established as the identifier available for linking these things. Thus, the most basic phase is judged to be likely to be possibly formed for linkage and sharing of information.

5 Conclusion

This study analyzed linkage by service unit and by data unit in order to integrate administrative information system, Intelligent land information system, and U-City service. As a result of analysis, the administrative information system, Intelligent land information system, and U-City service have mutually close correlation in the face of having mutually different platform and mutually different system, thereby being able to be known to have many parts in common even in data.

Accordingly, it is judged to be likely desirable to integrate and utilize systems, which are implemented now, respectively, for the efficiency in data management, the efficiency in system operation and service, and the elaborateness in data as well as a problem about the overlapping investment, which is indicated now.

The linkage of three systems will be varied according to the implementation phase and the legal position in Sejong City, Korea. A model suitable for this will need to be established hereafter. Also, a follow-up measure is considered to be necessarily taken on identity of data, which are different in name of the same or similar data or are different in data despite the same name.

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Public knowledge based on-line participation system for planning and developing U-City

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Structured Abstract
Purpose- The purpose of this study is to develop an ‘On-line Public Participation System for supporting Ubiquitous-City (U-City)’ planning and development. For this, firstly, a theoretical participation model was established. The participation system allows diverse entities to participate and cooperate anytime and anywhere in the process of establishing ‘U-City planning’, ‘selecting U-service’, and ‘designing and developing U-service’ which are the key elements of U-City construction. Then, by turning the researched participation model into an on-line system, it intends especially to reflect the idea of Web 2.0 that has the concept of ‘information sharing’ and ‘collaboration’.

Design/methodology/approach- In order to support the U-City plan making process with an on-line participation system, this research proposed an approach, firstly, to concrete the concept of a public participation model. For this the theoretical and historical definition of participation in the field of planning was investigated. Considering the new era of the Internet, however, participation was redefined in new terminology from Web 0.0 to Web 3.0. Then, the participation model was established in the process of ‘U-City Planning’, the ‘Selection of U-service’, and the ‘Design and development of U-service’ in the case study of Jinju City, Korea. The system consists of mainly three stages. The first stage is programmed for the process of deciding the objectives and strategies of U-City in Jinju City. The second stage is to search for appropriate U-services out of 228 U-services for Jinju City and to recommend similar services. The final stage is for designing and developing a U-crime prevention service that is one of those commonly adopted in U-City.
and closely related to the safe daily life of citizen.

Originality- In order to realize U-City it is inevitable to prepare a U-City Plan which establishes a city’s long term master plan on U-City. To this end, the on-line participation system that supports the U-City plan making process was developed and the contents were described. The key idea of this paper is that U-City planning should be carried on in a different process through the participation of diverse entities instead of the existing closed form mainly composed of experts. This means our on-line participation system can include the public and get support to form a consensus for decision making based on public knowledge. In addition, it is also possible to reflect regional demand or present situations in U-City Planning.

Practical implication- U-City is a new concept for a future city. Therefore local governments are confused and suffering difficulties on how to prepare and how to make their own U-Cities. Our system is anticipated to support them for U-City plan making. This participation system is currently being tested by some participants to be developed as a reference model that can be referred by each local government.

Meanwhile, because the contents to be included in the planning are quite extensive, all of them cannot be organized as a participation system. Thus, it can be said that this system provides the opportunity to present a new direction for ubiquitous city planning and to expand participation. As ubiquitous city planning newly commences, the system needs a lot of improvement and supplementation in its contents. However, this system will contribute to the embodiment of the future city, U-City as it is operated by the participation of diverse entities and their knowledge.

Keywords– ubiquitous city planning, participation system, web2.0, public knowledge, U-Service

Paper type – Practical Paper

1 Introduction

As the ‘Law on the construction of Ubiquitous City (U-City)’ and 4 related guidelines were enacted, the cities in Korea became obliged to establish U-City Plans respectively. U-City is defined in Wikipedia as “a city or region with ubiquitous information technology. All information systems are linked, and virtually everything is linked to an information system through technologies such as wireless networking and RFID tags”.

However, in order to realize U-City it is inevitable to prepare a U-City Plan which establishes a city’s long term master plan on U-City. Moreover, the U-City planning should be carried on in a different process through the participation of diverse entities instead of the existing closed form mainly composed of experts. Meanwhile, regional demand or present situations shall be reflected in selecting 1, the main contents in U-City Planning and deciding their priority.

On these points, this research intends to theoretically develop the participation model in which diverse entities, the public/experts/government/enterprise, can participate and cooperate anytime and anywhere in the process of establishing ‘U-City Planning’, ‘selecting a U-service’, and ‘designing and developing a U-service’. Then, by embodying 1 U-City service is defined as the ‘total of intelligent information or contents to be supplied through ubiquitous technologies and infrastructure of a city to people regardless of time and space.’ The subjects of activities in the city such as individuals, companies and authorities can be provided with a variety of U-City service of administration, education, welfare, culture, industry, safety, environment sectors and the like (Lee, S-H., et. al., 2009).
the researched participation model, it intends to develop a ‘Public Knowledge based Online Participation System for Planning and Developing Ubiquitous-City’ which reflects the concept of Web 2.0 and 3.0.

Constructing the participation system on the basis of research results which are produced by the U-Eco City Project driven by the Korean Government, especially U-City law and related strategic policies, Jinju City was selected as the case city, because it has diverse problems not only new town construction but old town regeneration. For the research methodology, the contents and process of U-City Planning designated by law were at first divided into several stages and the items possible to be modeled as a web-based participation system were classified and a participation method or tool was devised.

Then, for the first stage, as shown in Figure 1, the process of deciding the ‘objectives and strategies for U-City based on Jinju City’ was designed to be made from public participation via a web system. Next, the methodology and algorithm to search for an appropriate U-service out of 228 U-services available in Jinju City and to recommend similar services were developed. Thus, U-services which best reflect the regional characteristics of the case city and are proper to attain the objectives and strategies of U-City development were drawn by the public participation mode. Finally, we constructed a participation system in the planning, designing and developing of a U-crime prevention service that is one of those commonly adopted in U-City and closely related to the safe daily life of citizens.

![Figure 1. Scope and contents of research](image-url)
2 Definition of participation and theoretical development of a participation model in U-City

2.1 Concept of participation planning

The process where the participation concept has changed in the field of planning is diagrammed in Figure 2. The beginning of participation planning can be called ‘advocacy planning’ first presented by P. Davidoff, the American planner in 1965. He said “planning must be for powerless, inarticulate inner-city groups, notably when resisting destructive schemes by planning authorities, government agencies, or similar bodies”. Such a concept developed into ‘inclusive planning’ that includes the socially weak and evolved to ‘participation planning’ after the 1990s’ (Moon, 2004).

However, the philosophy of participation planning can be expressed as ‘planning with the people’ instead of ‘planning for the people’ (Klosterman, 2001). Namely, citizens no longer agree to the idea that they should follow the planning prepared for them by experts. This means that the city planning which is to control the life of citizen should be made with their participation and knowledge in processes ranging from the beginning of planning to monitoring the plan’s implementation.

Meanwhile, developing from the traditional public hearing and questionnaire, the participation methodology has diversely developed into an on-line participation system that uses IT technology and computers. As a result, the concept of participation is redefined in new terminology from Web 0.0 to 3.0, reflecting the Internet age.

Since the age of Davidoff belongs to the beginning of participation planning when computers are not usually used, this age can be called Web 0.0. Then, the period when participation planning was briskly discussed and on-line planning techniques began to be technically developed in the 1990s’ can be defined as Web 1.0. However, Web 1.0 unilaterally provided information without actually exchanging information in both directions with citizens. Thus, its limitation was the inability to systematically receive public knowledge. In addition, it cannot be real participation planning, because it focuses on GIS that technically deals with spatial data only or on the realistic reproduction of the shape after urban development in computer graphic like VR or 3D modeling.

As IT technology develops innovatively, however, we see the emergence of new systems that expand the participation of citizen or related entities and these systematically receive their knowledge to establish planning through two-way communication. In this flow, participation planning evolved to Web 2.0 that has the concept of ‘information sharing’ and ‘collaboration’. Especially, a lot of applied technologies are being developed to effectively promote participation on-line, for instance, wiki, open API, folksonomy, tag, RSS, etc. Although the concept of Web 3.0 is not yet defined exactly, it is expected that diverse channels like wired/wireless mobile equipment can be utilized in Web 2.0 based on wired Internet and can be developed in the form of personally customized information or the concept of enhanced decision making support.

From these, this study intends to develop a participation system so as to establish U-City planning on the basis of the Web 2.0 concept. This system will promote U-City development that reflects regional property based on public knowledge.
2.2 Ubiquitous City planning and a participation system

Participation is handled in diverse areas and stages in the existing studies. However, the meaning of participation in these studies lie in relevant entities like citizens, experts, government, etc that participate anytime and anywhere on-line to collaboratively make ubiquitous city in a series of courses for planning, developing and managing ubiquitous city. Thus, the participation system proposed in this study is defined as the ‘on-line participation system that provides an intelligent DB search function and decision making function based on the Web 2.0 concept, i.e., a participation system in the establishment of ubiquitous city planning and management which reflects regional situations.

2.3 Case study of existing participation systems

Although there are several cases of participation systems, they are representatively arranged as shown in Table 1. However, the most remarkable case among them may be the Planning Portal from the U.K. Here users are divided into 3 types, the general public, professionals and government users and the contents accessible to each site are managed in distinction. In addition, since e-planning service was additionally equipped in 2002, citizens can propose alternatives or opinions for city planning easily. Further, the information related to city development planning is provided in text, 3D modeling or animation to help users understand the contents. Moreover, its qualitative level is high as the system is constantly managed by experts. An E-Petition is the case where the residents’ opinion actually affects the legislative process as residents are directly connected to the prime minister’s office in the form of a collective petition. Next, an E-Panel is a system that supports interactive discussion among related parties so that the alienated class, youth and low-income class are encouraged to participate and the bill is deliberated on-line. Shenandoah Valley Natural Systems is a system where private, government and academic experts participate in real time to explain to people special
knowledge for easy understanding and to realize that the typical decision making flows from Web 2.0. Besides that, there is Sourcewatch.org which monitors policy issues through participation and encourages a wide variety of classes to participate in the public debate. TOM pursues the establishment of a social agenda. Table 1 shows which part such cases treat in the planning stage and the situation of the operating web site. Among them, Planning Portal is generally assessed favorably and Shenandoah Valley Natural Systems can be positively assessed in that it treats not only the initial stage of the city planning process, but also the stage of enforcing and assessing the plans.

Table 1. Cases of participation system

<table>
<thead>
<tr>
<th>Cases</th>
<th>Planning Stages</th>
<th>Evaluation</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop alternatives</td>
<td>Decide preferred alternative</td>
<td>Planning implementation</td>
<td>Plan evaluation</td>
<td>Participation Level</td>
<td>Activation rate</td>
<td>Accessibility</td>
</tr>
<tr>
<td>Planning Portal</td>
<td>√</td>
<td>√</td>
<td></td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>E-Petitions</td>
<td>√</td>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>E-Panels</td>
<td>√</td>
<td>√</td>
<td></td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Shenandoah Valley Natural Systems</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>TOM</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sourcewatch.org</td>
<td></td>
<td>√</td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ActNow</td>
<td></td>
<td>√</td>
<td></td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Scores are rated from 1 to 5 points; 1: very low, 2: low, 3: normal, 4: high, 5: very high

Notwithstanding such cases, the participation system is less utilized on the site and its effect is not so favorably assessed. This is because most systems still provide simple information or show development planning graphically to merely collect opinions through a bulletin board, although the concept of the participation system is excellent. Further, some cases cannot induce constant participation for just one time events, because the level of content handled in the system is low. Thus, the key to success of a participation system is to select a theme that can collect citizens’ interest and to diversely develop and provide content on their subjects.

Thus, this research intends to overcome the limitations of existing systems just for demonstrations and one-way providing information. In addition this research attempts to develop a participation system model that can operate over a long period for establishing ubiquitous city planning in each local government. Then, the system is to be developed so as to provide users customized information and support decision making based on Web 2.0 philosophy that emphasizes participation, sharing and collaboration.

2.4 Participation model of ubiquitous city planning process

(1) Development direction of system

The main contents and the direction of system development are as follows. First, the relevant entity shall participate in establishing ubiquitous city planning. Second, it is
required to arrange the requirement of U-City and to model ubiquitous city planning in each stage so as to embody the on-line participation system. Third, it is necessary to provide the information related to U-City in diverse methods and to develop tools for supporting decision making. Then, the participation of people shall be promoted by developing contents which interest participants through the utilization of web-based GUI or open API.

(2) Extracting the area where systematization is possible and modeling

Based on the laws and regulations of related guidelines, the U-City planning process is divided into the ‘Formulation of U-City vision’, ‘Sector planning’, and ‘Implementation and monitoring’ and the contents that must be contained in each stage are extracted. As a result, it was found that 5 items in the first stage, 8 items in the second stage and 3 items in the last stage are found to be programmed in the participation system as shown in Table 2. However, the items in the first stage and 2 items in the second stage (○ in Table 2) are modeled due to the limitations of the study.

Table 2. Fields that can be achieved through the participation system.

<table>
<thead>
<tr>
<th>Stages</th>
<th>Subjects</th>
<th>Possibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulation of U-City vision</td>
<td>- Analyzing regional situation ; strength, weakness, opportunities, threats</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>- Basic direction of U-City construction with regard to regional characteristics</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>- The planned goal</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>- Implementation Strategies</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>- Progressive promotion</td>
<td>○</td>
</tr>
<tr>
<td>Sector planning</td>
<td>- Discovering and deciding U-service with regard to regional characteristics</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>- Establishing U-City infrastructure and management</td>
<td>△</td>
</tr>
<tr>
<td></td>
<td>- Measures of integrating and linking neighbor cities</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Fostering and promoting regional U-industry</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Mutual ties of information systems within the domain region.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- International cooperation</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Protecting personal information and infrastructure</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Producing, collecting, processing, utilizing and distributing information</td>
<td>○</td>
</tr>
<tr>
<td>Implementation and monitoring</td>
<td>- Organization system of promoting construction projects of U-City</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Division of roles and cooperation among related administrative agencies</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Fund procurement and management</td>
<td>X</td>
</tr>
</tbody>
</table>
Next, with respect to the area that can be programmable as an on-line system, the specific system design factors were subtracted and the diverse activities and response methods performed by participants were prepared as scenarios as shown in Table 3. Namely, the participating entity, tools for participation, contents of providing information and delivery method are prepared in each stage. Here, significance and possibility of embodiment for each stage and items are divided into o, △, x and the participation level when the system is embodied is arranged in the assessment of a 5 points scale.

**Table 3. Model of participation in the area that can be embodied in the system**

<table>
<thead>
<tr>
<th>I -1-9</th>
<th>Formulation of U-City vision</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object</strong></td>
<td>Providing current situation &amp; provision of future planning information of the city</td>
<td>Significance</td>
</tr>
<tr>
<td><strong>Participating entity</strong></td>
<td><strong>Scenario</strong></td>
<td><strong>Tools for participation</strong></td>
</tr>
<tr>
<td>Provider</td>
<td>Participant</td>
<td></td>
</tr>
<tr>
<td>Local government, Company</td>
<td>Expert</td>
<td>- Local government and company provide the contents on the development projects and future planning. - Experts are provided with information through RSS technology and provide special knowledge on city planning and U-City development. - Citizen presents opinion that reflects the regional property through Tag technology.</td>
</tr>
<tr>
<td></td>
<td>Citizen</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Considering how much users would participate when the system is developed, the degree of participation is given a mark in the range of 1-5 points (5 points are the highest degree of participation)

3 **Analysis of system requirements**

System requirements and components were analyzed in each stage of the planning process. It defines what system should perform and which scenario should operate in each stage. As such, it is performed as follows.

First, the motivation, necessity and main functions of the system are defined and the shape of the system which is required by users is explored by experts’ brainstorming. Next, the system is largely divided into 8 areas and each area is subdivided into 3-5 functional processes, which in turn are divided and arranged in 3-7 unit functions. The results of requirements analyzed through this process are summarized in Table 4.
### Table 4. Summary of system requirement in each area and stage

<table>
<thead>
<tr>
<th>Area/Stage</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>User management</td>
<td>- Register and manage user, user information retrieval, My Page &lt;br&gt;- Qualify user for accessible sites, manage individual information</td>
</tr>
<tr>
<td>Manage citizen participation</td>
<td>- Introduce mileage system &lt;br&gt;- Reflect opinion by e-vote, on-line hearing, on-line questionnaire survey</td>
</tr>
<tr>
<td>Manage expert participation</td>
<td>- Manipulate system by composing expert group &lt;br&gt;- Experts present the alternatives and update with opinions uploaded &lt;br&gt;- Manage DB for analysis</td>
</tr>
<tr>
<td>Establish ubiquitous city planning</td>
<td>- Decide the vision, goals and strategies of U-City and the priority of U-service &lt;br&gt;- Consensus building on decision making by repeating the presentation of U-City planning drafts, collecting opinion and presentation of improved plans &lt;br&gt;- Give new information, support the easy opinion expression, on-line hearing and e-voting system &lt;br&gt;- Develop assessment system in the main decision making process of each stage</td>
</tr>
<tr>
<td>Develop unit U-service</td>
<td>- Develop and manage U-service</td>
</tr>
<tr>
<td>Manage U-service repository</td>
<td>- Update U-service pool which is newly developed or eliminated &lt;br&gt;- Explain U-service in details and provide U-service assessment information</td>
</tr>
<tr>
<td>U-service proposal and update</td>
<td>- Propose new service, revise service contents and developing method</td>
</tr>
<tr>
<td>Manage community and system resource</td>
<td>- Organize on-line community to induce citizens to participate in real time &lt;br&gt;- Prepare chatting, community bulletin board and thematic bulletin board &lt;br&gt;- Manage diverse computing resources</td>
</tr>
</tbody>
</table>

### 4 Contents of system

#### 4.1 U-City planning and participation system

This study is subject to limits in embodying all participation systems in the whole process of ubiquitous city planning. Thus, as shown in the above Figure 1, U-City planning is divided into 3 stages to select some contents only as objects which can be systematized. There are 2 main functions in the first stage, namely, a ‘city diagnosis map’ that identifies the situation of the region and the function that decides the goal and strategy of U-City. The 2nd stage is the function that assesses and selects the U-service best suited to the relevant city among the 228 U-services. The 3rd stage is for development of a U-crime prevention service through a participation system.
4.2 Design of on-line participation system

This on-line participation system has been developed with the title of [U-City of Our Community] so that it can be familiar to users. As shown in Figure 3, the main menu is composed of 6 titles, ‘Introduction’, ‘U-City planning’, ‘Finding U-Services in our community’, ‘Making U-Service for our community’, ‘My page’, ‘Information center’, etc. The first, ‘Introduction’ is supplemented with an explanation on the outline of this system, the participation system and U-City so that users can understand them easily. The contents from the 2nd stage are as follows.

![Figure 3. Main page](image)

(1) Stage of ‘U-City planning’

As U-City planning should be prepared for each city, the system needs to be accessible from each city. Namely, the system administrator can make a project for each local government like ‘Seoul ubiquitous city planning’ or ‘Melbourne ubiquitous city planning’, etc. The system users can participate in the establishment of ubiquitous city planning by clicking the relevant project (Refer to Figure 4).

The important feature of this system is that project contents and participation methods can be arbitrarily designed and organized depending on the request of local government and the intent of the planner. For instance, the system manager can design a project which contains a questionnaire survey, provides information, uses an open API map, analyzes the regional situation, represents of regional statistics etc (Refer to Figure 5).
The key point in this stage is to establish the goals and strategies of U-City first and to select U-services applicable to the city for achieving U-City goals and strategies. Then, this process can be accomplished by public knowledge via on-line participation. The establishment of goals and strategies is a very important process, because the direction of developing U-City is decided, depending on how goals and strategies are established. However, it was difficult to reflect the regional characteristics and demands in the past, because they were decided by a few experts. Thus, it is meaningful that the decision is made by diverse entities and with public knowledge through the on-line participation system.

