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Rising knowledge cities: the role of urban knowledge precincts

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Rising knowledge cities: the role of urban knowledge precincts

Abstract

Purpose – *The paper seeks to investigate the changing and challenging spatial nature of the rising knowledge cities' knowledge precincts.*

Design/methodology/approach – *The paper reviews the literature on recent knowledge precinct developments within the frame of innovation and urban economic competitiveness. The methodology develops a typological investigation and searches for useful insights for better understanding the fundamentals of knowledge precincts. The study exemplifies cases from Australia as well as other global best practices.*

Findings – *The paper sheds light on the contemporary knowledge production of rising knowledge cities, and points out the changing spatial agglomeration of knowledge-intensive industries and the formation of new types of knowledge precincts as the spatial core of knowledge-based urban development.*

Originality/value – *The paper provides an in depth discussion on the changing spatial concepts of knowledge precincts and their vital role for the knowledge-based urban development of cities.*

Keywords – *Knowledge precinct, knowledge-based development, knowledge-based urban development, knowledge economy, knowledge city, Australia*

Paper type – *Research paper*

Introduction

Advanced economies presently are being radically altered by dynamic processes of economic and spatial restructuring within the frame of new knowledge economy. In this context, 'knowledge-based urban development' (KBUD) has become an important mechanism for the development of knowledge cities. KBUD is extensively seen as a potentially beneficial set of instruments, which may improve the welfare and competitiveness of cities (Yigitcanlar et al., 2008a). Knowledge economy can currently be observed only in small parts of the world however its effect is worldwide. Since the knowledge is addressed as a key driver in urban development many cities all around the world are in fierce competition to attract talent and innovation by adopting various policy measures and incentives for promoting the knowledge city concept. Therefore the buzz concepts of being clever, smart, skilful, creative, networked, connected, and competitive have become some of the key ingredients of KBUD. Within this frame 'knowledge precincts' have been endorsed as the engines of KBUD for cities that chose knowledge production as a key goal in their development strategy.

This paper aims to contribute ongoing knowledge-based development and KBUD related discussions that are becoming more popular in the academic and professional literature (see Yigitcanlar et al., 2008a, 2008b). This is a follow up study of Yigitcanlar and other's (2007) work on 'attracting and retaining knowledge workers in knowledge cities', which was chiefly elaborated the question of "what a knowledge worker wants when not at work" (Yigitcanlar et al., 2007). In this study the focus is shifted from knowledge workers' social and living environments to their working (and in some cases also living) environments, namely knowledge precincts. The specific focus of the study is therefore the 'knowledge precinct development as the spatial core of KBUD'. The paper seeks to investigate the changing spatial nature of knowledge precincts in the urban context of competing knowledge cities with

particular reference to emerging Australian knowledge cities. This paper reviews the current literature on recent knowledge precinct developments within the context of innovation and urban economic competitiveness. The methodology develops a typological investigation and explores useful insights for better understanding the changing spatial concepts of knowledge precincts. The study also exemplifies cases from Australia since the knowledge precinct concept is quite popular in the agenda of Australian cities and therefore deserves a deeper investigation.

Knowledge economy and knowledge based urban development

During the last two decades a global, knowledge-based, and technology-driven economy has emerged, so-called 'knowledge economy' also variously labelled as 'knowledge-based economy', 'new economy', and 'creative economy' (Baum et al., 2007). In this new economy, knowledge related activities, including creativity as a tacit knowledge form, have become central for creating employment and wealth, and sustaining economic growth (Ofori, 2003; Howells, 2002). This implies the view of environmental and cultural assets of the cities and communities as economic resources (Landry, 2000). It also emphasises knowledge work and knowledge workers as vital parts of a new emergent mode of production in the current knowledge economy (Florida, 2005; Henderson, 2005). Yigitcanlar et al.'s (2007) recent study elaborates the question of attracting and retaining knowledge and creative workers in the knowledge economy by addressing the needs and desires of knowledge worker in the contemporary urban context. The authors develop a typology of different groups of knowledge workers in their preferred urban environments. For example, while scientists and engineers mostly prefer quality of university and R&D milieu, artistic/creative people place creative milieu with variety of entertainment options and urban diversity at the core of their preferences. By departing from anthropological point of view, authors explore the needs and