Methodologically, participation in this stage is realized as follows. The system administrator presents the list of preliminary goals, the preliminary strategies to attain these goals, the preliminary U-services to attain preliminary strategies and the U-service list similar to them. Here, the service list is presented on the basis of the relations between goal-strategy-service and the relations are to be set up on the basis of a questionnaire that
is performed by experts in advance. However, relations can be periodically modified by reflecting the opinions of users so that the final alternative may be formed by a users’ vote. Meanwhile, the U-services applicable to the city are assessed by an assessment mark of 228 U-services arranged through prior study and generally weighing citizen preference data (Refer to Figure 6).

Figure 6. Selection process of goals, strategies and services of U-City

(2) Stage of “Finding U-Services for our community”

This stage is developed to support the decision of U-services to be applied to the city. Among them, the function of ‘intelligent U-service finder’ was equipped to help users to find proper U-services out of 228 U-services. Thus, finder function searches and shows the results by diverse standards such as classification category, name, keyword etc. With respect to the discovered U-service, additional explanations and information were provided; the definition of U-service, classification category, a roadmap, assessment results from five criteria (social demand, business feasibility, importance, pervasiveness and urgency), time of commercial usage and applicable time to the city. Thus, the finder function performs as a database that can be referred to in the U-City planning. Further, intelligent function that recommends similar services on the basis of relations between services studied in the prior research was also loaded. However, the attributes and content of unit services were designed to be upgraded constantly by user’s participation.
(3) Stage of ‘Making U-Services for our community’

This stage is devised to reflect the demand and regional situation through the participation of diverse entities when planning or designing specific U-services. As all 228 services cannot be handled in this system, however, the participation system was built...
for a U-crime prevention service which is deeply related to daily life of citizens and indispensable to safe urban life. Indeed almost all of U-City planning in Korea adopted the U-crime prevention service to be provided to their cities. In this study, the on-line participation system for U-crime prevention service planning was developed for Jinju City.

With respect to the contents, the data of actual crime occurrence was statistically analyzed and the result was presented so that the participants may understand the actual crime situation in the region. Then, it operates on the basis of an on-line map so that users can understand easily. That is, open API function using a Naver map was utilized in this study so that it can approach any region in the country.

Figure 9 represents the crime occurring in Jinju City for one year in 2008 on the map with specific spots and details for each criminal type. Here, participants do not merely inquire about the crime information provided by the system, but personally participate in the regional crime prevention. Namely, anybody can record the witness spot and details of the crime as well as indicate the spots of anxiety for crime and details on the map. If data related to crime prevention is accumulated by such citizen participation, a regional crime map is made. Based on the crime map, a U-crime prevention service proper to the region and ground materials significant to the provision can be developed. Further, the data accumulated here can be used to establish crime prevention strategies in the region, thereby contributing to make a safer city.

Figure 9. Crime diagnosis map

For instance, the result in Figure 10 was acquired by making citizens indicate the spots and giving details about the crimes that they are afraid of as the system was in a trial run. By the way, this result is quite different from actual crime spots. Thus, it may be required to approach in distinct strategies for the actual crime spots and the spots where they are afraid of when developing U-crime prevention services. That is to say, urban design or environmental improvement is effective for the spot where actual crime breaks
out frequently by enhancing police patrol or installing U-crime prevention service facilities to make them comfortable. Like this, we can understand that U-crime prevention service should be enforced in consideration of regional characteristics and demand. Providing services in the position of supplier can hinder the construction of U-City which is effective and recognized by citizen.

Figure 10. Overlay analysis of the actual places of crime occurrence and places where there is a fear of crime (Sinan-dong, Jinju City)

Besides, this system includes incidental functions and personal participation activity details and personal mileage can be managed in ‘My page’ to promote participation. Later, mileage can be utilized as an incentive for participants in connection with the relevant local government. Then, bulletin board and announcements can be delivered to the ‘Information Center’.

5 Conclusion

As stated above, this study, planning a ubiquitous city as the future city must be carried on in an open type that is based on the participation of diverse entities and public knowledge instead of a closed structure which is composed of only experts. To this end, the on-line participation system was developed and the contents were described. This participation system is currently tested for some participants to be developed as a reference model that can be referred to by each local government in developing a ubiquitous city. Further, the program to expand the system by loading on the home page of local government is considered. As it took about one year to establish planning, it is required to form a system administrator and expert group for each local government for systematic and long-term management.

Meanwhile, because the contents to be included in the planning are quite extensive, all of them cannot be organized as a participation system. The prototype of a participation system was developed through the case of Jinju City. Thus, it can be said that this system provided the opportunity to present new direction of ubiquitous city planning and to expand participation.
As ubiquitous city planning newly commences, it is said that system needs much improvement and supplementation in it content. Further, many improvements will be required when establishing specific planning for each region within this system. However, this system will contribute to the embodiment of the future city, U-City, as it is operated by the participation of diverse entities and their knowledge.

Acknowledgements

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The use of mobile technology for crowd management in cities: the case of safe pilgrim mobility in the city of Makkah

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Structured Abstract

Purpose – This research proposes the use of Location Based Services and Augmented Reality technologies for a Mobile Pilgrim Assistant (MPA) to provide Hajj pilgrims with much needed timely information presented in their native language using a tool common to all people of the world: the mobile phone.

Design / Methodology / Approach – The MPA prototype was implemented using Microsoft Visual Studio 2008 with SQL server 2008 database support. To export the application on a mobile phone, Microsoft Mobile SDK 6.0 and Windows Web server for Web services was used. The mobile used for testing the prototype was HTC Touch Viva with a Windows platform. The MPA will be tested in Mina during the next Hajj season with a simulated crowd situation or in small scale crowd reenactments but in a real environment. The application will be assessed for efficient use of the system in the context of mobility, lighting and usability.

Originality – The holy city of Makkah, Saudi Arabia is a mountainous city that faces major challenges in construction, transportation and provision of services. The city lies in an area of 90 km² yet during Hajj the problems are magnified when more than 3.5 million (2009) pilgrims visit the holy city for a period of 6 days in constant movement around the holy sites at the same time, requiring camp accommodations, services, food, medical attention, and transportation. Human overcrowding leading to panic and stampede has resulted in the deaths of hundreds of pilgrims. A solution must be found that targets the pilgrims themselves to provide them with better information so they are able to make accurate, timely and wise decisions for their own safety and the safety of others.

Practical Implications – Mobile Augmented Reality applications can send and receive real time visual information, which pilgrims need using their mobile phones, while
performing the rituals to avoid problems and tragedies. If such a technology is used during Hajj it will reduce the burden on local authorities in terms of protecting and guiding the large number of pilgrims and it may help overcome the obstacles of their different nationalities, languages and backgrounds by providing them with real time information and e-services using their mobile phones.

**Keywords** – location based services, augmented reality, Makkah, crowd management, congestion, hajj

**Paper type** – Academic Research Paper

1 Introduction

A city is a human settlement and social unit in a specific urban area with a continuously growing population, which increase demand on private and public services (Kabbani & Abdeen 2007). The population distribution within a city varies from one region to another which leads to the emergence of overpopulation and urban sprawl in some regions causing social and environmental problems. Consequently, the conflicts between the requirements of urbanization and the limited resources and vulnerable environments are increasingly fierce (Wang, 2008).

One of the very serious concerns of city planners around the world is the unrestrained growth of cities without any type of control or follow-up monitoring. In addition, the rapidly increasing size of the city will lead to a massive need for the administrative authority to manage and provide for population needs. This is especially true when there are increasing demands placed on scarce resources which may cause many environmental problems such as water shortages, traffic congestion, and the misuse of urban land (Kim, 2008). Under these circumstances, strategic planning for sustainable and intelligent cities is a crucial challenge for planners and urban scientists (Kim, 2008).

Many cities all over the world have problems in terms of space limitations, which lead to crowd concentrations and traffic jams in small areas. Mass evacuation of large urban settings has occurred throughout world history, but, until recently, these situations were dispersed and seemed to seldom occur (McGuire, 2005). Tragic outcomes due to congestion happen as a result of man-made or unexpected environmental events. They may also be a result of the failure of local authorities to respond in a timely manner to such circumstances (Al-Sharief 2006). Metropolitan cities are laid-out to handle automotive traffic, with varying degrees of success. However, major power outages in New York, the attacks of 9/11 (McGuire, 2005), and the recent death of 19 people and injury of more than 300 during a stampede in a music festival in Duisburg, Germany show that urban cities need to be prepared to handle a mass-evacuation of individuals on foot within urban settings.

During disasters, chaos and dangerous situations may occur due to human behavior rather than the event itself. Escape panic situations normally exhibit the following nine characteristics (Figure 1) (McGuire, 2005):

1. People walk or run considerably faster than normal.
2. People’s interactions become physical in nature pushing at times.
3. Moving and passing of a bottleneck becomes uncoordinated.
4. At exits, arcing and blocking are observed.
5. Congestions build up.
6. The physical interactions in a congested crowd add up and cause alarming pressures which can bend steel barriers and brake down brick walls.
7. Fallen or injured people act as obstacles further slowing down escape.
8) People show a tendency toward mass behavior which means they do what others do even though they may normally never do so.

9) Alternative exits are often ignored or overlooked during escape situations.

Research has shown that knowledge is one of the main attributes a person can have to be able to act efficiently in a dangerous situation. Cities need to promote their citizens to be knowledgeable citizens and must allow them to develop their individual potential in interacting with others, play a part in the construction of their environment and establish person-context exchange dynamics (Martinez, 2006).

Knowledge Cities (KC) play a critical role in knowledge creation, economic growth and development to serve the population; they can be defined as “a class of cities that play a leading role in the spatial articulation of the global economic system or designate a dimension of all cities that in varying measures are integrated with this system” (Abu-Anzeh & Ledraa, 2007). A KC can also be defined as a city that depends on using technology to serve the growing human needs or where private or public services can be delivered and received anywhere and at any time (Kim, 2008). These perspectives help us to obtain a clear view with regard to the needs of KCs for a fundamental development innovation technology for modern city life in the 21 century (Dvir 2005; Yigitcanlar, O’Connor and Westerman, 2008; Kim 2008). Therefore, a KC is related to several other perspectives such as urban development, information and communication technology (ICT) and knowledge management.

A city with its own unique problems is the holy city of Makkah, Saudi Arabia. As cities try to educate, develop, and provide services for their citizens, Makkah has to accommodate millions of pilgrims and visitors to the city performing rituals in small areas and at the same time creating congestion, traffic jams, and environmental problems which cause chaos, delays and even death. As any local authorities of any city, Makkah authorities have a challenge to invest in their own citizens, who need to alter their lifestyles to cope with such a mass influx of people into their city while managing millions of visitors that are different from year to year, providing services for both groups. Local authorities have an extra burden regulating the private sector that view the city as a yearlong lucrative market and aggressively pursue financial profit by building commercial accommodations, restaurants, and shopping venues for visitors while ignoring safety codes and building regulations.
Figure 1. Examples of pedestrian crowds

2 The City of Makkah

Makkah [http://en.wikipedia.org/wiki/Wikipedia:IPA_for_Arabic] is a city in the western region of Saudi Arabia (Figure 2). It is the capital of the Makkah Almukarramah region and is considered the holiest city for all Muslims.

Figure 2. Makkah Al Mukarramah region
The city is located at 25/21 north latitude, and 49/39 north longitude, 909 feet (277m) above sea level, with an area at 550 km². It is surrounded by many mountains such as Mount Ajyad (1,332 feet), Mount Abu Qubays (1,220 feet), Mount Quayqin (1,401 feet) and Mount Hira (2,080) (Figure 3) (Makkah Municipality, 2010). In spite of the small area of Makkah city (Table 1) the population density is very high (Table 2) (Makkah Municipality, 2010).

**Table 1. Statistics of Makkah City**

<table>
<thead>
<tr>
<th>Area of Makkah Region (Al-Jamoum, Bahra, Ashuaiba)</th>
<th>14,500 km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of Religious Sites</td>
<td>550 km²</td>
</tr>
<tr>
<td>Area of Central Region</td>
<td>6 km²</td>
</tr>
<tr>
<td>Populated Area</td>
<td>88 km²</td>
</tr>
<tr>
<td>Population in 1425 H (2004)</td>
<td>1,300,000</td>
</tr>
<tr>
<td>Number of Makkah Districts</td>
<td>60 Districts</td>
</tr>
</tbody>
</table>

**Figure 3. Makkah City**
Table 2. Distribution of population on the administrative units in Makkah Region

<table>
<thead>
<tr>
<th>Province</th>
<th>Population</th>
<th>Area</th>
<th>Density (person / km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Jumumum</td>
<td>76,026</td>
<td>6.59</td>
<td>12</td>
</tr>
<tr>
<td>Al-Kamil</td>
<td>18,468</td>
<td>2.88</td>
<td>6</td>
</tr>
<tr>
<td>Al-Khurmaah</td>
<td>38,600</td>
<td>12.21</td>
<td>3</td>
</tr>
<tr>
<td>Al-Lith</td>
<td>109,953</td>
<td>12.48</td>
<td>9</td>
</tr>
<tr>
<td>Al-Qunfeidah</td>
<td>240,944</td>
<td>7.32</td>
<td>3</td>
</tr>
<tr>
<td>Al-Taif</td>
<td>883,538</td>
<td>47.97</td>
<td>18</td>
</tr>
<tr>
<td>Jeddah</td>
<td>2,821,371</td>
<td>4.84</td>
<td>596</td>
</tr>
<tr>
<td>Khulays</td>
<td>49,919</td>
<td>4.32</td>
<td>12</td>
</tr>
<tr>
<td>Makkah</td>
<td>1,402,944</td>
<td>7.39</td>
<td>181</td>
</tr>
<tr>
<td>Rabigh</td>
<td>68,538</td>
<td>6.75</td>
<td>10</td>
</tr>
<tr>
<td>Mnyah</td>
<td>44,229</td>
<td>22.31</td>
<td>7</td>
</tr>
<tr>
<td>Turubah</td>
<td>42,654</td>
<td>4.95</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>579,7971</td>
<td>140.01</td>
<td>41</td>
</tr>
</tbody>
</table>

3 The Hajj

The Hajj is one of the five pillars of Islam, that must be performed during a specific time between the 8th and 13th Dhu’l-hijjah (the 12th month of the Muslim lunar calendar). It is obligatory once in a lifetime for every adult Muslim, male or female, physically and mentally fit with the means to perform it. Hajj must also be performed in specific locations or ritual sites: the Holy mosque -Kaabah, Mina, Muzdalifah and Arafat. All of these locations are located in a geographical area of 802 km² (Figure 4) (Ministry of Hajj, 2010). The holy sites of Mina, Muzdalifah and Arafat in Makkah have fixed boundaries (Table 3) and are connected by a limited number of roads.

Table 3. Statistics of Makkah City (Makkah Municipality, 2010)

<table>
<thead>
<tr>
<th>The Holy Mosque of Makkah</th>
<th>Area of the Mosque</th>
<th>100,000 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area of Squares inside the Mosque</td>
<td>135,000 m²</td>
</tr>
<tr>
<td>Ritual Sites</td>
<td>Total Area of Ritual Sites</td>
<td>33 km²</td>
</tr>
<tr>
<td></td>
<td>Area of Mina Site</td>
<td>8 km²</td>
</tr>
<tr>
<td></td>
<td>Area of Muzdalifah</td>
<td>12 km²</td>
</tr>
<tr>
<td></td>
<td>Area of Arafat</td>
<td>13 km²</td>
</tr>
</tbody>
</table>
The Hajj ritual starts after pilgrims prepare themselves from a location outside of Makkah -Al-Mekat- to wear special simple clothing (Figure 5). This complicates efforts in trying to stay close to one’s group or family in crowds due to the unified dress requirement. Later pilgrims head to Almasjid Alharam in Makkah to circle the Kaabah and then go to a sleepover in Mina before moving on to Arafat. On the 9th Dhul-hijjah, on a five-kilometer trip during the Alnafrah phase of Hajj. Almost all pilgrims move together after sunset from Arafat to Muzdalifah before they are back to the Mina area which lies about three kilometers west of Muzdalifah (Figure 5) (Ministry of Hajj, 2009).

With more than 3 million pilgrims and support service providers moving at the same time in such a small enclosed area, a situation of extremely congested regions is created and concentrated in three main areas (Abdulrazek 2005):

1. The Grand Holy Mosque: It can hold up to 820000 worshipers at the same time. The crowd density in the peak seasons of Hajj and Ramadan reaches close 8people/m² (Figure 6) while crowd density above 4 people/ m² (for moving crowds) is defined as the upper safe limit for crowd flow. At 8 people/ m² the risk to the crowd is defined as intolerable (Algadhi 2010). This congestion was eased somewhat after a great expansion of the Mosque which is still ongoing.
2. Mount Arafat area: This is an open space desert location about 9 miles east of Makkah (Figure 7). It is relatively wide, but during Alnafra (the movement of pilgrims from Arafat to Muzdaielah at sunset), traffic and human congestion results in deadlock of buses and cars for hours.

Figure 7. Mount Arafat

3. Mina: Mina is a rough mountain area about three miles from Makkah. On certain days pilgrims gather in a small area (Jamarat) for the stone throwing ritual (Figure 8). It is a particularly dangerous area even though it has been expanded by building a bridge with two levels. In spite of this, congestion and stampede leading to death still occur.

Figure 8. Mina
4 Research motivation

In a city such as Makkah which receives millions of pilgrims who do the same thing at the same time in a small geographical area, especially with the yearly increase of pilgrims, the problem of traffic and human congestion is magnified and many tragedies have occurred in the past (Figure 9). There are many factors that lead to the increased numbers of visitors to Makkah, such as the increasing number of Muslim in the world which has reached up to 23% of the world’s population, the improved financial means of Muslims, the development of advertisement means and visual media, the mega projects for developing and expanding the holy places in the city, and the advances and low cost of transportation (Abu-Rizaiza 2005).

The major challenge facing urban planners and designers for the city of Makkah, is planning the movement of pedestrians, which include women, children and the elderly, vehicles and mass transit during the period of Hajj (Shehata & Koshak 2005). Yet with all the expansions, plans and successes, the Hajj seasons have been plagued with tragedies due to dangerous overcrowding and stampede, fires, human bottlenecks, traffic jams, and environmental pollution (Table 4).

Table 4. Accidents during Hajj from 1975 to 2006

<table>
<thead>
<tr>
<th>Date</th>
<th>Accidents</th>
<th>Casualties</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decembe r, 1975</td>
<td>Fire</td>
<td>Death of 200 pilgrims</td>
<td>Camps for pilgrims near Makkah</td>
</tr>
<tr>
<td>July 2, 1990</td>
<td>Suffocation</td>
<td>Death of 1,426 pilgrims</td>
<td>Inside a pedestrian tunnel (Al-Ma'aisim tunnel)</td>
</tr>
<tr>
<td>May 23, 1994</td>
<td>Stampede</td>
<td>Death of 270 pilgrims</td>
<td>Al-Jamarat</td>
</tr>
<tr>
<td>April 9, 1998</td>
<td></td>
<td>Death of 118 pilgrims and another 180 injured</td>
<td>Jamarat Bridge</td>
</tr>
<tr>
<td>March 5, 2001</td>
<td></td>
<td>Death of 35 pilgrims.</td>
<td></td>
</tr>
<tr>
<td>February 11, 2003</td>
<td></td>
<td>Death of 14 pilgrims</td>
<td></td>
</tr>
<tr>
<td>February 1, 2004</td>
<td></td>
<td>Death of 251 pilgrims and another 244 injured</td>
<td></td>
</tr>
<tr>
<td>January 12, 2006</td>
<td></td>
<td>Death of 346 pilgrims and another 289 injured</td>
<td>Mina</td>
</tr>
</tbody>
</table>
In particular, the Jamarat area has witnessed many serious accidents due to crowding at the stoning area, leading local authorities to construct a gigantic pedestrian bridge (flyover) in that area a few years ago. This made it possible for pilgrims to throw Jamarat in levels using predefined walk ways. Despite the utilization of the bridge and with the increasing number of pilgrims the crowding problems still remain (Koshak 2006).

Pilgrims come from most countries of the world but many are elderly and/or with a low level education and varied languages. Most of the problems and major tragedies occur due to the lack of knowledge of the pilgrims themselves on how, when and where to move. The Saudi government is continuously looking for better procedures to protect pilgrims by deploying tens of thousands of security personnel to help organize pilgrims and direct their movement. However, this creates an additional burden on authorities to oversee their safety as well.

5 Expansion solutions

Local authorities have worked on various solutions to resolve these problems and every year they provide many plans to avoid the congestion in order to ease traffic and pilgrim mobility (Shehata & Koshak, 2005). Construction projects include:

a) The Holy Mosque Expansion:

The Holy Mosque could not support the growing numbers of worshippers, so an expansion began in 1988 and is still ongoing with over 60,000 m² of prayer area on the enlarged roof, in addition to another almost 86,000 m² in the surrounding plaza allowing one million worshipers to be in and around the mosque during peak seasons (Samirad, 2009) (Figure 10).
b) The Stoning Bridge:
It will be expanded to a six-floor building of bridges with two tunnels (Figure 11), which should reduce the congestion by distributing traffic to split the load on the Jamarat walkways exerted by the crowds into smaller more manageable groups (Binladen, 2010).

Figure 11. Stoning Bridge

c) The Metro Link:
This is a rail link (Figure 12), that would serve three million pilgrims traveling between Arafat, Muzdalifah and Mina at a rate of 72 thousand pilgrims per hour, in both directions.
Also, a shuttle-bus transportation system used currently during Alnafrah helps organizers achieve high traffic flow rates, by using Radio Frequency Identification (RFID) based tracking tags fixed on the windshield of each shuttle-bus. These tags are used mainly to automatically keep track of the identity of buses leaving and entering the parking area (Municipality, 2009). The shuttle-bus transporting system may cover the pilgrim transportation needs but it needs many stations and depots to provide maintenance support.

The expansion projects that seek to resolve the problem of limited space, may solve some problems but cause others such as the need to close the areas surrounding them by diverting congestion to other places. Tunnels used to divert traffic create air pollution in the tunnels, which affects the pilgrims on foot and the infantry inside the tunnel. Poor ventilation caused authorities to periodically block entry into the tunnel which create a backlog of pilgrims and reduce tunnel capacity.

6 Objective of this research

With all the progress the Saudi government has achieved in terms of construction and expansion, it is human behavior during chaotic events that account for most of the injuries and fatalities that happen during Hajj. Physical expansions alone may increase problems and make management more difficult; educating pilgrims on exit and entry of buildings and structures is always challenging. Alternative solutions must be found that target the pilgrims themselves in an attempt to increase their knowledge by providing them with vital information to make accurate, timely and wise decisions for their own safety and the safety of others. This will reduce tragedies, delays and inconveniences. For Makkah to cope with a mass influx of people from different countries, incomes, ages, languages and educational backgrounds it must move towards being a Knowledge City (KC) utilizing ICT’s to provide more efficient and cost effective solutions usable by most people. Such solutions should focus on pilgrims’ direct interaction with their environment to make correct and sensible choices. Therefore, the main objective of this research is to introduce the Mobile Pilgrim Assistant (MPA) prototype by building a model that exploits emerging technologies such as LBS and Augmented Reality delivered via mobile phones to reduce crowd congestion and provide visually oriented pilgrims on foot with self-control in terms of navigation through the holy sites during Hajj.
7 Mobile solutions for Hajj crowd management

Many companies try to provide stand-alone hardware and software solutions which have basic functions to guide the individual pilgrim, but all of these solutions assume technically savvy pilgrims or require an investment must be made to train them. Hardware requirements and cost and the regular updates of software are additional overheads that need to be considered (Figure 13). Some of these devices share common features such as:

- Find your location with ease - Hajj & Umrah Maps
- Find nearby shops, cafes, hospitals and more
- Text and voice guidance, 2D and 3D map views

![Figure 13. Lost During Hajj Umrah - GPS Navigator](image)

7.1 Location Based Services

ICTs, which include any communication devices such as: satellite systems, computer and network hardware and software systems, and mobile phones, provide public access and sharing of information in a city that delivers services and improves the quality of life (O'Hare & O'Grady, 2002). ICTs, and LBS technologies such as Geographic Information Systems (GIS) are raising the possibility of a dramatic transformation of the way we perceive and move about the urban environment, as well as how we interact with each other in an urban space (Kim, 2008). In addition, LBS are services that employ their capability to increase location awareness and to allow simpler user interactions so that they can adapt to a particular environment. These services are accessible with mobile devices through networks, utilizing the ability to make use of the location of the mobile device (Steiniger, Neun & Edwardes, 2006; Fang, LiXiaolei & Fuling, 2007). Such technologies would help users determine their positions and find paths and routes answering many questions such as “Where am I?”, “Where can I go?”, and “How should I behave?”.

7.2 Augmented Reality

Augmented reality (AR) is a relatively new technology that combines imaginary information like a virtual object into the real world and in real time with interactive visualizations that allow the user to imagine a real 3D environment (Mulloni, Dünser & Schmalstieg, 2010). Augmented Reality technology is being utilized in many areas such as medicine, manufacturing, visualization, path planning, and entertainment and military applications (Figure 14-15), but it has received a great deal of attention as a new method for displaying location-based information in the real world (Mulloni, Wagner & Schmalstieg, 2009).
This technology can be used to enhance the user's interaction and perform tasks especially when the virtual object shows real information that the user cannot detect using personal senses (Azuma, 1997). In addition, we can say that the application is classified as an Augmented Reality system if it has three characteristics. First, it must combine the real and the virtual. Second, it must be interactive in real time. Third, it must be registered in 3-D to make sure that the user cannot tell the difference between the real world and the virtual augmentation of it. Finally, the system must appear to be working in a single real environment (Azuma, 1997).

Interactive augmented reality systems must also have some characteristics to allow a high degree of vision and utility to ensure that the virtual objects interact with the user in a natural manner (Vallino 1998). These characteristics include the registration of virtual objects in the augmented view, virtual and real objects being visually indistinguishable, virtual objects exhibiting standard dynamic behavior, and the user having unconstrained motion within the workspace (Vallino 1998). The high cost cannot be ignored, so there is need to lower the cost to allow for broader usage and a minimal run-time setup (Vallino 1998).

However, indoor and outdoor terms which usually are used in Augmented Reality technology need to be differentiated. Indoor localization means the determination of a user’s location taking place within a closed area or inside a building such as a campus, company, museum or exhibition (Mulloni et al., 2009). Technologies used to achieve this include active RFID, ultrasonic, infrared, magnetic, and radio sensors but all require a permanent electronic infrastructure to facilitate measurements (Mulloni et al., 2009). Outdoor localization means the determination of a user’s location, the place in the open air, or through buildings such as a town, a street, or a city exhibition; there is a technology to achieve this, such as a Global Positioning System (GPS) (Mulloni et al., 2009) (Figure 16). But the GPS-based navigation system works only outdoors because the required satellite links are blocked inside buildings. So, we can build LBS applications which give users the ability to see the real world around them, with additional information which can be added by computer graphics to represent the real world at real time (Fang et al., 2007).
Usually Augmented Reality systems need to adapt with other assistive technologies to achieve an advanced LBS system (Fang et al., 2007), so we have to look at other techniques and combine LBS to provide advance LBS on PCs or mobile devices using either indoor or outdoor localization (Fang et al., 2007).

### 7.3 Augmented Reality with Mobile Devices

In the past few years, mobile phones have become an increasingly attractive platform for augmented reality (Wagner & Schmalstieg, 2003). There were more than 1.22 billion mobile phones sold in 2008 and it is estimated that this number will rise to 1.8 billion units in 2012, with 800 million of them being smart phones (Wagner & Schmalstieg, 2003). Mobile phones are now third generation, but the second generation was a challenge when it came to importing a fully featured PC-based Augmented Reality framework, such as the Studierstube4 platform which is able to import existing applications and make them run on mobile phones. Third generation Studierstube ES enhanced the compatibility requirements and added new elements to the design, such as an asymmetric client-server technique that is specific to mobile devices (Wagner & Schmalstieg, 2003).

A collaboration between Augmented Reality technology and mobile phones (smart phones such as PDAs) can determine a user’s location indoors based on what the camera-phone sees, and outdoors by receiving virtual information from a database or another system such as GPS (Ravi, Shankar, Frankel, Elgammal & Llode, 2005). The phone allows the users to interact with their real environment in real time based on that information. For example, WIKITUDE mobile Augmented Reality navigation system helps drivers easily recognize and follow the suggested route in the real world instead of looking at an abstract map (Figure 17) (Wagner & Schmalstieg, 2003).
Mobile Augmented Reality applications can send and receive real-time visual information which pilgrims need using their mobile phones while performing the rituals to avoid problems. If such a technology is used during Hajj, it will reduce the burden on local authorities in terms of protecting and guiding the large number of pilgrims and may help overcome the obstacles of their different nationalities, languages, and backgrounds, while providing them with real-time information and e-services using their mobile phones.

8 MPA design

The architectural model of the Mobile Pilgrim Assistant (MPA) presents Real-time (R) data and Archived (A) information as a distributed system (Figure 18), which contains several components working together:

1. The User Interface Layer: This is the part of the system that users interact with using either their personal mobile devices as clients of the system or their local device as an administrator of the system where updates for information and services are requested.
2. Main System Layer: This is the presentation layer between the user and the server system which provides icons representing current available services to users as well as updates and responses to queries for the GPS system responsible for producing digital maps.

3. Identification Layer: Each location has many sensors which have the unique identification codes to send the correct data to the user requesting it.

4. The Storage Layer: This contains two Data Base (DB) servers which store system archived data and real time sensor generated data. Data Base Management Systems manipulate data received from requests and sensors and sends them to the main system layer.

5. Network Layer: This is backbone infrastructure of the system.

The detailed system steps for the MPA which shows the management of the system and the information update process are (Figure 19):

1. The system uses the GPS for automatic user location detection without users' request. Therefore, it will be necessary that the mobile phone used supports GPS applications and the user should be in an open space.

2. The user can request archived information. Then the system will use Web services to load the data from the distributed DB from specific servers for the first time after the user logs in, allowing the data to be hands on with all users at anytime and anywhere. This reduces the need to browse the Web during crowd situations especially when no network coverage is available in that area. The user can also request real time data using the mobile camera to be able to represent his location graphically.

3. In case of any up-to-date information for the program, the system will alert and remind users to load updates when they reach an area of network coverage and when it is a safe place to interact with the phone.

4. Based on the crowd level received by the system through location sensors, the system will decide on the type of display most effective for users. Users stuck between pilgrims blocking their vision can only make use of directions displayed in text format, not graphical arrows.

\[\text{Figure 19. Main steps for MPA}\]
The flowchart in Figure 20 clarifies the interactive process for navigating through the system's screens. The first step will be an alert message received from mobile network connectivity providers to the users' mobile phones if they would like to download the system. Upon agreement, the application will be downloaded once and after selecting the preferred interface language, the system will provide each user with a unique identification code. After log in, the user will be able to view the main screen with multiple options for either archived information or real time information. The archived information includes:

- Information about any holy site destination with images either stored or broadcast live.
- Information about Hajj, including all the plans about Hajj season, guidelines, new rules or policies set by the Ministries of Transport, Hajj, and Culture.
- General maps could be displayed in two-dimensional or three-dimensional perspectives and directions from one area to another, which should be three-dimensional only.
- Location maps for facilities and services pilgrims need such as hotels, pilgrims’ camps, parking, hospitals, etc.

9 Methodology

The Mobile Pilgrim Assistant prototype was implemented using Microsoft Visual Studio 2008 with SQL server 2008 data base support. To export the application on a mobile phone, Microsoft Mobile SDK 6.0 and Window’s Web server for Web services was used. The mobile used for testing the prototype was the HTC Touch Viva with a Windows platform. Figures 21-23 present screen snapshot examples from the MPA for the archived information menu, while the screen snapshots (Figure 24-30) show examples of simulated real time information displayed to users upon request. The MPA will be tested in Mina during the next Hajj season with a simulated crowd situation or small scale crowd reenactments, but in a real environment. User satisfaction, usability, and usage data will be collected and analyzed and results will help us determine the effectiveness and efficiency of such a tool within the context of mobility, lighting, and practicality of use.
Figure 20. Flowchart of MPA’s Navigation

Figure 21

Figure 22

Figure 23
10 Conclusion

Although there has been tremendous time, effort and money spent to attend to the welfare, safety and convenience of all pilgrims in Makkah by developing construction projects and guidelines for pilgrim mobility, all of which have alleviated some of the problems, new problems have arisen due to the growing number of pilgrims every year. New projects take time to develop and major rerouting and bottlenecks are created during construction, which increase the congestion situation due to the mountainous landscape of Makkah. The rapid convergence of ubiquitous computing technology, ICTs, and LBS technologies, such as GIS, are raising the possibility of a dramatic transformation of the way we perceive and move about the urban environment, as well as how we interact with
each other in an urban space. Endless possibilities for Augmented Reality systems are currently being developed that promise increased convenience, awareness, transparency, and access to information. In addition social opportunities are created that break traditional barriers by receiving and delivering services anywhere and at any time, thereby creating knowledge cities that provide better services to citizens.

It was the purpose of this research to propose a solution -Mobile Pilgrim Assistant- that requires no physical construction of buildings and roadways, but rather exploits existing and emerging technologies that can be utilized immediately with the cooperation of the local authorities and mobile network providers through the use of devices that are already available to most pilgrims. The new generation of mobile phones is equipped with sensors, cameras, and GPS capabilities and has more processing power and larger screens capable of displaying images, maps, or videos, thereby optimizing Internet browsing for mobile use. Using LBS and Augmented Reality technologies delivered via mobile phones will be a valuable, cost-effective, and real-time communication device that will supply pilgrims with much needed timely information and e-services which will give them back control over their own safety and mobility and provide them with a better Hajj experience. It will reduce bottlenecks, overcrowding, stampedes and even death. Most research on the use of LBS and Augmented Reality investigates and discusses the problems of the obstruction of signals by buildings and moving objects such as vehicles and even trees, disturbing sensors and tracking. However, for the open, outdoor and flat landscape of most of the ritual sites of the Hajj, such obstacles should not be a problem. It is only during the visit to the holy mosque that buildings and mountains could disturb LBS mobile services.

Kim (2008) suggested that the advancement of ICTs with widespread economic activities provide scientist and engineers with powerful tools for implementing urban strategies that promote sustainability and informed decision making; however challenging and complicated the tasks due to the multiple facets of complex urban system.

Despite the proposed and ongoing mega expansion construction projects, Makkah will always be one of the most complex urban systems and the Hajj one of the most complex religious and economic activities. The MPA would be a cost-effective, immediate and efficient method of communication that must be the focus of local authorities since it targets pilgrims directly and increases their knowledge. Doing so will provide pilgrims with real time data and information to make informed decisions during difficult and challenging situations that could be life threatening. The MPA will be tested in Mina during the next Hajj season with simulated crowd situation or small scale crowd reenactments but in a real environment. The application will be assessed for efficient use of the system in the context of mobility, lighting, and usability.

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Why GIS projects fail

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Abstract
In this technology explosion today, large amount of funds are directed towards Geographic Information Systems (GIS) projects. Despite the enormous advances in GIS industry, there are still many failed GIS projects. Several factors contribute to the failure of GIS projects. This research focuses on answering these questions: What factors are associated with transition from escalation to de-escalation of GIS projects in Jordan? And Why some GIS projects fail in Jordan? What actions are most taken to bring GIS projects under control? How to solve the failure situations, improve quality and reduce cost? Supporting information was gathered from several sources, including magazine articles, books, and Questionnaire survey for Jordanian GIS Companies. The results are extract the top 10 reasons that cause GIS projects fail in Jordan, suggestion actions to keep GIS projects under control, and advice to spend enough time in planning and scheduling are the most important things to improve quality and reduce cost of Jordanian GIS projects.

Keywords - escalation, GIS, survey, questionnaire.

1 Introduction
In this technological explosion nowadays, large amount of funds are directed towards Geographic Information systems (GIS) projects. How much the company's trust of the success of their projects? How many companies can keep projects in control? What are the factors that affect GIS projects cause them to fail? Based on reports, when undertaking a large and complex projects had a high degree to fail, so where is the problems, how to solve them?

Any GIS projects developer should keep in mind that building any GIS project is just like building an office building, then the most of the problems during or after finished projects would go away. Before building an office building, an architect draws up detailed plans, builds models, and makes blueprints. At each stage, the plans are carefully and repeatedly reviewed. During construction, each step is tested and inspected [1]. GIS projects like this, the developer won't start implement it without a carefully plan and select suitable methodology for that project then start testing project on each stage for it, all of that taken to reach a good project to companies without any fail, but we don't forget the other factors that effects GIS project and take them to fail- the reader can see them later.
2 Literature review

There are many writers studied why projects fail. For instance, Field said "projects fail too often because the project scope wasn't fully appreciated and/or user needs not fully understood." [1].

Pugh [2] that on average, about 85% of GIS projects fail, 87% went more than 50% over budget, 45% failed to produce the expected benefits, and 86-92% went over schedule as a recent study performed by KPMG Information Technology. The same idea mentioned by Hamil [3]. The KPMG, Canada's largest professional services organization, performed an in-depth study on failed projects. Pugh’s results show the top ten reasons of GIS failure:

1. Poor scope: the projects vague, incomplete, creepy or satisfy business need not the customer.
2. Poor schedule: too long/ too short time scales.
3. No quality standard: spatial, attributes, topology or acceptance are not keep in real.
5. No executive sponsors: no answer for these questions: who’s got your back? Where’s the funding?
6. No staff training: unused resources or change to resistance.
7. Failure to manage risk: fail to define or monitor the risks.
9. No internal marketing: little victories.
10. Planned Obsolescence: fail to plan of what will happen in 5 years?

Aronoff [4] [5] identified a number of reasons why GIS technology can impede successful GIS implementation:

- Software does not perform as expected;
- System installation and start up is late;
- Customer support is too slow or inadequate;
- Data entry is more costly and slower than expected;
- Price of the hardware or software or maintenance increase;
- System is not user-friendly and training is in adequate; and
- Software cannot be modified to provide additional functions or handle unexpected problems.

Tomlinson [5] reported an example of software failure in respect to forestry applications in North America. The true advantages of GIS are only realized when it is used to manipulate, analyze and model spatial data. In practice GIS are reported to be limited to a digitized forest inventory because of limitations in the functionality of software or resistance to the GIS approach by forest managers. Many systems do not support a complete range of forms of spatial analysis on points, lines, grid cells and rasters and irregular polygons. Many of these technical problems with GIS software, however, have been solved with software becoming increasingly ‘powerful’ and more reliable. In reality, many failures of GIS, which are often the results of the acquisition of wrong type of technology, are often related to poor or inadequate technical assistance [5].

The research of Russell [6] focused on analysis of why some GIS projects fail and other succeed. GIS industry survey data were collected and analyzed as part of a Masters dissertation to see if maturity models and structured methods play an important part in project success. Members of GIS organizations in the U.S. (URISA, GITA) provided data including the respondent’s organizational structure, the success of projects, the type of projects undertaken, and the general attributes of the respondents. Most of the
respondents were from county and city governments with a majority reporting that their projects were either on-budget or under budget, but also reported that projects did not meet deadlines. County, city and transportation sectors were evaluated as having the lowest project management maturity rank as compared to private industry. Data indicate that there is a possible correlation between maturity and project success [6].

Another example of GIS failure in business noted difficulties with integrating diverse data sources by Birks et al. [7] [8]. This study performed in UK. Result showed that in general there are significant difficulties building a comprehensive spatial database in the first instance, but subsequently it is often easier to maintain this database.

Gauld [9] sought to fill the public sector case study void. It details the failure and abandonment of a large New Zealand public hospital Information Systems development. The case corroborates findings from the private sector literature, namely that ill-planned and managed, large and multifaceted projects are more likely to fail and that contextual issues are highly influential. It also shows how much more complex project commissioning and development is in situations of public governance where political and organizational elements come to the fore. Finally, the article offers lessons for public sector Information Systems planners.