desires of a knowledge worker and draw a base for understanding urban and cultural needs of knowledge workers when not at work. Findings of this study indicate that a typical knowledge worker wants an intense 21st century urban environment to see the perfected human body, picturesque spaces for human display, to be part of a new community of strangers – defined by aggregation in action, a transport rich environment, places rich in time. Above all, the study points out the crucial importance of knowledge workers' desires and attitudes in the shaping of successful knowledge precincts and rising knowledge cities.

The economy of a knowledge city creates high value-added products using research, technology, and brainpower. In the knowledge city, the 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). Although many city initiatives call themselves knowledge cities, currently, there are only a few cities around the world (e.g., Barcelona, Boston, Delft, Munich, Singapore, and Stockholm) that have earned that label. Many other cities aspire to the status of knowledge city through urban development programs that target KBUD (Ergazakis et al., 2004). Examples include: Brisbane, Dubai, Melbourne, Monterrey, and Shanghai. The top-tier knowledge cities specialise in a few sectors only, but set ambitious goals for each, and they also develop their knowledge-based policies carefully.

To date, the (re)structuring of most of the cities has proceeded organically: in essence, as a dependent and derivative effect of global market forces. Urban and regional planning has responded slowly, and sometimes not at all, to the challenges and opportunities of the global knowledge city. Almost a decade into the new century the economic success of the knowledge-intensive development policies in a number of cities and nations have led urbanists to think of whether similar policies could be applicable for the knowledge-based

planning of city-regions (Knight, 1995). In recent years, urban planning has consolidated its interest in the paradigm of post-modern social production under the rubric of KBUD (Carrillo, 2004; Corey and Wilson, 2006). The concept of KBUD has started to gain acceptance among urban scholars. Parallel to this recognition, KBUD has become an emerging area of research interest which transcends interests of planners, economists, geographers, and social scientists. Despite this growing interest KBUD still remains in its infancy (see Yigitcanlar et al., 2008a; Yigitcanlar et al., 2008c).

Planning sees KBUD as a new form of urban development for the 21st century that could, potentially, bring both economic prosperity and sustainable socio-spatial order to the contemporary city. The goal of KBUD is a knowledge city purposefully designed to encourage the production and circulation of abstract work (Cheng et al., 2004). KBUD can be regarded as a vision/strategy to nourish the transformation and renewal of cities into knowledge cities and their economies into knowledge economies. It is not about the strict government control on the development, rather it is the initiation and provision of the knowledge incubation environment (e.g. incentives, knowledge and urban infrastructures, quality of life) jointly by public-private-academia for entrepreneurs (e.g. knowledge-enterprises, knowledge workers, artists).

KBUD is a powerful strategy for economic growth and the post-industrial development of cities and nations to participate in the knowledge economy (Yigitcanlar et al., 2008a). It is a strategic management approach, applicable to purposeful urban human organisations in general (Carrillo, 2002). Relatively recent and growing literature indicates that KBUD has three purposes: The first one is, it is an economic development strategy that codifies technical knowledge for the innovation of products and services, market knowledge for understanding

changes in consumer choices and tastes, 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). The second one is that, it indicates the intention to increase the skills and knowledge of residents as a means for human and social development (Gonzalez et. al., 2005). The later one is that to build a strong spatial relationship between urban development clusters. Broad KBUD policies include: developing capital systems (i.e. human, social, intellectual), distributing instrumental capital, developing and adopting the state of art technologies, providing hard and soft infrastructures, and providing quality life and place (Carrillo, 2002; Yigitcanlar et al., 2008a). Following the realisation of the necessity and importance of KBUD, knowledge precinct development, as the spatial nexus of KBUD, has become a significant part of the strategic vision attempts of the rising knowledge cities.