Participants from the 15th IPMA World Congress proposed eight factors leading to project failure (Journal of Management Development, 2001). One was the "Wrong Leader." Five types were identified: two of whom damage the project-the "overt saboteur" and the "passive resister"; two of whom do little to benefit it-the "non-committed" and the "well-wisher"; and only one beneficial-the "fully committed." A second was "Ineffective Controls": financial controls concentrate on cost rather than time, so delays caused in an effort to save money can end up costing much more than the planned saving; project management tends to look backward comparing progress to-date against plan, and spend too little time looking forward, anticipating issues and making timely corrections. Others included inappropriate team and poor communication [10].

Dvir et al. [10] found that, although there was no doubt that some basic level of planning was required; there was no correlation between planning and success. However, they did find a significant correlation between success and the development of requirements for the project, and recommended that the project's goals and deliverables should be defined (a view echoed by Jiang et al., 2002) [10].

Winters [11] stated the top ten reasons of project failure as the following:
1. Inadequately trained and/or inexperienced project managers
2. Failure to set and manage expectations
3. Poor leadership at any and all levels
4. Failure to adequately identify, document and track requirements
5. Poor plans and planning processes
6. Poor effort estimation
7. Cultural and ethical misalignment
8. Misalignment between the project team and the business or other organization it serves
9. Inadequate or misused methods
10. Inadequate communication, including progress and reporting.
3 Reasons of failure

Projects in general fail for various reasons. Several factors contribute to fail GIS projects include:

1. Top management support
   - Changing of top management support: Every study ever done about system success or failure has identified top management support as a critical success factor. Without full commitment from top management that is clear when problems arise on a project (as they inevitably do), the project will collapse, so project need to change of top management support that effects by the way in time, budget, and efficient of the project.
   - Lack of top management support: The persons who become top management support must be experienced. They have an idea of how they can have a full commitment to face any problems in the project to be success and won’t be collapse. Unfortunately the companies maybe don’t find these persons so its take projects to fail.

2. Technical leadership
   The person in the role of project Technical Lead must be experienced. He/she should have completed other successful similar projects. The role of technical lead is like that of a skilled heart surgeon, but like these persons hiring too much, so they are increase cost of project (that reflect by the way to the budget of the project). On the other hand maybe GIS companies suffering from lack of technical leadership, that is mean there is not available have enough experience or have any experience to finish like this projects in a successful way so the results IT projects go in the road to fail.

3. Poor planning
   Many persons have probably heard the saying “if you fail to plan, you plan to fail.” At the project/task levels, poor planning is one of the main reasons projects fail, fall behind schedule or miss their deadlines.

   Without adequate planning, it is difficult to really understand what it will take to complete a project successfully. Lack of planning leads to inadequate preparation, unexpected problems, and poor execution.

   Poor planning is a worst practice because:
   • If you don’t have written plans, you are using your memory to keep track of things. Planning is an excellent tool for getting things out in the open. Good planning forces you to think about your projects before you set about doing them and to put your thoughts down on “paper” (not necessarily real paper, software works great for this too.). This alone can help you prevent many project failures and delays.
   • Without plans, it is difficult—sometimes even impossible—to get a clear picture of all the things that you are working on and what still needs to be done. Planning allows you to identify all your projects and tasks and gain a much better understanding of what it will really take to complete them. Without planning, you won't have a clear idea of what you need to do and you won't be able to prioritize your time properly. How can you prioritize your time if you don't even understand what you are trying to accomplish? When you don't have clear priorities, you are much more vulnerable to distractions and unexpected events.

4. Objective changes during project whether it's unclear or changing needs of the project
   Objective may changes during the project because of unclear view of it during plan or maybe changes of the needs for the environment, and end user. As an idea maybe the
reason of change the needs because of facing some problems during the project to solve it needs must change for keeping project alive.

5. **Unrealistic time including long time scale**

   Long timescales for a project have led to systems being delivered for products and services no longer in use by an organization. The key recommendation is that project timescales should be short and enough, which means that larger systems should be split into separate projects. There are always problems with this approach, but the benefits of doing so are considerable.

   Many managers are well aware of the need for fast delivery, leading to the other problem of unrealistic timescales (short timescale). These are set without considering the volume of work that needs to be done to ensure delivery. As a result, these systems are either delivered late or only have a fraction of the facilities that were asked for. The recommendation here is to review all project plans to see if they are realistic, and to challenge the participants to express any reservations they may have with it.

   Miss attention to accuracy, completeness and timeliness

   If the accuracy of the information is without verifying with the data subject, may mean that the quality of the newly digitized information is poor as it is out of date or complete.

6. **Change in permissions from regulating authorities**

   Sometimes the policy on data development needs a relook which effect on GIS project development. This relook may take the GIS projects to fail.

7. **External Shocks to the organization**

   External events, perhaps unrelated to a particular troubled project, may also trigger a general reassessment of resource allocation and allow de-escalation to proceed.

   Changes in ownership, natural disasters, public scandals, competition which force the companies to fast delivery and other events beyond the control of organizational members all qualify as external shocks to the organization.

8. **Scope creep**

   Every GIS project is executed with a set of deliverables, and has an expected closure time. Prior to this closure period, there are a predetermined set of tasks and activities to complete the project successfully. These tasks constitute the scope of a project. Since a project schedule is closely tied to the delivery timeline and the scope, a little variation in the scope can affect delivery and in turn affect the success of the project.

   This inching forward or scope to introduce more requirements that are not included in the initial planning of the project whilst maintaining the same time frame for project delivery is called Scope Creep. Scope Creep is the pejorative name given to the natural process by which clients discover what they really want.

9. **Failure to communicate and act as a team**

   It is difficult to find too many persons have the same idea and the same view to the project. Every person in the world has their own idea, their opinion and their mind, so how these persons can communicate correctly to reach the successful of the project? How they can be act as a same mind same ideas to the let their reach the surface of water and be in safe? So if they fail to communicate and act as a team be sure the project will fail.

10. **Not care about scalability issues**

    It is important to develop data in such manner that future expansion is possible. If this is not considered during data creation then different kinds of spatial data pertaining to the same area can not be attached with each other due to difference in projection systems and attribute information.
11. Lack of quality and availability of base data
Data quality is essential when a GIS is used to make decisions that, potentially, could adversely impact the data subject. Without accurate information, any potential operational efficiency or benefits may be compromised. Lots of data creation effort gets stuck because either the base data being unavailable (limited resources) or very poor quality.

There is a saying heard from many persons that is "We realized we had unlimited needs but limited resources." The limited-resource allocation problem arises in many projects when there are different limitations on the amount of resources available. The scheduling objective is to hold project duration to a minimum while resolving the resource conflict by shifting the activities until the resource requirements do not exceed the amount of resource available. The objective is to minimize project duration using the resources available and increase the utilization of equipment and labor force available. So if requirements exceed the amount of resources available, then the project will collapse.

12. Loss standards/Formats including symbology
A standard format needs to be developed for spatial data as data conversion from different formats causes a lot of data loss and quality of the data gets reduced. A standard including sets of symbols that should be developed to use with all kinds of applications using GIS. If these symbols missed from one application to another then it's not suitable for all clients and any project using a kind of symbol and took it to another application, the application fail to understand it then the project fail.

13. Cultural and ethical misalignment
Around the world different culture force the people who's live in one country from another, so if the project need to have developer, worker or manager from different country maybe his/her idea will not suitable for culture of the environment where the project is built, the result the project fail. Same will happen if the team who works together from different country, different environment and different culture, they can not communicate well with each other and the project will fail.

14. Lack in analysis the requirement to match client ideas
The client will have certain ideas for the data development. However, in most of the cases he/she not be fully clear or aware of what best can be done. The GIS analyst should assess the requirements of the user and suggest what is best suited for his/her need, but if the GIS analyst have less experience in like this project or don’t care so much in analysis the requirement in order to match what the client ideas the project in its way to fail. No one will take like that project.

15. Organizational practices for evaluating decision makers: process vs. outcome
Some organizations emphasize the attainment of outcomes rather than the means for obtaining outcomes. Simonson and Staw [12] found that de-escalation was promoted by removing the threats of negative outcomes and by rewarding decision makers on the basis of their decision processes rather than their outcomes. In this way, some of the psychological pressures faced by decision makers could be mitigated and sustained commitment in the face of problems reduced [13].

16. Poor testing and evaluation
Putting a system into production without adequate testing is like diving into a swimming pool without checking to see if there is water in it. Can you swim without water? Will the project success without testing and evaluation. Test plan should describe not only the tests to be run but also how test failures or variances will be handled, if you ignore the testing phase because of the time, the needs of the project... etc. be attention that you are walk to the fail road for that project.
4 Methodology

Firstly, in performing the research, information was gathered from journals articles, books, and Internet sites.

Then, Questionnaire paper was designed according to Zikmund [14]. The Questionnaire reviewed thoroughly. We designed a web site for putting this Questionnaire online for the companies which we couldn’t visit them. Then we started to ask Jordanian GIS companies to fill out the questions, by persons who work with GIS such as Geographic Information Officer (GIO), Chief Exclusive Officer (CEO), Geologist and others like spatial analyst from Public/Private Company.

Lastly, data generated from filled questionnaires were analyzed using SPSS to deice the main factors for failing projects in Jordan and trying to give proposition for solving them. Because understanding the reasons why projects fail will assist GIS professionals and senior management in preventing the same mistakes from recurring, thus improving efficiency and decreasing costs.

5 Survey results

5.1 General information about questionnaire and the fillers

The Questionnaire included in Appendix A. (note: Appendix B contains another format of the Questionnaire but we don’t use it because the one of Appendix A is best for indicating an accurate image than in B). It was sent to real Jordanian Public/ Private GIS companies in both ways: online and papers, as showed in Appendix D. The number of received responses was 50 out of 100; 96% papers and 4% online (Figure 1). These responses distributed as appear in Figure 2: 84% of them from public company and 16% from private ones. We must mention that all of online responses were from public companies, but paper responses were from both types (public & private).

Figures 3- 7, give information about the persons who filled the Questionnaire, their positions, education degree, education area, gender and experience. Figure 3 shows that 14% of responses filled by CEO, GIO filled 8%, Geologist filled 12% and others like spatial analyst, engineering...etc. filled 66%. Educational degree of the persons who filled out the Questionnaire appears in Figure 4 as the following: 46% have a Bachelor degree, 28% have a Master degree, 8% PhD degree and 18% others such Diploma degree. If the reader looks to Figure 5, it shows the educational area of the filler in percentage is 28%
studied GIS, 14% studied management while 58% distributed to others educational area like geography. The percentage of responses from males was 58%, on the other hand females who filled it formed 44% from all of responses, (Figure 6). Last information collected about the persons who responded appears in Figure 7. It shows experience by year for respondents stored from high to low percentages. The highest one collected from the persons who their experience less than 5 which was 30%, then for 5-9 years 28%, 10-20 years 24% and lastly greater than 20 years 18% of responses.
5.2 Project failure analysis

Now the most important part from the survey is presented here. On another words the target of this research here. Studying the several factors contribute to the failure of Geographic Information System (GIS) projects. Giving the suggestions to avoid failure situations, improve quality and reduce cost. The reader can see the results of study in Table 1. The Questionnaire included a repetition of some factors. This repetition used to reflect if the filler was aware and serious.

Table 1. Factors with average response rating as appeared in the Questionnaire.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Average Response Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of top management</td>
<td>74.96</td>
</tr>
<tr>
<td>2. Lack of technical leadership</td>
<td>67.16</td>
</tr>
<tr>
<td>3. Poor planning</td>
<td>69.04</td>
</tr>
<tr>
<td>4. Miss attention to accuracy and completeness</td>
<td>60.62</td>
</tr>
<tr>
<td>5. Long time scales</td>
<td>56.96</td>
</tr>
<tr>
<td>6. Objective changes during project</td>
<td>57.26</td>
</tr>
<tr>
<td>7. Not care about scalability Issues</td>
<td>59.92</td>
</tr>
<tr>
<td>8. External shocks to the organization</td>
<td>54.31</td>
</tr>
<tr>
<td>9. Lack in attention of quality</td>
<td>57.6</td>
</tr>
<tr>
<td>10. Lack of availability of base data</td>
<td>59.74</td>
</tr>
<tr>
<td>11. Scope creep (expanding of project scope)</td>
<td>50.3</td>
</tr>
<tr>
<td>12. Project team failure to communicate and act</td>
<td>53.52</td>
</tr>
<tr>
<td>13. Unrealistic time scales</td>
<td>54.22</td>
</tr>
<tr>
<td>14. Change in permission from regulating authorities (re-look of the policy on data development)</td>
<td>45.83</td>
</tr>
<tr>
<td>15. Loss standards/ Formats including symbology</td>
<td>53.26</td>
</tr>
<tr>
<td>16. Changing the needs during the project execution which affect its objectives</td>
<td>50.64</td>
</tr>
<tr>
<td>17. Cultural and ethical misalignment</td>
<td>40.21</td>
</tr>
<tr>
<td>18. Lack in analysis the requirement to match client ideas</td>
<td>50.7</td>
</tr>
</tbody>
</table>
Table 2 shows the factors after the removal of repeated questions or those related to each other. This process reduced the number of factors from 21 to 17.

**Table 2.** factors with their average response rating after filtering.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Average Response Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poor planning</td>
<td>69.04</td>
</tr>
<tr>
<td>2. Lack of top management/ Change in top management support</td>
<td>67.33</td>
</tr>
<tr>
<td>3. Lack of technical leadership</td>
<td>67.16</td>
</tr>
<tr>
<td>4. Miss attention to accuracy and completeness</td>
<td>60.62</td>
</tr>
<tr>
<td>5. Not care about scalability Issues</td>
<td>59.92</td>
</tr>
<tr>
<td>6. Lack in attention of quality and availability of base data</td>
<td>58.67</td>
</tr>
<tr>
<td>7. Organizational practices for evaluating decision makers: process vs. outcome</td>
<td>58.2</td>
</tr>
<tr>
<td>8. Unrealistic time scales</td>
<td>55.59</td>
</tr>
<tr>
<td>9. External shocks to the organization</td>
<td>54.31</td>
</tr>
<tr>
<td>10. Objective changing during project whether it’s not clear or changing needs of the project</td>
<td>53.95</td>
</tr>
<tr>
<td>11. Poor testing and evaluation</td>
<td>53.54</td>
</tr>
<tr>
<td>12. Project team failure to communicate and act</td>
<td>53.52</td>
</tr>
<tr>
<td>13. Loss standards/ Formats including Symbology</td>
<td>53.26</td>
</tr>
<tr>
<td>14. Lack in analysis the requirement to match client ideas</td>
<td>50.7</td>
</tr>
<tr>
<td>15. Scope creep (expanding of project scope)</td>
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</tr>
<tr>
<td>16. Change in permission from regulating authorities</td>
<td>45.83</td>
</tr>
<tr>
<td>17. Cultural and ethical misalignment</td>
<td>40.21</td>
</tr>
</tbody>
</table>

The top 10 reasons of failure in Jordan are (Table 2):
1. Poor planning.
2. Lack of top management support/ Change in top management support.
3. Lack of technical leadership.
4. Miss attention to accuracy and completeness.
5. Not care about scalability Issues.
6. Lack in attention of quality and availability of base data.
7. Organizational practices for evaluating decision makers: process vs. outcome.
8. Unrealistic time scales.
9. External shocks to the organization.
10. Objective changes during project whether it’s unclear or changing needs of the project.
Figure 8. Factor number with its average response rating.

Figure 8 presents the relationship between factors using there number and their average response rating as appear in Table 2.

From the data above, we can conclude that the best way to put GIS projects in Jordan on the right track is to spend time on scheduling and planning. So if a person is interested in a project to success, he/she must allocate enough time for initial planning. Keep in mind that he/she will have a better overview of the project only when he/she has a better initial planning (requirement, schedule, specification and budget). Once he/she has better overview he/she will know where his/her resources will go and how to manage them. From all of our experience we suggest some actions that may take to bring GIS projects under control:

- Make sure to plan before starting the development or implementation.
- Pay attention to tasks in the critical path.
- Set up the necessary processes to calculate and inform the risk.
- Ensure that the GIS project has clear objectives.
- Understand project trade-offs when making decisions regarding objectives change.
- Use the duration instead of the time on task to estimate schedule.
- Avoid using linear approximation when estimating time or resources.
- Get the support from the executive management and ask them to be open if they have any reservations about the project.
- Require that users participate in design and implementation of your project.
- Make sure you have the appropriate planning, communication, and technology skills.

Now may be the reader asks how to solve the failure situations, improve quality and reduce cost? We will answer by taking the actions which keep the project under control; we think that he/she will never reach the failure points.

5.3 Limitations

Not all of visited companies accepted to fill the Questionnaire survey, really we don't know why?
Because of the mother language in Jordan is Arabic, not all people understood the English format of the Questionnaire. This reason leads us to translate it into Arabic format which have the same information of the English one. The Arabic Questionnaire appears in Appendix C.

5.4 Future work

Human should keep in there mind that all of what they are learning in their life, they are still knowing a drop from a huge sea, that's mean there is no limitation for learning, always there are more and more things we don't know. Persons have always aspiration to go ahead; aspiration is the engine to reach more and more. Our aspirations are comparing Jordanian results with other Arab countries companies like Lebanon, Bahrain ...etc.

6 Conclusions

The best way to have a good project without any failure i.e. to put project on the right track (under control, improve quality and reduce cost) is to spend enough time on scheduling and planning.

If proper actions are taken, you will save your GIS project.

Lastly, every person knows more from his/her faults, so companies can get better at performing projects by learning from projects which they have carried out or from studying well other companies’ faults.

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Appendix A- English Questionnaire form 1

**WHY GIS PROJECTS FAIL?**

Several factors contribute to the failure of Geographic Information System (GIS) projects. Understanding the reasons why projects fail will assist Geographer professionals and senior management in preventing the same mistakes from recurring, thus improving efficiency and decreasing costs.

This study is tailored to your experience in Jordanian environment. We would appreciate knowing your opinion of the factors causing GIS projects to fail by asking you to fill out the short survey below along with any additional comments you feel would be helpful. Thank you for your cooperation.

**Section 1:**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Rating (1-100)%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of top management</td>
<td></td>
</tr>
<tr>
<td>2. Lack of technical leadership</td>
<td></td>
</tr>
<tr>
<td>3. Poor planning</td>
<td></td>
</tr>
<tr>
<td>4. Miss attention to accuracy and completeness</td>
<td></td>
</tr>
<tr>
<td>5. Long time scales</td>
<td></td>
</tr>
<tr>
<td>6. Objective changes during project</td>
<td></td>
</tr>
<tr>
<td>7. Not care about scalability Issues</td>
<td></td>
</tr>
<tr>
<td>8. External shocks to the organization</td>
<td></td>
</tr>
<tr>
<td>9. Lack in attention of quality</td>
<td></td>
</tr>
<tr>
<td>10. Lack of availability of base data</td>
<td></td>
</tr>
<tr>
<td>11. Scope creep (expanding of project scope)</td>
<td></td>
</tr>
<tr>
<td>12. Project team failure to communicate and act</td>
<td></td>
</tr>
<tr>
<td>13. Unrealistic time scales</td>
<td></td>
</tr>
<tr>
<td>14. Change in permission from regulating authorities (re-look of the policy on data development)</td>
<td></td>
</tr>
<tr>
<td>15. Loss standards/ Formats including symbology</td>
<td></td>
</tr>
<tr>
<td>16. Changing the needs during the project execution which affect its objectives</td>
<td></td>
</tr>
<tr>
<td>17. Cultural and ethical misalignment</td>
<td></td>
</tr>
<tr>
<td>18. Lack in analysis the requirement to match client ideas</td>
<td></td>
</tr>
<tr>
<td>19. Change in top management support</td>
<td></td>
</tr>
<tr>
<td>20. Organizational practices for evaluating decision makers: process vs. outcome</td>
<td></td>
</tr>
<tr>
<td>21. Poor testing and evaluation</td>
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</tr>
</tbody>
</table>
Comments:

Section 2:
What are your suggestions to avoid failure situations, improve quality and reduce cost? Depending on your answers in Section 1:

Section 3:
Please check the appropriate answer:

- Position:  
  - CEO
  - GIO
  - Geologist
  - Others

- Education degree:  
  - B.S
  - M.S
  - Ph.D

- Education area:  
  - GIS
  - Management
  - Others

- Gender:  
  - Male
  - Female

- Experience (years):  
  - < 5
  - 5-9
  - 10-20
  - > 20

- Company Class:  
  - Public
  - Private

Please return this Questionnaire to the Reference Desk when completed.