Understanding the spatial formation of new knowledge precinct developments

Creativity and knowledge production are dominantly urban phenomena that require a certain scale and intensity of knowledge infrastructure as well as vibrant urban life with a full mix of diversity and tolerance (Florida, 2005). Knowledge production is also dependent on a large pool of talented labour power and consumption, which is critical to form a functional urban region suitable for knowledge precinct development. In such landscape, cities concentrate on extensive global networks as intense mediums of exchange for knowledge precincts to flourish (Van den Berg et al. 2004). Additionally, knowledge workers, primary sources of knowledge precincts, prefer inspiring cities with a thriving cultural life, an international orientation, and high levels of social and cultural diversity (Baum et al., 2007). A big city with an evidence of world city formation accommodates high quality urban services (i.e. high quality residential areas, cultural districts, recreational facilities, connectivity to global air

transport networks and so on) and a diversified economic base including extensive supplier and distribution networks and specialised services. Examples of the new generation urban knowledge precincts, such as One-North Singapore, 22@bcn Barcelona, and Brisbane Kelvin Grove Urban Village, could be referred to support this tendency.

Knowledge precincts can be regarded as the spatial nexus of KBUD that chiefly refers clustering of R&D activities, high-tech manufacturing of knowledge-intensive industrial and business sectors linked by mixed-use environment including housing, business, education and leisure within an urban-like setting. The working definition of such areas differs from country to country (i.e. high-tech cluster, knowledge/innovation cluster, knowledge/innovation hub, digital village), more or less indicating a clustering of high-tech enterprises with a commercial mix of urban life and culture, predominantly within central urban locations.

According to Searle and Pritchard (2008) concentrations of knowledge sectors within particular urban areas may take a number of different forms that can be distinguished within three major types of knowledge clusters (potential knowledge precinct zones). The first type is the clustering of knowledge-intensive service sector activities (KISA) around corporate head offices and related activities of the increasing number of transnational corporations (Martinez-Fernandez and Miles, 2006; Martinez-Fernandez and Martinez-Solano, 2006). These KISA clusters operate in tandem with clusters of high-order financial services. Since the trust and tacit knowledge transfer have prime importance for finance and business service operations they reinforces the clustering in traditional core locations in global cities. Searle and Pritchard's second type is largely based on high-tech production, predominantly as ICT or biotechnology. The champion of this model is famous Silicon Valley, mainly on a knowledge network that encompassed both regional learning institutions (Stanford University and the

universities of Northern California) and for profit industry research teams. Innovations produced in the knowledge network were adopted and developed economically by proximate industries operating in an environment of flexible development. Such high-tech clusters are most commonly around suburban areas with a campus like atmosphere for reasons of image and the amenity preferences of their knowledge workers (Castells and Hall, 2004). Their third type refers to creative industry clusters largely based on cultural knowledge generation like movie-making, popular music and related areas. Although ICT-based social networking and business opportunities are important tacit knowledge and face-to-face communication are at the core of such type of clusters. Urban knowledge precincts frequently combine the characteristics of those basic knowledge cluster types that briefly mentioned above. For example, when ICT clusters may contain a combination of the first and second types, advertising and multimedia clusters combine elements of the first and third types, as well as the second in the case of multimedia (Searle and Pritchard, 2008). The distinctive feature in the formation of new generation knowledge precinct here is the value of 'urbanity' that is depicted in the remainder of the section.

Precinct formation is actually an urban phenomenon; in urban planning and design the term 'precinct' is defined as the urban area with the distinctive character comprising its internal closure and mobility (i.e. recreation precinct, residential precinct, education precinct, entertainment precinct) (Cullen, 1971). Lynch (1960) describes urban 'district' as similar to the precinct that mainly refers to a medium-to-large section of the city with perceived internal homogeneity and distinguished by some identity or character. Therefore the term 'knowledge precinct' has rather place-centred and highly refers to a distinct part of a city with recognisable identity to which knowledge gives its unique character. In this sense, knowledge precinct can be regarded as the locus of different type of knowledge clusters which

“geographic scale are not pre-determined and may be local or national/international – or both depending on the industry and its global construction” (Searle and Pritchard, 2008: 186).