Appendix B- English Questionnaire form 2

WHY GIS PROJECTS FAIL?

Several factors contribute to the failure of Geographic Information System (GIS) projects. Understanding the reasons why projects fail will assist Geographer professionals and senior management in preventing the same mistakes from recurring, thus improving efficiency and decreasing costs.

This study is tailored to your experience in Jordanian environment. We would appreciate knowing your opinion of the factors causing GIS projects to fail by asking you to fill out the short survey below along with any additional comments you feel would be helpful. Thank you for your cooperation.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Disagree Strongly</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Agree Strongly</th>
</tr>
</thead>
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<td>3</td>
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<tr>
<td>Lack of technical leadership</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Poor planning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Miss attention to accuracy and completeness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Long time scales</td>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Objective changes during project</td>
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<td>3</td>
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<tr>
<td>Not care about scalability Issues</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>External shocks to the organization</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
9. Lack in attention of quality 1 2 3 4 5
10. Lack of availability of base data 1 2 3 4 5
11. Scope creep (expanding of project scope) 1 2 3 4 5
12. Project team failure to communicate and act 1 2 3 4 5
13. Unrealistic time scales 1 2 3 4 5
14. Change in permission from regulating authorities (re-look of the policy on data development) 1 2 3 4 5
15. Loss standards/ Formats including symbology 1 2 3 4 5
16. Changing the needs during the project execution which affect its objectives 1 2 3 4 5
17. Cultural and ethical misalignment 1 2 3 4 5
18. Lack in analysis the requirement to match client ideas 1 2 3 4 5
19. Change in top management support 1 2 3 4 5
20. Organizational practices for evaluating decision makers: process vs. outcome 1 2 3 4 5
21. Poor testing and evaluation 1 2 3 4 5

Comments:

_________________________________________________________________
_________________________________________________________________

Section 2:
What are your suggestions to avoid failure situations, improve quality and reduce cost? Depending on your answers in Section 1:

_________________________________________________________________
_________________________________________________________________

Section 3:
Please check the appropriate answer:

- Position: □ CEO □ GIO □ Geologist □ Others
- Education degree: □ B.S □ M.S □ Ph. D
- Education area: □ GIS □ Management □ Others
- Gender: □ Male □ Female
- Experience (years): □ < 5 □ 5-9 □ 10-20 □ > 20
- Company Class: □ Public □ Private

Please return this Questionnaire to the Reference Desk when completed.
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Out of the heads and bottom drawers of non-traditional owners: a proposed ICT framework for mobilizing community knowledge

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Structured Abstract

Purpose, perceived problem – Public space and activities operate in the creative tension (or disconnect, in some instances) that lies between responsible authorities and interested members of the public. Involvement with the Moonee Ponds Creek Co-ordination Committee (MPCCC) over the past few years has demonstrated that there is increasingly less churn and more contextual knowledge in that interested public than there is in those authorities. But that only adds to the problem of getting that knowledge out of the ‘heads and bottom drawers’ of those "non-traditional owners” and into agreed documentation required to underpin strategic/critical policy, and ultimately, resource allocation. This paper attempts to suggest an alternative framework to begin capturing this knowledge so as to enable a richer, shared comprehension and hence more dynamic conversations between these seemingly disparate groups with an overlapping agenda- that of the sustainable development of the wider catchment/areas influenced and impacted by the Moonee Ponds Creek.

Design/methodology/approach – Online information systems have long promised progress in the development of community collaboration, but it has taken more recent progress in the effective use of digital map layers and easy to use mobile data capture to make the prospect of more dynamic agreed documentation a realistic prospect. This may now need to be supported by improved technologies for bi-directionally tracking between raw data and strategic summarisations beyond the level yet achieved by wikis and other collaboration tools. Issues of scale are important as we work up and down iteratively between the whole catchment / wider contexts and more specific or local work sites. This would also aid formal authorisation processes that need to work in a timescale between destabilising volatility and loss of relevance due to on-the-ground changes, the rate of
which varies considerably along the Creek's journey from rural parkland to intense urban infrastructure.

**Originality/value** – The paper is informed by a deep appreciation of the general applicability of emergence, systems and complexity theory at all levels, especially in the production of agreed knowledge through webs of conversation, the consequent susceptibility of that process to delusion and the compensatory need to better ground prescriptive documentation on observables.

**Practical implications** – Taking on leadership of the Moonee Ponds Creek Co-ordination Committee in the middle of processes (i) to produce a new strategic plan for the Creek and (ii) to redefine the relationship between the original council and community partners in MPCCC, has heightened focus on the need to better utilise community knowledge. The proposed framework for mobilising community participation builds on this premise, to subsequently outline a generic toolkit applicable and scalable to similar scenarios elsewhere.

**Keywords** – community knowledge, participatory technologies, urban complex systems, systemic intervention strategies

**Paper type** – Academic Research Paper

1 **Introduction**

Our contemporary urban landscape is rapidly changing and increasingly unpredictable. This is true of most cities we inhabit today; a quality and effect perceivable across the numerous sub-systems and networks of the complex urban environments that we navigate, inhabit and interact with, everyday. Any change or design intervention in one part can ripple through related networks, to affect innumerable and diverse participants and stakeholders. This would imply that the issue of urban land-care (i.e. management and development) be handled extremely sensitively, striking a balance between the optimal benefit of all involved and the natural, sustainable evolution of the areas under consideration. Unfortunately, the governing bodies and their design processes that intervene here- to direct/shape these ever-changing ‘flows’- seem to be limited, and limiting. Their plans and strategies can even sometimes counter the broader direction of sustainable and systemic co-evolution, in certain cases, which leads to the oft-seen signs of unplanned growth and visible urban chaos. A possible explanation of this, from a systems’ perspective, is outlined later in Section 1.2, though it should suffice to say here that there is a perceivable disconnect due to this, one that exists between policy makers and the actual ‘users’ and inhabitants of the region.

The overlay of technology that has emerged in the 00s (via the internet, and the ubiquitous handheld device- the mobile phone) is able to provide us robust techniques of bridging this gap, by providing an interface to simultaneously involve the many participants, to collectively monitor (real-time) on-ground urban changes and their effects- be it due to environmental factors (e.g. climatic shifts) or man-made developmental projects. As part of a larger systemic ICT interface, these tools can then also be capable of assisting these diverse participants in (individually & collectively) reading this living and dynamic ‘entity’; ways that can help envision alternate futures by accurately interpreting and anticipating the evolutionary stages of this urban complex system. This hence can potentially become an ICT-based scalable and portable platform for conversation and collaboration, for the management of urban networks or subsystems, imbued with the wealth of community knowledge.
In the absence of such an open platform that can act as an interface or mediator, the more traditional means of community consultation can increasingly be seen as a sham. More charitably, community consultation is a tactic by consultants engaged because of their processes and not for their local knowledge, a tactic to frame their interaction with public opinion through questions where their preconceptions can cope with allowed responses. To illustrate this, the paper is based on ongoing experiences and efforts in and around the Moonee Ponds Creek, which reflect these gaps and problems, as multiple stakeholders strive to achieve a workable strategic plan. It is hoped that the directions proposed by this conceptual ICT framework bridge these gaps by using easily available and ubiquitous technologies (web, and mobile) to connect these disconnected entities that are working in parallel, by providing a common platform to share data, and trigger discussions, in their processes of knowledge (and decision)-making.

**A brief overview of the structure of the paper, its purpose and some other considerations**

In order to construct this proposal for outlining an ICT-based solution, the paper is structured in the following manner:

- An introduction, that provides the intent of the paper, a backgrounder of the ongoing Moonee Ponds project the learnings are derived from, and some insights from complexity that try understand the perceived gap

- Two sections that establish the common knowledge base that goes into such systemic intervention processes. The first part (A) outlines the spatial nodes and entities that the system is comprised of, and ways to make that knowledge explicit. The second part (B) tackles the element of time- ways to collectively see the effect of changes in the system, and the dynamics of the numerous relationships. The inherent complexity of this task, of dealing with a seemingly small section of a much larger urban system is also highlighted here. Most of the writings here are drawn from applications of systems sciences and complexity theories. Relevant case studies are also inserted here to illustrate how these issues are tackled elsewhere (especially by using web and mobile technologies), to extract some more insights

- Having established this common knowledge base, the paper attempts to put together the key points learnt from the relevant theories, case studies and the Moonee Ponds project, to suggest some concepts by way of a rough schema, i.e. directions to base future work on. A concluding section projects or extrapolates these directions, again based on current developments in complexity theories, as a ‘crystal ball’ view to help envision a futuristic outcome/goal of the outlined direction.

Also worth noting here is that this proposed ICT framework is originally prepared as part of a competitive funding proposal and hence remains as something members of the group behind ‘Putting Community Knowledge in Place’ will continue to pursue. In other words, it is still fairly conceptual and needs some degree of experimentation in the real-world, before any detailed explanation (beyond the rudimentary directions suggested now) is given. As far as possible, learnings- both from theory (complexity and systems) and practice (sustainable urbanism projects in the global realm)- that support these suggestions, is given. It is hoped that this roadmap, of ways to proceed, is incorporated into the planning process at Moonee Ponds, to subsequently generate a follow-up paper that explains this ICT framework in-depth, its degree of success or failure, and strategies for implementation.
1.1 Moonee Ponds Creek Case Study – A backgrounder

The Moonee Ponds Creek is an approximately 25 km creek in the city of Melbourne, that traverses varying landscapes- from the natural settings up north through suburbs of Melbourne (inner, outer) to the Docklands, providing drainage services for managing variously polluted runoff to the sea. In addition, it is seen as a ‘microcosm of Melbourne’s landscape character’ which caters to a mix of recreation, sport, social and cultural needs.

Figure 1. The lower Moonee Ponds Creek and its corridor across Melbourne, from 1860 (left) and 2009 showing how natural meanders and pondings have been confined to drainage channels by urban development. This also highlights the transition from traditional methods of knowing the terrain by representative paper-based maps made from human perceptions, assumptions and measurements, by interested cartographers; as compared to the more accurate digital snapshot via satellite imagery, devoid of such human interpretations- but with the added flexibility of being collaboratively layered and tagged by larger communities of interest.

Earlier officially perceived as a drainage reserve, projects undertaken by various involved communities have changed this perception. The governing authorities are trying to work in partnerships with these interested agencies to continue the reinvigoration of the creek corridor via coordinated and consistent policies, an ongoing process for the past many years. The following key issues are now being highlighted as the focus of the next 5-year strategic plan currently being developed-
1.2 Making meaning

As can be seen from the previous list of diverse key issues, such a process involves any number of variables and factors that can affect differing scales—from the micro to the macro—affecting different stakeholders. This can make the process rather tedious, and reaching any consensus can be fairly difficult to achieve. The time range involved here is from the immediate (6-12 months) through the intermediate (1-2 years) to the long term (5 years), which makes matters more complicated. There also seems to be a visible and perceivable disconnect between the limited knowledge and resources of the responsible authorities versus the on-ground, involved, and more dynamic everyday-wisdom that is lived, experienced, and expressed collectively by interested participants/members of the public.

To better understand this last point, a few theoretical & philosophical models are explained here, that seek to comprehend these processes and their limiting/limited nature. To begin, Stuart Kauffman’s notion of ‘Fitness Landscapes’ is introduced here (Kauffman 1995); which is explained in the following diagram (see Fig. 2). Communities working around an intermediate 'peak' are drawn to local maxima as objectives to work towards, oblivious to the higher peaks that may be present in the surrounding landscape. As a resultant, we may see only incremental change in strategic plans, whereas more effective and evolutionarily ‘fit’ concepts or solutions may lie elsewhere, out of sight. This notion is also linked to Kauffman’s theory of the Adjacent Possible (Kauffman, 2000), wherein time is actively brought into the picture, and any present ‘state’ of such a
system is limited to certain possible future configurations, or future states, depending on its pathway (i.e. previous choices) and current position.

![Fitness Landscape Graphic](image)

**Figure 2.** The Fitness Landscape depicted as a graphic; from Eric Beinhoker’s *Robust Adaptive Strategies* (MIT Sloan Review, April 1999). The portion circled in red represents one of numerous intermediate peaks whose local maxima and minima may define the actions and decisions of those situated there. This hence has the inherent possibility of being irrelevant or flawed, against the evolution of the whole system, as this is oblivious to higher/better peaks (and hence strategies) located elsewhere in the landscape.

Closely related to this is the notion of **Bounded Rationality**, from Herbert Simon (Simon 1955; and as interpreted by Hall et al, 2007) which refers to the rational decision making ability of an individual or group as being limited (or ‘bounded’) by its frame of reference – i.e. the information and resources that are made available during the process. This can also be seen as an explanation for the increasing disconnect between governing strategies/plans to on-ground events and changes.

The following sections take these inherent drawbacks of traditional knowledge-making (and strategy-planning) processes into account, while proposing a contemporary and dynamic ICT framework for mobilizing this community knowledge more effectively. For this, the first step is that of addressing the complex and temporal nature of these matters, the subject of our next section.

2 Towards a common knowledge base (Part A) - acknowledging the diverse elements of the system

To begin acknowledging and comprehending the inherent complexity of an urban complex system or subsystem, it would help to gain a perspective on the range of elements that it is comprised of. This in turn implies exploring the multiple constituent nodes and networks, and the differing scales they operate at. Unpacking the diverse range of these elements would then help us better comprehend the dynamics of their interrelationships, depending on their function and behaviour. For this, certain notions are defined below as aids to begin describing these diverse elements, and towards attempting a common and shared understanding.

2.1 **Agent & aggregate**

An **Agent** is defined here as any active participant within the system, independently navigating its networks, while simultaneously competing or collaborating with other
agents in a similar role. In the context of this urban complex sub-system of the Moonee Ponds Creek catchment area, this implies any active and involved member of the public. This includes key representatives of various agencies and organisations that frequently cross paths for negotiations and discussions. These agents are also seen as sources of data, each one being limited or constrained by their interests and field of activity, and their capacities for collecting and recording that data.

At the next level, that of the Aggregate, we find the various parent entities – mostly community associations, interest groups, businesses and government bodies- that may similarly have parallel or conflicting interests. The aggregate is defined as being more than just a collection of agents, to differentiate between the individual agents from the larger contexts / bodies they may represent. (This is due to the fact that the list of aggregates may even comprise some that are not directly involved or affected at all. In addition, the aggregate excludes non-affiliated individuals, who may be key drivers or active agents of change). The aggregates again can be seen to display several modes of interaction, perhaps seen as a parallel to biological interactions- ranging from mutualism and symbiosis through to forms of predation.

To illustrate the types, in the Moonee Ponds case study, the various agents and aggregates involved can be broadly structured into the following-

**Agents**
- Land owners, ‘non-traditional’ owners
- Local government representatives
- Visitors
- Individual cyclists
- Vandals / disruptive elements

**Aggregates**
- Governmental – city council, water board, airport authority
- Businesses – construction companies, shipping companies, etc.
- Organisations – NGOs
- Special interest groups – e.g. sports & recreation, bike groups
- Experts & Consultants – landscape, ecology, planning

An exercise in stakeholder mapping is hence seen as a crucial first step, wherein the identity, interests, activities and future intentions are made as explicit as possible. Also key here is the zone of influence, wherein each of these agents or aggregates is located within a specific frame, or boundary, of relevance/interest. This hence illustrates a hierarchically complex urban entity (as described by Hall et al, 2010a; also see Miller 1978 and Salthe 1985), with different levels involved in collecting and processing information (within their bounds), and exchanging the same with other levels, both above and below. The introduction of a common and open platform to help capture and display the diverse information from different levels would hence be beneficial, overcoming the gap or disconnect noted earlier.

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1 The traditional owners refers to the original aboriginal inhabitants; ‘non-traditional’ is used here to differentiate from that and instead to encompass members of the public who use and care for particular public assets.
2.2  Context- immediate & peripheral

The Context here is defined as the larger spatial environment in which the Agents and Aggregate are embedded in, and hence operate. There are two layers here- one being the more immediate focus (be it a creek or a park, for example), and the other being the influencing periphery. In order to begin comprehending this finite stretch of land and resources enmeshed in a complex urban fabric, and the underlying dynamics, one perhaps needs to begin by generating an exhaustive list of resources and assets, both natural and man-made. For instance, from the case study dealt with here, this may comprise the following:

- Natural features – Geography, topography, soil conditions, local climate
- Built features – Amenities (e.g. paths, trails), and varying land-use interventions (residential, commercial)
- Adjoining features – Influence of significant natural or man-made features nearby (e.g. seas, rivers, roads and highways, large-scale construction), Links to other open spaces
- Flora and fauna – Habitat, Wildlife corridors
- Water supply & drainage

The importance of this Context is of course owing to the region (the Creek corridor) being the primary study objective. Another secondary focus comes up when locating the various Agents and Aggregates within this, and mapping their zones of interest and influence. The varying features of the context offer the diverse participants means to ‘act’ out their functions and behaviours, and hence influences their everyday decisions and actions. Studying these relationships closely can reveal greater insights into the underlying dynamics of the system itself, and its evolutionary path. Any platform that makes explicit the participants (Agents, Aggregates) and the underlying Context needs to inherently allow for these collaborative and dynamic information overlays. (This is explored further in Section 3).

2.3  The role of contemporary technologies

As seen above, there are different kinds and levels of information that go into the process of collective knowledge-making. Being predominantly visual & spatial information here (when dealing with a spatial region), the best way to deal with this would definitely be the layered and digital map, as seen in contemporary mapping platforms such as Google Maps or Wikimapia. Involved agents can monitor and insert points of interest or action as a map overlay, e.g. geo-tagged photographs uploaded on a periodic basis can also depict the impact of changes over time. This hence becomes a dynamic portal or virtual mirror to study the dynamics of the systems under observation, and the effects of all its interacting elements over time. We now look at some innovative experiments in new technologies that illustrate this.

2.4  Relevant case studies

There are numerous projects in the international domain that seek to achieve the objectives laid out in the above sections, in their own ways. One of these, selected from the projects’ pool & community familiar to the authors, is the India Biodiversity Portal (see Pitroda et al, 2007). This is an online dynamic repository of user-generated information pertaining to geographically distributed biodiversity (see Fig. 3). Built on an
open Content Management Platform (CMS) and deploying Google Maps as a base, the website is ‘designed to harness collective knowledge, seek voluntary participation of users and establish a participatory platform for content generation, verification and usage’.

To achieve this, the portal makes use of map overlays which are classified into three main categories – Layers by Theme (e.g. Abiotic, Biogeography, Species), Layers by Geography (based on states/regions) and Participative Layers (clusters of community interest). In this manner, it attempts to be an inclusive platform to ‘Explore, Contribute, Search & Measure’ from a diverse range of participants, and is ‘expected to be of interest to researchers, hobbyists, professionals, naturalists, policy makers, activists, educators and students, as well as the curious citizen and the netizen’.

![Figure 3. The India Biodiversity Online Portal](http://indiabiodiversity.org/map)

A web-based community platform designed to be one in ‘perpetual beta’

The support for developing this portal comes from some key environmental activists (Agents) based in numerous non-governmental organizations, and is now even endorsed by the National Knowledge Council (Govt. of India). However, the drawback in this case is that, being a national level initiative, there needs to be a core team just for developing and continually managing the platform. This perhaps demonstrates one end of the spectrum, where strong collective drive and a coordinated effort can (with basic investment & free technology platforms) achieve great results. On the flip side, the issue here is that setting up such a platform still requires and relies on an external mediator (a dedicated web development team, in this case). In other examples described later in this paper (ref. Section 4), we find alternates where simpler but equally effective platforms are initiated and deployed by the community members themselves, without relying on any external assistance.

3 Towards a common knowledge base (Part B) - revealing & mapping interconnections, relationships

Once the quantitative base-layer of Agents, Aggregates and Context is made ‘visible’ or explicit via a shared platform, the next step is to investigate the characteristics and
properties that go into the richness of their connections. These are qualitative measures to
distinguish and differentiate the multiple types of actions, interactions and relationships
involved. Traditional means of studying systems would deploy limited computer
simulations, based on assumptions, to match the observables, as a means to this.
However, when dealing with a real-world / real-life open system, with several
indeterminate and emergent factors that may not even be taken into the operative rules of
the simulation, an alternate is provided here. A dynamic data driven approach is
suggested (as derived from other streams of complexity sciences – see ISC-PIF 2010,
Pentland 2010, Ratti 2009 & 2010) to unpack the numerous dimensions of behaviour and
function (and their effects). This mode operates via sensing and monitoring on-ground
conditions, the ‘vital signs’ so to speak, to bring value to the base data already gathered
by helping compare collective assumptions versus actual effects; resulting in richer
insights and hence models of comprehension.
A critical notion here is that of *Time*, and changes in/over time- and in order to
account for this, one must constantly and continually monitor on-ground conditions in
and around the sub-systems being considered. Related to this is the concept of the time-
span, which in turn implies the frequency of change, seen as generated + collected ‘data’,
and the lifespan of that recorded data. A combination of the previous notions- of agency
and context (seen as acting in realms more *Spatial*)- infused with the acknowledgement of
the *Temporal* - can be quite beneficial when building community knowledge, and thus,
participation. The following sections describe this in more detail.

3.1 *Time, complexity, and cognition*

For all dynamic living systems, there exists several feedback mechanisms in place for
their processes and subsystems, to ensure information / signals from critical stages or
events are passed on to the regulatory or control mechanism, in order to make appropriate
changes (see Hall 2005).

This mechanism becomes even more significant in the subsequent evolutionary
changes of the system, as it moves to increasing levels of complexity. Beyond a certain
stage, ignoring these critical signals can lead to systemic failure, or even death. In the
case of urban complex systems, being largely man-made, we find this feedback
mechanism severely lacking. In order for these coupled human-environment systems to
become more optimal, sustainable and successful in their functioning, it would be
appropriate to introduce these processes through the already pervasive and ubiquitous
overlay of technology that exists today- the web, sensors and mobile phones. Some of this
already exists in the city today in other ways- the all too familiar 911 or 000 calls and the
more-recent 311 non-emergency reporting service. It would now be beneficial to extend
this paradigm to other areas that would assist richer models of comprehension for the
numerous dynamics in the networks that make up the city. This additional and temporal
capability, when infused into the base-layer of information already in place (as described
in Section 2 above) would greatly enhance the processes of community knowledge-
making - which can alternatively be seen as an increase in the cognitive capabilities of the
collective itself (see Hall 2006).

3.2 *Dynamic and real-time Data*

As mentioned above, there already exist many modes and means for the active agents
of a community to collect and upload many kinds of raw data (Pentland 2009, Calabrese
2010, Rojas 2008). The zones of influence mentioned earlier (in the description of agents-
Section 2.1) come into play here, along with its associated notion of time-span. For
instance, in the case of Moonee Ponds, a home or land owner near a certain section of the
Creek would focus on that narrow frame/region on and near his property and relevant
changes specific to that area over shorter, more immediate spans of time. The kind of data
collected by this agent could range from sensor data about environmental conditions, or
photographs over durations of time, to other narratives, documents and records from his
personal ‘archives’. Other agents, say a representative from an interested body such as
Melbourne Water, would have longer term data, such as static maps and records
addressing plans and changes across the entire length of the Creek and over larger spans
of time. By comparing and contrasting these two sources of data via the same platform or
interface, the distinctions between perceived and actual data (and knowledge) become
apparent, and shareable, for the community to collectively study and decide appropriate
action points.

3.3 Relevant case studies

There have been several urban experiments both local and global that deal with the
capture and visualization of dynamic urban data in order for communities of interest to
make use of it. One instance of each is briefly described below, along with the inherent
strengths and/or drawbacks.

The first example is that of Neat Streets (see Kuruppu 2010), in Australia and New
Zealand (ref. Figure 4a). With a view to getting more urban issues (such as road
obstructions, vandalism) resolved- and faster- by way of non-emergency reporting, the
Neat Streets application can be downloaded to most GPS-enabled smart-phones. Users –
interested or active members of the community- are encouraged to send in a photograph
and brief description (automatically geo-tagged), then sent to the data centre for further
action. The web portal displays this overlay on a map. Though this is an ideal system for
a certain range of issues and involvement, it lacks the scalability and portability required
to become an effective and comprehensive platform for community knowledge and
decision- making, which usually includes other forms of information or data.
Figure 4a: Neat Streets addresses non-emergency reporting by citizens, for maintaining a close watch on conditions on city streets

Figure 4b: Trash Track in action – this MIT Senseable lab’s initiative meticulously tracks trash from its origin to final ‘resting place’

The next example is from Senseable labs at the Massachusetts Institute of Technology (MIT), in Fig 4b (unpublished; see Sentient City 2009). Trash Track is one of the flagship projects at the lab that addresses various urban interventions via digital means. This project was initiated as a brief experiment to demonstrate the role of technologies to assist in revealing unseen networks within the city, in this case- trash routes. To do this, any trash generated at the lab for a specific time period was tagged with a smart location-aware chip (based on GSM technologies). The location data read for the subsequent days could then be collated and visualized. Though demonstrating the effective use of mobile technologies and the pervasiveness of the same, the project is seen as resource intensive, requiring each article (of trash) to be tagged and monitored, as also a fair degree of proficiency with mobile technology. This hence also restricts wider, mass appeal, when dealing with communities of interest with diverse membership. We take these insights into account later in the paper, when proposing the ICT-driven framework.

4 An ICT-driven interface to complexity

As described earlier in Sections 2.1 and 2.2, the sheer number of relationships and interconnections that comprise such a small slice (viz. the Moonee Ponds Creek) of a larger urban complex system (the city of Melbourne) can prove to be a difficult challenge whilst putting together a strategic plan that can be agreed upon by all members of the community. In order to assist this process of building a shared knowledge base for collective intelligence, we have seen that there already exist various technological tools and aids (sections 2.3 and 3.3) which are participatory, inclusive and easy to use.

The role and importance of emerging technologies in the changing nature of urban ‘planning’

Being constantly ‘plugged-in’, the web and the large number of mobile devices (and other handhelds) that we constantly carry and employ, become active markers for our
activities and interactions. In addition to the feedback mechanisms that this brings into place, there is also a form of bi-directional contact and communication. Hence, agents can connect with other agents or even the aggregate, and vice versa, in real-time. The context or environment, when integrated with arrays of sensors and actuators, can also be seen to send and receive signals. As illustrated earlier, this real-time and pervasive sensing (or visualization) of systems, that reads dynamic data streams off the systems being studied, is evolving to be the predominant method of understanding urban systems today. This process would imply a sub-process of making sense of the data in ways that would be advantageous for a collective and sustainable future, for a range of very diverse participants. To clarify, this would involve some form of planning, but in a way that counters the very logic of traditional urban planning as a top-down approach. The new alternate would have to incorporate the bottom-up, and effectively remove any central authority. The role of the planner would now be that of an interface, or mediator, allowing continual dialogue and multiple exchanges between Agent, Aggregate and Context.

There is hence now a need to develop a comprehensive and open platform for this; one that is capable of presenting an overview of the systems under observation and discussion, and visualizing /sharing dynamic real-world data easily. In other words, this can be an interface to complexity- to comprehend, build shared knowledge, and aid in decision-making. Being predominantly driven by recent tools from information and communication technologies (ICT), this would inherently be a digital web-based interface, with the following:

- Explicit and detailed listing & descriptions of key Agents, Aggregates and their zones of influence; via a dynamic online platform
- (Dynamic and digital) map-based spatial representation of regions under consideration, with the ability for incorporating user-generated layers. This too would ideally be web-based- a centralized platform for reference, conversations/discussions, and for capturing inputs from the participants (see next point, below)
- Ability to assimilate and depict / visualize real-time raw data to illustrate changes over time, and over a range of formats (text, video, audio, stills). This data can be generated via the participants’ mobile devices (and even sensors/actuators where needed), intermittently connected to the primary web platform by various means

This mediating space too makes use of technology in ways both informational as well as tangible and can bearchitected into a comprehensive framework of ICT enabled modules that assist the various processes of collective knowledge-making. An indicative diagram or rudimentary schema of this proposed framework is presented in Fig. 5 below.
Figure 5: A schematic situating a proposed system for mobilisation of community knowledge. The ongoing requirement for generating policy documentation with respect to public space through processes involving statutory landholders and community “friends” groups is seen in the 2010 context provided by the introduction of new non-emergency reporting systems. Together these suggests an opportunity to develop accessible processes which encourage the submission, cataloguing and reference of particular local knowledge by making use of current technological means, knowledge which would otherwise be left in the heads and bottom drawers of non-traditional owners.

Once the base layer of visualization is achieved with the constant assimilation of generated data by users (embedded and spread across the width + breadth of the system), one can go about envisioning the next step- the real challenge of comprehending the complexity of an evolving ‘living’ urban system and reaching some form of collective consensus for strategic intervention, and maintenance.

Prior and ongoing work in related fields (e.g. Computer-supported Collaborative Work, Collective Intelligence, Groupware) illustrates that this is a predominant and critical area of research in today’s information age (see Rheingold 1993, Levy 1994, Schuler 1994). Other closely related works and projects (see Hall et al, 2010 & RCL 2008) that make use of open platforms such as Google Sites for this process are built upon a related schema. Though beyond the scope of this paper to compare and integrate these approaches, it is hoped that this adds to the discourse, and supplements the learnings and endeavours towards that shared goal.
5 Conclusion - the future networked urban ‘organism’?

Assuming this transition is achieved, of initiating and establishing the ICT interface, and the network reaches a higher level of connectivity and hence complexity, the next question would be that of where/what next. From the perspective of the numerous evolving complex adaptive systems that we see around us (including us as a species; also see Chaisson 2001), some pointers can be seen, as detailed out below.

5.1 Evolving the ICT interface to complexity

From the basic building blocks described in the schema, we see that the initial desired generic attributes of the interface would read as follows:

- Flexible, open-ended
- Scalable, modular
- Portable & replicable; open-source
- Layered, hierarchical; digital
- Capacity for links and annotation

Moving on from this basic list, we now envision a systemic ICT interface for complex dynamic information that builds upon learnings from real world dynamic living systems. In order to achieve this, the parameters or capabilities that need to be built into these coupled socio-technical ICT systems of the future would read as:

- History, archive, memory
- Anticipation, sensing, monitoring
- Learning, comprehension, reflexivity
- Innovation, creativity
- Self-organization, autopoesis (Maturana & Varela, 1980), evolution
- Resilience, versatility, vicissitude

A truly interconnected, enmeshed and co-evolutionary complex urban system – that includes the ICT interface overlay- would act as a collective entity that is responsive to other adjacent and similar entities (sub-urban areas, towns, other cities) and the natural environment it is a part of. This brings along with it a greater ability to increased cognition through coordination at a sensory-motor level, optimising relationships between the users and the natural or built/infrastructural elements. This would hence result in lesser wastage, greater degrees of awareness, and hence increasingly sustainable ways of living. This would, it is hoped, also increase the resilience of such urban systems to better cope with unseen and unforeseen perturbations or disruptions (now commonly referred to as VUCA; situations which are Volatile, Uncertain, Complex and Ambiguous, based on Richard 1997).

As the evolutionary aspects address all contained and enfolded by the urban systems being addressed, it can be said that the outcome would head toward the direction of a more sapient urban entity, not too far metaphorically from the image of the human body wherein many different parts and elements work together in sync towards the ideal of better living.
References

Referenced in Figure 2

Referenced in Section 3.2

Referenced in Section 5

Referenced in Section 3.1

Referenced in Section 3.1

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Free technology for the support of community action groups: theory, technology and practice

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Structured Abstract

Purpose – Urban areas are administratively complex, and bureaucrats are often overburdened, which means they are often working at what Herbert Simon called the bounds of their rationality. Thus, responsible bureaucrats may have little genuine knowledge of issues within their briefs that impact community members. Groups concerned with such issues may emerge in the community. Given their focus, members of such groups will have issue-related local knowledge; and probably also the time and effort to share and assemble such personal knowledge into practical and informative group proposals. This paper reviews this situation and demonstrates how simple to use and freely available socio-technical tools can be applied to support knowledge based community action.

1 Although styled as a formal journal paper, this document is written as a hypertext intended to be read on a computer screen connected to the Internet; in itself demonstrating some of the Web technologies it discusses. References in the text are linked to the full bibliographic citation. In turn, most citations link with a single click to the full text of the item referred to via the TinyURL link. The URLs are provided, not for bibliographic detail, but as simple one-click connectors to the full content of the referenced item. All URLs are valid as at 22 September 2010.
Design/methodology/approach - The paper provides a theoretical framework for community action, discusses some of the revolutionary cognitive technologies that provide tools for implementing the framework, and presents a template based on two of Google’s cloud computing applications: Google Sites and Google Docs to demonstrate how the technology can be used (see “Template for Knowledge-Based Community Organizations” - https://sites.google.com/site/organizingcommunityaction/)

Originality/value – The theoretical framework is new, and we are unaware that such an approach towards the support of community action groups has been previously documented.

Practical implications - The generic tools demonstrated are free and may be used by anyone with an internet connection and a Web browser. They provide action and other social groups with simple yet sophisticated tools to collect, and assemble personal knowledge; and to transform it into community knowledge. Properly used, the tools can provide bureaucrats with the necessary background knowledge to make rational decisions about allocation of resources, etc. to deal with various kinds of situations. The template developed for this project demonstrates capabilities of the cloud computing tools.

Keywords – social technology; community knowledge management, cloud computing; organization theory; bounded rationality

Paper type – Academic Research Paper

1 Introduction

This work relates to the sociological concept of “community action”. Somewhat following Bryant (1972), community action denotes any emergent or external attempt to form or involve local groups in voluntary self help schemes or as participants in the process of statutory policy making and service implementation. Thus, a community action group is a group of people formed in the community to promote, guide, or carry out social, political or practical objectives of interest to the community. We are particularly concerned to explore the roles of knowledge and information in the formation of such groups and the achievement of their goals within the governance frameworks of urban and regional environments. Action groups are at the far end of the spectrum of knowledge based communities including communities of interest and communities of practice (Brown & Duguid 1991; Wenger & Snyder 2000; Nousala 2006). Compared to communities of practice, which often are informal subdivisions within the structural hierarchy of existing organizations, action groups are normally independent, self-governed and usually formally constituted groups of people with their own self-determined goals. Historically, action groups have emerged in local areas from the face-to-face social interactions and collective work of people sharing common concerns and interests. The new Web-based technologies demonstrated here have been tested in community action groups, but provide all kinds of knowledge-based groups with powerful tools for assembling, sharing, and applying knowledge and enable virtual participation in group activities.

We present here a theoretical framework for community action, discuss some of the revolutionary cognitive technologies that provide tools for implementing the theory, link to a working template demonstrating how the technology can be used, and make some very preliminary observations from ongoing case studies where the technology has been recently implemented. Given that the specific technologies we are concerned with here
have only become fully functional this year, there has been no opportunity to study their use over long time scales.

Urban districts are complex adaptive systems comprised of hierarchically dynamic networks of social, physical and economic interactions among their inhabitants. Such systems have many of the properties allowing them to be considered autopoietic (i.e., living) at a level of hierarchical organization above people and below economic or statutory organizations comprised of people (Simon 1962, 1973; Miller 1978; Maturana and Varela 1980; Salthe 1985, 1993; Hall 2003, 2006; Hall et al. 2007). All the activities involved in maintaining the organized urban fabric of the district are to some degree knowledge-based and would not function without the material and structural implementation of that knowledge. Here we consider how individual people can work together in the interface between the complex systems of urban and regional governance and the physical environment to ensure local and personal knowledge is available to guide and constrain activities of administrative juggernauts.

Governing bodies make decisions to do things in the world at many different levels of organization, whether by committees, individual bureaucrats or designated workers. All decisions involve boil down to individual people choosing among various alternatives based on available knowledge. Under the label, “bounded rationality”, Herbert Simon explained that the rationality of decisions is limited by the amount of information that can be held in the mind, processed and understood (Simon 1955, 1979; Else 2004; Hall et al. 2007, 2009). If these limits are breached by lack of pertinent information that can be found in the available time or an overload of irrelevant information, decisions become increasingly irrational. However, suboptimal decisions are still often better than no decision, so Simon recommends developing means for “satisficing”, i.e., to provide tools to make the “best” decision one can in the time available.

One solution is to devolve organizational decisions closer to the problems. Another is to more effectively filter decision related input to genuinely critical information and tested wisdom (Hall et al. 2007). Greiner (1998) observed that growing businesses had to survive several revolutionary transformations in management structure to achieve success. The successful revolutions represent changes that kept operational decisions within the limits of rational decision making. In other words, decisions need to be made by people who are close to and well informed about the issues being decided (Hall et al 2009).

Within large social systems, action groups can emerge from networks of people with interests in particular problem areas (Nousala 2006; Nousala & Hall 2008; Nousala et al. 2009). However, there is a large gap between the emergence of an action group; and assembling their personal knowledge into coherent explicit structures to support rational decisions by a bureaucrat or functionary. We next look at some theoretical considerations involved in understanding and bridging this gap.
2 Theory of knowledge-based organizations

2.1 Theory of knowledge

What “knowledge” and “information” mean in the organizational knowledge management discipline is contentious (Hildreth & Kimble 2002; Stenmark 2002; Wilson 2002; Miller 2002; Land 2009. Here we adopt Karl Popper’s (1972) definition that knowledge is “solutions to problems”, whether this knowledge is contained in someone’s thoughts, articulated in speech, written on paper or embodied in the structure of an artefact. In this framework, “information” refers to variations and uninterpreted codes that may store and transmit knowledge, i.e., Bateson’s (1972): “differences which make differences”.

Donald Campbell (1960, 1974) coined the term evolutionary epistemology for the understanding he and Popper had that knowledge was something that grew from living entities’ experiences with the world through trial and error learning, “blind variation and selective retention” (Campbell 1960) or “tentative solutions and error elimination” (Popper 1972).

One of Popper’s concerns was to differentiate between fantasy and belief on one side and “scientific” knowledge, i.e., knowledge that could be trusted to be reasonably reliable (Popper 1959, 1963, 1972). Such knowledge is built over time through fallible cyclical processes beginning with speculation based on “general” knowledge and observation, and progressing through trial, error-elimination and sharing of results, followed by subsequent rounds of further speculation based on shared knowledge (Osinga 2005; Hall et al. 2007). Understanding how this cyclical process can work most effectively in an increasingly socio-technical environment is crucial to making the most effective use of knowledge-based activities in the urban systems environment.

What makes knowledge reliable from a Popperian point of view? Scientists and others may claim to know something reliably. However, no matter how many tests a knowledge claim has survived; it can never be equated to truth (where truth is the complete correctness of a claim about the real world - Popper 1959, 1963). However, something about the conduct of science still contributes more to the growth of knowledge than do fantasy and belief. To clarify his thinking about the evolution and growth of knowledge, Popper (1972) introduced an ontology of three worlds, as extended by (Hall 2005, 2006; Hall et al. 2007; Vines et al. 2007, 2010; Hall & Nousala 2010):

1. World 1 (W1 - physical events and processes) is dynamic physical reality and everything in it, including physiology.
2. World 2 (W2 – cognition and living knowledge) is the domain of embodied behavior of agents, mental states and processes, and structural (i.e., tacit) knowledge. Embodied knowledge is the system’s propensities to act in certain ways in response to particular situations. By extension, W2 includes the embodiment of all kinds of cybernetically self-defined and self-regulated dynamic processes. In other words, W2 contains the semantic significance or meaning of cognitive processes and their results in living systems, while the physical dynamics of the matter remain in W1.
3. World 3 ("W3" - objectively persistent products of knowledge) is the domain of persistently codified knowledge, where encoded content can exist objectively and independent from a knowing entity. Popper defined W3 to include "the world of the logical contents of books, libraries, computer memories, and suchlike" (Popper 1972: p. 74) and "our theories, conjectures, guesses (and, if we like, the logical content of
our genetic code)" (Popper 1972: p. 73), while the physical structure of the codified content remains always in W1. W2 mediates between W1 and W3.

Knowledge evolves and grows as claims in W2 are shared via social expression and codification in W3, and strenuously tested against W1. Claims that survive personal criticism and intersubjective testing are clearly better than those that fail such tests.

Popper (1972) summarized his ideas in what he called his “tetradic schema”, or more boldly, his “evolutionary theory of knowledge” (Figure 2). Popper developed his evolutionary epistemology primarily in the context of human cognition. We argue that knowledge is formulated and applied by living systems (Hall 2003, 2005, 2006; Hall et al. 2005) across several hierarchical levels of organization (Miller 1978; Salthe 1985, 1993) including living cells, multicellular organisms including people, and social and economic organizations (Nousala and Hall 2008; Hall and Nousala 2010).

Figure 2. Popper’s “general theory of evolution” (1972: p. 243). $P_n$ is a problem in the real world. $T_{Sm}$ are tentative solutions (or theories) the entity may embody or propose in W2 to solve the problem. $EE$ represents a process of selection imposed by W1 on the entity applying the tentative solution, or a process of criticism and error elimination in W2 that selectively removes those solutions that don't work in practice. $P_{n+1}$ represents the now changed problem situation remaining after $P_n$ is solved. As the entity iterates and reiterates the process, it constructs an increasingly accurate representation of external reality.

The knowledge management literature provides many different learning cycles (e.g., SECI - Nonaka 1991; “knowledge life cycle” - Firestone & McElroy 2003; double-loop learning - Blackman et al. 2004, etc.). We prefer the terminology associated with John Boyd’s OODA loop process (Boyd 1996). Not only does this have a very robust derivation from multiple disciplines in the worlds of history, philosophy, physical and biological sciences, complexity theory, (Simon 1962, 1973; Salthe 1985, 1993) and military affairs (e.g., Grant 2005; Grant & Kooter 2004; Oisinga 2005), but it directly applies Popper’s evolutionary epistemology to building knowledge about real world situations (Hall 2003, 2005, 2006; Hall et al. 2007; Vines et al. 2010). The OODA loop involves iterated processes of:

4. Observing (i.e., collecting sense impressions of the world),
5. Orienting (sense-making, relating observations to prior knowledge, generating tentative solutions, logic testing, planning, etc. – Grant & Kooter 2004),
6. Deciding (selecting a tentative solution),
7. **Acting** (applying the selected solution/plan to the real world). The next iteration repeats, beginning with observations of the world – including effects of the action.

OODA or knowledge building cycles generally involve interactions of the three worlds (Figure 3). In a social context, W2 knowledge may be exchanged among individuals tacitly or by articulating and exchanging explicit claims via W3. In a community environment we are particularly interested in tacit exchanges between the W2’s of different individuals (that may involve the articulation of ideas via speech) and capturing and sharing such knowledge explicitly via W3. With iterated cycles of knowledge building and testing, knowledge of the world grows more reliable with time, and thus becomes more trustworthy.

![Figure 3. Cyclic interactions of knowledge and control between Popper’s three worlds.](image)

Boyd (1996) also emphasized the importance of time in the observing, orienting, deciding and acting cycle. Speed of decision is often a factor in solving real world problems that can escalate if not dealt with in good time. However, it is important to consider the impact of time and the quantity and quality of knowledge on decision makers (Simon 1947; 1957; 1969).

Basically, in the real world there is never enough knowledge and time to fully understand and assess a problem and alternative solutions in order to make the perfect decision (Simon 1955, 1957, 1979; Else 2004, Hall et al. 2007). These limitations prevent decision makers from knowing and understanding everything they would have to have in their minds to make perfect decisions. Thus, organizational systems should be constructed to facilitate the time-consuming tasks of information gathering and the creation and assessment of alternative (i.e., “tentative”) solutions. Those making decisions must “satisfice”, i.e., to try to optimize their information gathering and thinking strategy to make the best decisions they can within the bounds of time and the knowledge that is available when and where it is needed.

Thus, “knowledge” is solutions to problems, the value of which depends on the degree to which it has actually been tested against the real world. In this context, “information” is a “difference which makes a difference” (Bateson 1972) or a significant arrangement in the structure of a system that could have been different without any different expenditure of energy (after Saltthe 1993).
2.2  *Hierarchically complex organizational systems and epicyclic knowledge growth*

In seeking to understand how organizational knowledge grows and can be managed in large multi-level organizations, we have studied a variety cases, such as:

9. industry clusters (Hall 2006a; Hall & Nousala 2007), and
10. the knowledge society (Vines et al. 2010; Hall & Nousala 2010a).

In conjunction with the casework cited above, we are constructing a theory of organizational knowledge combining the evolutionary theory of knowledge discussed above with Maturana and Varela’s (1980) autopoietic theory of life (Hall 2003, 2005, 2006; Nousala & Hall 2008; Hall & Nousala 2010) and the theory of hierarchical systems.

Where a complex dynamic system at any level of organization is autonomously able to act within its environment to self-produce and maintain its dynamic state of organization, it may be “autopoietic” (= “self” + “production”) or living. As defined by Maturana and Varela (1980), systems are autopoietic when they meet six criteria considered necessary and sufficient to recognize when a complex system could be considered to be autopoietic, and thus living (Varela et al., 1974 – paraphrased here):

11. **Bounded** (demarcated from the environment),
12. **Complex** (different components within the boundary),
13. **Mechanistic** (system driven by energy dissipation),
14. **Self-differentiated** (system boundary intrinsically produced),
15. **Self-producing** (system produces own components),
16. **Autonomous** (self-produced components are necessary and sufficient to produce the system).

![Figure 4](image-url). A hierarchically complex system examined from a specified focal level (From Hall et al. 2005)
Based on the theory of hierarchically complex systems (Simon 1962, 1973; Koestler 1967, 1978; Miller 1978; Salthe 1985, 1993, 2004 - Figure 4), systems at the focal level are components of a single higher level system functioning as an environment for the focal systems. Subsystems below the focal level are components of focal level systems. In this model, large organizational structures involve several hierarchical levels or epicycles of knowledge building and testing. In each epicycle there are continuous exchanges between the personal or tacit knowledge of individual people and articulated and explicit forms of knowledge that can be shared among people involved (Hall & Nousala 2010a; Vines et al 2010).

Hall and Nousala (2003, 2005, 2006; Hall et al 2007; Vines et al 2007; Nousala and Hall 2008; Hall & Nousala 2010) combine autopoiesis, hierarchy theory and evolutionary epistemology to argue that knowledge-based autopoietic (living) entities can emerge and evolve at several levels of organization:

17. **single-celled organisms** where knowledge is embodied in the dynamics of cellular structures (W2) and codified in DNA (W3),

18. **multicellular organisms** where knowledge is embodied in the dynamics of cellular interactions, epigenetic structure and socially transmitted knowledge (all W2) and as codified in sexually exchanged DNA codes (W3) – Jablonka and Lamb 2005, 2007), and

19. **social and economic organizations** such as companies comprised of people and their technologies where knowledge is embodied in the dynamics of human interaction, the structures of organizational routines, plant and equipment layout and tacitly accepted organizational jargons (all W2) that Nelson and Winter (1982) called organizational tacit knowledge; and as explicitly codified in organizational documentation.

Based on the complexities of human interactions in organizations comprised of humans, it is also likely that other autopoietic entities can emerge at intermediate levels of organization between individual people and large socio-economic organizations (e.g., communities of practice and other kinds of communities – Nousala & Hall 2008; Nousala & Jamsai-White 2010; Nousala et al. 2010) or at higher levels yet than single organizations (e.g., nation states – Wendt 2004; and industry clusters – Hall 2006a; Hall and Nousala 2007). Urban and regional councils are organized entities existing between people and the state, while community organizations such as we are considering here emerge between people and councils.

The properties of autopoiesis are embodied in the persistent organization of the dynamic network of interactions among the components of a system; whereby autopoiesis is perpetuated as its structure changes continually from one adjacent possible state to the next as matter and energy pass through it. Kauffman (2000, 2003) and Kauffman et al (2008) define the “adjacent possible” as all possible configurations of system components that could be reached in the next instant from the present configuration. For any system with many components, the adjacent possible is a vanishing small fraction of all configurations that are physically possible. A living system remains living as long as aspects of this favourable structure persist through time; e.g., as the system progresses from one instant to the next, most of the adjacent possible states fall within an attractor basin affording the properties of autopoiesis. Where the system lacks capabilities to compensate for perturbations to the structure such that the next state falls outside of the attractor, it disintegrates and any knowledge it held is thus selectively eliminated (Popper’s 1972 “error elimination”). What remains in surviving autopoietic systems after
error elimination are those structures embodying structural or codified knowledge that has survived the test. Thus, the *history of problems survived as embodied in its structure* in the present instant represents “structural” knowledge in W2.

Figure 5 illustrates our concept of a knowledge-based autopoietic system at a selected focal level within the complex systems hierarchy (Hall et al., 2005; Nousala and Hall 2008). Autopoietic systems are comprised of many coupled cyclic processes (i.e., epicycles) driven by the dissipation of energy between high potential sources and low potential sinks coupled to the transformation and transport of other inputs from sources to products and waste (“other outputs”). Subsystems and processes comprising the entity are indicated by looped arrows to indicate their largely cyclic nature. Some of the flow through the system is fed back into the system itself to maintain system integrity against entropic tendencies to decay. Some subsystems are fully determined aspects of the focal system, while others may be autopoietically cooperating subsystems. Ultimately, all cycles and epicycles within the system are driven by the dissipation of high potential energy transported from sources to sinks (Prigogine 1955; Morowitz 1968; Salthe 1985, 1993; 2004; Chaisson 2001; Hall 2006). The capabilities of the focal system are determined by those of its components and their possible interactions, and the focal system’s activities are constrained by selective processes to meet its problems or imperatives for survival, such as maintaining an internal environment where its subsystems can function within the environment created by the higher level supersystem. The higher level supersystem provides the focal system with its external environment that constrains its behaviour to stay within the bounds of what is possible within that environment. Further constraints are provided by prior history and knowledge that determine what is possible for it to do in the next adjacent possible.

![Diagram](image)

**Figure 5.** The knowledge based autopoietic system in its environment within a higher level system (from Hall et al. 2005).

Urban councils and their delegates are responsible to provide services necessary for civil life and for maintaining peoples’ health and amenities. To do this functionaries need to know who, what, where, when, why and how-to relating to problem areas. Based on ideas from Hall (2003, 2005), Nousala (2006), Vines et al. (2007), Vines et al. (2010), Hall and Nousala (2010a). Figure 6 illustrates the application of this theoretical framework to epicyclic knowledge acquisition, building and acting in the urban
environment. We recognize knowledge-based autopoietic systems in at least three nested levels of organization:

20. *Individual people* ("I"). When concerned about a particular problem area, individuals may go to considerable lengths to gather explicit knowledge in the form of existing documents, photography, maps, records of measurements, etc; as well as developing his/her personal knowledge. This knowledge building may involve cycles of *Observing, Orienting, constructing Tentative Theories, and acting to Eliminate Errors.*

![Knowledge cycles in urban governance (derived from Vines et al. 2010).](image)

**Figure 6.** Knowledge cycles in urban governance (derived from Vines et al. 2010).

Noosphere is the sum of human knowledge. Individuals, groups and councils all draw from and add to this store of knowledge as consequences of their activities.

21. *Community action groups* ("WE"). Where individuals in the community face similar problems, they may share concerns and knowledge to stimulate the emergence of a community group (Nousala and Hall 2008) to resolve the problem. Group knowledge building may involve sharing personal knowledge and building a group repository of documentation and observations. The success and sustainability of the group will depend to a considerable degree on the success of the personal interactions in assembling useful knowledge and action plans.

22. *Councils* ("THEM"). Councils are complex bureaucracies, organized into departments responsible for problem areas. Decisions to formalize actions tend to be centralized, where the bounds to rational decision making are likely to be the greatest (Hall et al. 2009). Committees or officers making decisions often have little or no personal knowledge of specific problems. Groups close to the problems can play important roles by collecting, organizing and presenting their collective knowledge in formats easily used by functionaries. Ideally, action groups can function as knowledge building epicycles supporting councils’ own knowledge building activities.

23. *Noosphere* (Krippendorff 1986). (a) The space occupied by the totality of information and human knowledge collectively available to man and (b) the cybernetic processes operating in this space. This includes all kinds of knowledge artifacts in W3 and the collective personal knowledge of humanity in W2. I, WE and THEM can all draw on the collective knowledge and wisdom of the “Noosphere”.

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The idea of the Noosphere derives originally from discussions among Valadimir Vernadsky (who also coined the term “biosphere”), Teilhard de Chardin, and Edouard Le Roy, that initially had mystical and vitalistic connotations (Turner 2005). Turner reviews and updates the concept in a way that corresponds with our usage here. The noosphere is the net product of the global diversity of knowledge ecologies like those shown here in Figure 5 and described by Hall and Nousala (2010a) for peer-reviewed journals and Vines et al. (2010). The knowledge ecosystem comprises all of the living and cybernetic entities using and contributing the knowledge forming the noosphere (e.g., see Pallaris & Costigan 2010).

3 Technologies for socially constructing and sharing knowledge

In less than a lifetime, the invention and integration of various cognitive tools and production technologies have extended human mental capacities far beyond the bounds of human brains. Humans have become “post human”, where people and their machines are now symbiotic (Licklider 1960; Pepperell 1995; Hayles 1999; Hall 2006b; Yakhlef 2008). Organizations have become “socio-technical”, i.e., comprised of people plus their tools, machines and technologically mediated processes (Harvey 1968). Over the last 30 years, tools such as personal computers and the internet have extended human cognition to radically revolutionize people’s interactions in organizations so that people in today’s organizations are cognitively knitted together with a wide variety of technologies extending cognition beyond the mental bounds of human bodies.

3.1 Technological revolutions change the nature of human cognition

Progress towards these post-human capabilities involved four revolutions in technology enabling major cognitive revolutions, each supporting huge changes in the biological nature of the human species in terms of their abilities to solve problems in their interactions with the world (Hall 2006b):

24. Speech and teaching transfer articulated knowledge from one human memory to another perhaps 100,000 - 200,000 years ago.

25. Writing and reading record and transmit knowledge external to human memory >5,000 years ago.

26. Printing technology and near universal literacy vastly extended human memory 560 years ago.

27. Electronic content creating and processing technologies (i.e., word processing, spreadsheets) and the Internet for individuals extended cognitive processes beyond limits of human brains around 30 years ago.

Since Hall’s (2006b) paper, a fifth major revolution is expanding post-human cognitive capabilities at a still increasing pace.

28. Semantic, social and cloud computing technologies (i.e., “Web 2.0”) support the emergence of collective cognitive processes at group and organizational levels (Hall et al. 2008, 2010; Vines et al. 2010; Hall and Nousala 2010a).
3.2 Computers externalize aspects of personal cognition

Microelectronic technology able to support the personal computing revolution had its origin around 1971 when Intel launched its first large-scale silicon chip-based microprocessor, the 4 bit 4004 (Aspray 1997). This was followed in 1972 by the 8 bit 8008 processor which powered the first personal microcomputers (Stachniak 2003). Since then Moore’s Law (Intel 2007) has led to exponentially increasing computing power. Today, processing power, transmission speed and storage capacity per dollar are increasing exponentially at rates approximating 37, 19, and 26 percent per year, respectively – with no evidence that technological limits will be met soon (Koh & Magee 2006; Chang & Baek 2010). The physical communications backbone connecting these computers at light speed is provided by Internet that began its development in the 1960’s as a project of the US Defense Advance Research Projects Agency to provide backup communication in case of nuclear war, with the first implementation in 1969 (Leiner et al. undated). Sets of processes and software tools have emerged in three domains using personal computers and the Internet that serve to externalize and connect aspects of the knowledge building cycle:

29. Content creation (word processing, spreadsheets, databases) were all introduced around 1980.

30. The World Wide Web (“Web”) using hypertext technology linking servers and browsers were developed from 1989 to around 1993. These provided basic infrastructure for viewing hyperlinked HTML texts.

31. Web search engines. To close the knowledge growth cycle between creating and viewing; indexing, “search” and retrieval tools were needed for finding relevant texts. These were developed by around 1995. Google was launched in 1998 with underlying technology (Brin & Page 1998) able to keep pace with the exponentially increasing volume of content on the Web, and by 2001 was well on the way to dominating the market (Gasser 2006). By 2006 Google had probably indexed more than 20 billion pages (Notess 2006). By July 25, 2008 they claim to have registered over 1 trillion (1 x 10^12) web pages (and that is after removing duplicate URLs! – Alpert & Hajaj 2008). Today Google has indexed most of the academic, scientific and professional literature (via Google Scholar) and many millions of books that have been scanned from America’s major research libraries (partially available via Google Books and Amazon). Any of these pages that are relevant to a problem at hand can be discovered in seconds using keyword or string searches or citation indexing concepts (Hall et al. 2010; Hall and Nousala 2010a).

3.3 Semantic, social and cloud computing externalize aspects of community cognition

Since 2000 the Web’s revolutionary capabilities for extending cognition have continued to evolve at a still increasing pace. Three trends of technological understanding and development are coming together to externalize and support cognitive processes at the community level:

32. Semantic Web, where specialized markup languages allow the semantic significance of components of text to be marked up in ways that computers can understand for further processing (Berners-Lee et al. 2001; Hall 2001), with the first
“Recommendation” for XML released in 1998 (W3C 2010). However, the full potential of the semantic web hoped for by Berners-Lee et al. (2001) has still not been realized because of difficulties reconciling logical and dialectical differences between the implementations of XML on different sites (Vines et al. 2010, Vines & Firestone 2008).

33. **Web 2.0.** Web 2.0 or “social computing” does not refer to any specific technological developments but rather to the development of aspects of the web that favor collaboration and the sharing of web content. The term Web 2.0 was invented by O’Reilly in 2001 to cover the whole range of social computing activities (O’Reilly 2007; Gruber 2008). Following Miller (2005), Web 2.0 thinking seeks to:

*Free data* (e.g., ‘freedom of information’, minimize constraints on data access),

*Enable virtual applications* (e.g., aggregating data & functions from different sources),

*Facilitate two way participation* (e.g., peer to peer)

*Focus on user needs not provider wants*

*Build modular applications* (enabling construction of hierarchically complex systems)

*Share* (code, content, ideas)

*Facilitate communication and community building*

*Facilitate remix and mashup*

*Become smarter* (e.g., Amazon’s recommendation engines, Google’s Page Ranking)

Open up the “long tail” **(make it cost effective to service small requirements of large number of individuals)**

*Build trust* (in individuals, assertions, data and its reuse)

For community knowledge management, probably the best known and most successful application exemplifying many of these qualities is the community constructed Wikipedia (Wikipedia 2010). A wiki is a collaborative website where users can easily add to, modify and comment on content using web-based tools (usually only a Web browser). Wikis facilitate collaboration in the collection, generation, review and distribution of content. They typically allow users to add new content, link to other content within and outside the wiki environment, edit content, organize and structure content, view content and access a history of changes to contributions. Contributions may be authored within the environment or brought in from outside (O’Leary 2008).

34. **Cloud computing.** The concept first appeared in 2007 (Markoff 2007; Lohr 2007; Lohr & Helft 2007) to cover the idea that data storage and processing will be offloaded onto external repositories and data processing centers (Baker 2007; Raman 2008) users can access the data and control the processing with little more than a web browser and internet connection. The major tools involved here are mostly Google’s cloud “Apps” (Wikipedia – “Google Apps”)² as described by Hall et al. (2010).

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² Google’s cloud applications have been released and are evolving so rapidly, recently and pervasively that there has been little time for them to be properly digested and documented in the formal literature. The most accessible reviews I have found of their histories and capabilities are those in the cloud computing tool, Wikipedia. References to these articles are cited: Wikipedia “link”).
4 Building a template for knowledge based community organizations

For community actions to be successful, they need to be based on tested knowledge of the problems being confronted. From early experience with Google’s Apps from January through mid May 2010 (Hall et al. 2010), it seemed that Google’s cloud Apps could meet all requirements for managing community knowledge.

4.1 Usability tests

The assumption that the technology would be useable in practice has been tested in four new implementations (note: these are tests/demonstrations that the technology meets theoretical requirements discussed above, not studies of the knowledge lifecycles in the groups concerned):

35. Test 1: Hall established a wiki style collaboration site for authors contributing to the Knowledge Cities Summit special session, “Putting Community Knowledge in Place”, beginning with Google’s own Project Wiki template (Google 2009). Implementation started 17 May and was completed and shared with others on the contributor list by 26 May.

36. Test 2: Selected components of Putting Community Knowledge in Place were used as the starting template for a demonstration linked to the present paper that has been shared with the world (Hall and Best 2010). Work began 27 June 2010, with the page structure complete by 29 June. Page contents were modified July 5, 8, and 22 as inclusions and linked documents were refined.

37. Test 3: Starting with a blank Google Site, Best created a new site for the Riddells Creek Landcare Group (RCL) and transferred content into it from the existing RCL Web page hosted on conventional server-based web technologies. The new RCL site includes public pages as well as private pages accessible only to Committee members. The Google Site version will be released to public access via the existing Riddells Creek Landcare URL in the near future. Beginning with the blank site opened around June 1, Best and other members of the RCL Committee transferred most historical documents, project records, financial accounts, and membership list details before the 24 July 2010 AGM. All RCL people who have tested it have found the Google technology intuitively easy to work with, much easier than the existing server-based technology that requires specialist skills to administer.

38. Test 4: Google Sites was trialed in a committee meeting of an umbrella group of 11 landcare groups to see how easily a group naïve people with modest computing skills could come to grips with it. The Secretary (representing one group) and representatives of two other groups attended the meeting. Sitting around a kitchen table and networking wirelessly via their notebook computers, participants soon understood the Google Sites’ logic. Led by one of us, and starting with a blank site, the basic structure for the umbrella group’s Web page was built within an hour. This explains the group’s aims, describes joint projects and stream observations, establishes a private committee area, and provides links to each of the 11 component groups. This site is also currently undergoing further development, but has not yet been published.

The conclusion from all of these tests is that anyone able to use an internet browser on a home computer should be able to work within a Google Site to make their personal knowledge explicit. As a final comment, we note that Google provides only very limited documentation to explain how to use the sophisticated functionality and multiple add-in
functions (i.e., “gadgets”) they provide. To partially fill this gap we developed the Template for Knowledge Based Community Organizations (Hall & Best, 2010) that also includes some detailed usage notes (Hall, 2010).

4.2 Demonstrating knowledge management capabilities to support community action

For community actions in the real world to be successful in terms of having their intended effects, they need to be based on tested knowledge of the reality being confronted. As noted above, a wiki provides a framework for the social construction and testing of knowledge following a Popperian OODA knowledge development cycle as illustrated in Figure 2 and Figure 6. An appropriately implemented wiki should meet most knowledge-related requirements for a community action group. Google Sites (together with other (Google Apps) meets several knowledge management requirements for community action groups, as illustrated in Hall and Best (2010):

39. Observation: Hall (2010) explains how individual users can insert a wide range of materials ranging from original observations to links and embedded documents, or even a “file cabinet” into a web page, ranging from textual notes and observations, individual photographs, photo albums, maps, and even videos (as illustrated by “Monkey Business”).

40. Orientation and development of tentative theories/solutions: Web pages allow people to add comments and attach additional document files, e.g., as shown at the bottom of William P. Hall’s contributor page. Message functions can be used for either general discussions at the site level, or discussions related to specific project pages, etc., shown on the bottom right of the Welcome page (general discussion) and at the bottom of the Free Technology for the Support of Community Action Groups page.

41. Decision: Decisions can be developed via topic page-related discussions or polls based on spreadsheet forms.

42. Action: Google Sites provides excellent facilities for multilayered presentations. Inviting councilors to join the site may be a deliverable in its own right, as this would give them full access to a submission and layers of supporting information.

43. Monitoring results of actions: The full capabilities of the observing functions can be used.

44. Member administrative functions: New member records can be generated automatically using a Google Spreadsheet form in a web page (as illustrated on the Join the Community page).

45. Financial management: Financial records, contracts, funding proposals and all other matters of financial interest can be kept in a linked Site accessible only to group officers and committee members.

46. Communication, coordination and tracking: There is no mailout function specifically associated with a Google Site. However a parallel Google Group can readily be established to manage a mailing list (see http://groups.google.com/). Group members can nominate to be notified of changes to the site as a whole or to designated pages within the site.

47. Facilitate internal trust and outside security: As can be seen from the Join the Community page and various Contributors pages, e.g., Susu Nousala, the Template provides ample possibilities to create a trust-worthy persona within the site community. Secure materials can easily be established in linked Sites where the access is password protected and fully controlled. Google’s cloud computing Apps
have been certified for government use under the US Federal Information Security Management Act (Krishnan 2010).

48. *Provide epistemic structure*: Pages within a Google Site can be readily established in a logical hierarchy reflecting the group’s aims and purposes. Documents and cross-links within pages provide additional cognitive associations. If desired linked document libraries can also be established within Google Docs, organized within a hierarchical folder structure (e.g., click the Community Library link). As amply demonstrated in the Template, hyperlinks can be used throughout the site structure to link associated knowledge objects.

5 Discussion and conclusions

Even before the Web was established, it was recognized that computer systems could help form and sustain community groups (Licklider & Taylor 1968; Rheingold 1993; Schuler 1994). As elaborated above, in the last year or so, free and easy to use social technologies have appeared that offer all the capabilities required for building social knowledge management environments for knowledge based community groups. Once established, the site and its contents persists as an underlying and evolving structure containing the knowledge relating to the community’s imperatives as individual members come and go. Individual humans are the dynamic actors in the organizational system, but it is largely the evolving knowledge contained in the organizational system that guides and informs members’ individual actions to sustain the goals and structure of the community beyond the memberships of any particular individuals in the organization.

Although this is the only paper in the special session “Putting Community Knowledge in Place” to focus on Google’s social technologies for community groups, several other papers in the session illustrate similar features.

49. *Iramoo Green Web* (Hocking & Wyatt 2010), establishes a web of partnerships among a variety of institutions and community action groups to facilitate “deliberative community engagement through a range of methods that legitimizes local community knowledge and practices”.

50. *NeatStreets* (Kuruppu 2010) demonstrates the use of smart phones with cameras and geotagging to collect observational data on community problems (e.g., leaking water mains, lost shopping trolleys, potholed streets, etc) for reporting to councils or other relevant authorities.

51. *Tacit knowledge network support* (Nousala et al. 2010) describes the emergence of tacit networks for knowledge exchange in small organizations that transform personal knowledge into community knowledge.

52. *Out of the heads and bottom drawers of non-traditional owners* (Smith and Nair 2010) documents the existence in most communities of large volumes of personal knowledge and documentation relating to local environments and planning issues that is essential to support council decisions that councils generally do not know about.

53. *The trails of two cities* (Smith 2010) looks at the development of community action to support the retention and landscape preservation of unused rail reserves established in the late 19th Century.

Except for the company described by Nousala et al. (2010) the small organizations represented in this special section are all components of an emerging umbrella group concerned with monitoring and maintaining or even improving the ecological health of Melbourne’s urban fringe. This super-organization is emerging from the overlapping
interests of (1) individual landcare groups combined into umbrella groups covering drainage basins crossing the northern and western suburbs of Melbourne, (2) native plant and animal societies (e.g., the Keilor Plains Group of the Australian Plants Society), and (3) an emerging group called NatureShare that is seeking to observe, photograph and map all Victorian flora and fauna). It is possible that the social technology described here may powerfully help coordinate all of these group and umbrella interests into a powerful autopoietic supersystem. Over the next years we will be following the development of selected community action groups, the impacts of new technologies on their knowledge lifecycles and successes/failures in achieving their aims, and changes in their knowledge ecologies (e.g., along the lines of Lanzara & Morner 2003 and Sowe et al. 2008).

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Treating premium malaise through intelligent urban configuration (ICM)

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Abstract
Policy and urban interventions are invariably contentious; pitting visionaries against liberal conservatives. Despite resistance to teleological idealism which necessarily tightens planning governance and imposes constraints on corporations and developers, current urban configurations are deficient. Policy urgently needs to address spatial urban price and social fragmentation, access inequity and housing affordability. As with any malady, management encompasses diagnosis, surveillance, detection and treatment rather than deliberate or misconstrued accentuation. The paper postulates and briefly considers the “Intelligently Configured Metropolis” or ICM which, however, extends beyond geographical urban confines. Without it, environmental stress and demographic pressure will accentuate urban housing dystopia. ICM seeks to suppress demand and supply residential dwelling price drivers and orientate capital towards innovation, social product and environmental improvement. Premium drivers include expansive foreign investment and immigration policy, institutional mediocrity, price distortions, information asymmetry, fossil fuel configuration and community disengagement. Treatment involves fostering ecological niche manufacturing in rigorously-planned, urban-edge rail hubs. These, productive and aesthetically meaningful satellite places provide decent, affordable housing, are pedestrian and cycle friendly abet insurgent civic discourse. Six pillars for ICM are suggested: policy clarity involving population, foreign investment and immigration, strategic ‘whole of government’ reform to effectively enforce recalibrated policy and cost-effectively deliver world class services to local communities, price, tax and pension rationalisation to nudge people towards sustainable choices, surveillance, analysis and dissemination of robust environmental, community and spatial information, re-conceptualisation and sustainable transformation of cities and, finally, the devolution of power to engaged communities.

Keywords - housing affordability, urban fragmentation, community, premiums.

Paper type – Academic Research Paper

1 Introduction
This paper investigates an expansive framework which, at the risk of sounding pompous, is designated for want of a better description, as the Intelligently Configured Metropolis or ICM. The ICM is intended to direct attention to current deficiencies and sketch possible strategic urban re-orientations toward healing. It is hoped that the ICM
directions contribute toward resolving some of the urban malaise caused by social, housing and access fragmentation manifest in urban residential property price disparities. These locally based premia capitalise the benefits of privilege locations.

**ICM 1 - Policy clarity**

Capital market volatility, driven by global credit availability and sentiment, influences local house prices. ICM, then, requires some financial market discipline underpinned by salutatory international regulations to restore confidence in rating agencies and some degree of trust in the banking system. Nationally, ICM is underpinned by sensible national fiscal and monetary policy which balances price stability and full employment at decent wages. Other policy pre-requisites for ICM are credible long-term infrastructure provision, enlightenment rather than managerialism (Wadley 2010) in urban planning and balanced immigration quotas based on sustainable demographics. ICM requires resolution of debate involving foreign investment. Once a clear vision of desired system permeability is articulated, policy can be recalibrated and mechanisms devised for its proper surveillance and enforcement. Excessive system permeability makes local property market expansive, if not inflationary and exposed to foreign investment volatility.

**ICM 2 - Strategic institutional reform**

Procedurally, ICM abhors confusion, inconsistency, duplication and mediocrity (Green 2009). The second pillar of ICM involves, if not constitutional change, then sustained reform to update policy and modernise institutional and legal configurations without undue erosion of valued custom or tradition. Its goal is to reconfigure administrative architecture and culture, improve planning and raise management calibre. ICM rejects electoral posturing and vested obstructionism in favour of integrated, progressive and transparent government.

Practically, ICM begins with joint strategic and standard setting oversight bodies in various fields to modernise and harmonise federal, state and commercial entities. Agile and innovative, these oversight bodies would establish priorities and set robust project and service delivery guidelines. Whether in catchment management, mental and other health services, child care and education, transport or urban planning, Australia urgently needs to repeal fragmented legislation and to modernise. Whole of government policy should nurture people’s real capacity to engage creatively and productively, rather than consumptively in society. Shelter is the first step towards productive dignity in a modern knowledge economy.

In a democratic society, the unpalatable logic of centralised leadership, strategic alignment and standardisation around world best practices, needs to be balanced by judicial oversight, strong governance, and sound human resource management to foster an enlightened and ethical government bureaucracy (Minnery and Wilson 2008).

Within deontological bounds established by the rule of law tradition, broadly accepted ethical principles and human dignity, intervention should target the disadvantaged without encouraging a culture of dependency. Valid program outcomes are better housing, education, health and jobs. Other legitimate areas for public policy are vulnerability to climate change and the enrichment of community life.

Planning in Australia has evolved but modern, supposedly integrated plans, sit uneasily with the rhetoric of free choice in unfettered markets. Government housing markets intervention should be integrated and coordinated. Policy should assess spatial environmental risk and climate change vulnerability with the objective of reducing marginalisation. Bluntly, this point means answering the simple question: does a
proposed policy or revitalisation project reduce environmental degradation or improve social product? The project found premia were paid for various privileges (job access, schooling etc) and to avoid social deprivation or acute and creeping urban noxiants (congestion, blight, visual dis-amenity, and noise and air pollution). Projects should, instead of reinforcing privilege, expose and seek to dissipate existing externalities, deflate premia and foster a real innovative spirit and capacity.

**ICM 3 - Rationalisation of price and tax signals**

ICM abhors irrational, advocacy-driven market distortions. A conjunction of legacy taxation regulations, pension arrangements and subsidies can encourage overinvestment in residential property without solving housing affordability. Rather than a ‘trickle down’ indirect approach, an ICM drives bold visionary projects which house and productively employ disadvantaged residents (see urban reconfiguration below). In ICM, price, tax and pension policy seek to artfully manage the processes of betterment and compensation without being paternalistic. Whether by mandating default options, improving product labelling or by introducing public sector competition, government should nudge decisions towards healthy and environmentally sustainable options (Thaler and Sunstein 2008).

In the ICM, a rational housing information system should help to reduce unnecessary consumption. It should push socially and environmentally desirable buildings without compromising housing affordability. To get it, regressive distortions artificially inflating returns must be stripped out. Prices and taxes should internalise externalities to reflect the real social (health, community) and ecological (carbon, water, wildlife) opportunity costs of activities. Currently, fiscal perversities include the First Home Owner Grant, capital gains tax exemptions and the deductibility of mortgage interest payments (Disney 2009).

The ICM proposes tax simplification and its reorientation towards wealth, resource consumption and waste generated, not labour used. It should act to target incumbent windfall property gains, social imposts and polluters rather than people doing useful work. Practical assessment metrics could include capital gains, water used, energy efficiency ratings, carbon emissions, traffic disruption, noise and, in the final analysis, commonly validated ugliness (Boyd 2010 [1960]). Reform is necessary in the face of mounting ecological challenges of sprawl (and the associated habitat loss), carbon emissions and excessive energy or water use (Evans 2007; Porterba 1984). The first step is internal conceptual consistency in government, guided by ecology, aesthetics and social welfare.

**ICM 4 - Spatial information transparency**

An ICM is predicated on properly articulated and transparent spatial information to preserve or rationally allocate for tempered growth. Development is constrained to areas of low environmental impact but, once settled on; projects are innovatively conceived, properly financed, competently executed and coherently managed (Randolph and Judd 2000). Transparency requires more project publicity, particularly at embryonic planning stages. Increased transparency could mitigate risks that information is clandestinely exploited by the wealthy, informed or unscrupulous.

Despite cost, ICM collects, integrates, analyses and disseminates a robust variety of local spatial community and environmental indicators on, for example, health, crime, air quality, noise pollution, and street aesthetics (Elton 2006). Growth corridors and limits, based on environmental carrying capacity, are explicit. To reduce misinformation, results of local statistical assessments should be simply codified for transparent and convenient public digestion.
Improved collection, analysis, mapping and review of urban data should help government better to target locations which actually deserve public investment. It could reduce unmerited economic rents and prevent windfall economic gains from accruing to central property landlords without their making a commensurate social contribution to urban productivity or lifestyle. For individual property transactions, ICM presumes transparent labelling of public transport links, flood risk, energy and water efficiency.

ICM mitigates the agency problem by a culture of integrity, property human resource management and good governance. Rather than concentration on central, privileged locations, ICM is configured to redress perceived and actual spatial inequity. It channels public and private investment towards deprived outer urban hubs but curtails sprawl.

An important mechanism for rational urban growth is spatial information transparency to monitor the geography of public investments. Improved governance of public urban interventions requires the collection and impartial review of cumulative government revitalisation disbursements to assure their legitimacy and encourage non-partisan spatial distributions. To achieve this step practically, auditors could use GIS maps to display cumulative totals of public monies allocated in each election ward and thwart attempts to exceed equitable limits. Such robust spatial financial analysis increases public confidence in due process of government and reduce the risk of surreptitious ‘hedonic boosterism’.

ICM 5 - Sustainable urban reconfiguration

At the urban scale, ICM moves away from concentration toward resilient, networked and self-contained satellite towns which act as competitive hubs to deliver wellcare excellence, lifelong learning and provide a platform for meaningful community engagement. The ICM has fast and convenient public transport links instead of a fossil-fuel configuration. Resident travel is largely within their edge master planned communities (MPC) for upstream community-based services such as jobs, culture, mental and physical health and wellbeing, child care, education, retail and transport (O’Connor and Healy 2004).

Hammarby Watertown (Stockholm) is a concrete example of the sort of self-contained, sustainable, waterfront development with a strong renewable focus. Its excellent public transport includes ferry and light rail connections to central Stockholm. It also has a large proportion of affordable housing stock. Another Swedish example is Bo01 in the city of Malmoe. In Sweden, unlike in Australian capital cities, waterfront living is not only reserved for the very rich (Kozlowski 2010).

ICM relies on a vigorous rail network. However, the rejuvenation of rail entities (towards proactive planning, capitalisation of existing networks and substantial new investment in mass urban transit proceed) proceeds without inflating premia. Early project transparency and taxation of windfall gains could accomplish it.

ICM is bold and proactive not reactive to population growth. It is underpinned by niche, cutting-edge industries, not the transfer of extractive surpluses from coal, gas or iron ore. An ICM balances strategic centralised infrastructure with competitive peripheral niche production centres which provide jobs, engagement and the cultivation of progressive discourse in diverse insurgent communities (Gibson 2006; Wong 2008; Yigitcanlar 2008).

ICM 6 - Community devolution

1 Lot and property structural idiosyncrasies and micro-location quality variability all constrain the usefulness of mass appraisal.
Within broad strategic and planning guidelines, rule of law constraints and independent oversight, power should devolved to elements of the local community (O'Connor and Stimson 1995; Healy 2000; Kresl 2007; Newman et al. 2009; Yigitcanlar 2009). Communities are repositories of intangible cultural meaning which bring long term net benefits (Kostof 1993). Unfortunately, specifying planning mechanisms to deliver well governed local devolution is not easy, as the confusion and change of planning regimes over time illustrates. Local democracy risks generating inconsistency, corruption and poor decisions (Bodnar and Borocz 1998). As well as significant tangible infrastructure projects, consideration should be given to intangible investments in nurturing local communities and ‘cultural ecosystems’ (Throsby 2006). Government arts funding should be redirected away from ‘facilities’ which, because of lobbying, receive disproportionate share toward smaller, local ‘breeding-grounds’ for future artists (Markusen and Schrock 2006: 1683). One possibility is to create a strategic neighbourhood alliance or institutions, perhaps through incorporation which, collectively, directs development.

Projects should include new community-based institutional structures, training and skills development. Locally, policy should devolve real power to innovative communities. Instead of sterile consumerist alienation, public places should inspire meaningful civic dialogue. Innovative milieus for discourse are playful pedestrian precincts where mavericks, artists and musicians can freely challenge, create and participate in government. Within communities, the size of properties should be curtailed and their robust environmental configuration mandated.

2 Conclusion

Although the ICM is a tentative framework, it nevertheless highlights some of the current urban intuitional deficiencies and points towards possible improvements. Its limitations are those of any teleological interventions which can backfire, be corrupted or become redundant in the face of evolving technological innovation. Nevertheless it is clear, without being too idealistic, that much can be done to at least clear some of the institutional and policy obstacles which, whether because of pervasive planning and government managerialism or vested interests of incumbents, hamper progress.

References


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<td>Wei-Ning Xiang</td>
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<td>Youn Taik Leem</td>
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