New generation knowledge precinct formation brought up the question of ‘what is so unique in knowledge precinct developments that adds a *value* in providing an attractive investment area’. This important question can be addressed by investigating five major themes (see Table 1) that give useful insights on the new loci of knowledge precincts in the urban contexts of rising knowledge cities.

Table 1: Common themes and values of new knowledge precinct developments

THEMES	VALUES	EXAMPLES
1. LIVING AND WORKING (mixed-use environments)	Business, real estate value: Real-estate and technology capitals are very active in shaping knowledge precincts (i.e. Nokia in Helsinki). Hence, commercial success has a great value. This means the end of rigid separation of working and living environments of so-called knowledge workers.	Helsinki Digital Village, Brisbane Kelvin Grove Urban Village
2. CENTRALITY (proximity, clustering, premium access to different infrastructures, services, and amenities, place quality)	Economic value, development value: Formation of knowledge precincts has become a new urban policy tool for the revitalisation of environmentally degraded former industrial sites or inner city urban districts.	Helsinki Digital Village, 22@bcn Barcelona
3. BRANDING (symbol for branding a city as a knowledge city)	Symbolic value, design value: A regeneration strategy for creating successful knowledge cities or formation of new niche markets. Marking the name of the emerging knowledge city with a landmark development.	22@bcn Barcelona, Taipei 101
4. LEARNING AND PLAYING (interactive environments, living laboratories, experience of place)	Learning value, experimental value: Urban playfield of cutting-edge technological innovation and creativity, places of interaction, knowledge hubs-such as universities.	Copenhagen Crossroads, Zaragoza Digital Mile
5. CONNECTIVITY (social networking, places of interaction, pedestrian orientation, face-to-face contact)	Social value: face-to-face contact, tacit knowledge transfer, place identity.	One-North Singapore, Kelvin Grove Urban Village Brisbane

Living and Working

New generation knowledge precinct developments are located mostly around ‘mixed-use environments’ with an aim to collect the benefits of blurring boundaries of living and working facilities (Cunha and Selada, 2007). As mixed use projects, they achieve a critical mass of technology enterprises and knowledge workers. Modern urban settings, however, have been traditionally designed according to fixed zoning planning principles, where each area has a specific and exclusive function in the organisation of the whole urban system. Advances in networked infrastructures, basically throughout the ICTs, major urban functions and activities (i.e. work, education, recreation, shopping) have been blurred almost in any place in the new post-modern urban scene –flexible, decontextualized, enclaved, and fragmented (Page and Phillips, 2003). Knowledge precincts resist traditional planning approaches because they are so changeable and subject to many external forces. In this context, new generation precinct developments consider the importance of giving room for living, working, learning and playing within their boundaries (i.e. Crossroads Copenhagen, Helsinki Digital Village). Another important issue is the declining ‘housing affordability’ as being a significant barrier to the development of KBUD strategies (Yates et al., 2005). New generation city scale knowledge precinct projects purposefully aim to integrate different types of knowledge clusters, particularly the creative ones, with mixed-use living environments. Generally they are deliberately located at the intersection of technology, urban design, and real estate development domains that carry great *business and real estate value*.

Centrality

Knowledge precincts today have great *economic and development value* that pragmatically requires premium access to networked infrastructures such as scientific, financial, technical, and educational in increasingly central urban locations. Since spatial proximity helps generate

and transfer knowledge more effectively firms in such precincts prefer to locate around close proximity to vibrant urban life and amenities. New knowledge precinct developments have tended to be located in the centres of cities (Audretsch, 1998). Traditional suburb, in this sense, implies the separation of work, retail and residential activity and has a number of negative consequences for attracting and retaining knowledge workers (Baum et al., 2007). Recent knowledge precinct developments follow the trend of revitalisation of dilapidated inner city areas and turn them into knowledge precincts. Helsinki Digital Village is established around a former industrial site within an inner city district in Helsinki where the first industrialisation in Finland was begun. In Helsinki, like many other cases worldwide, science and technology have been at the service of citywide urban renewal strategies. 22@bcn in Barcelona has followed the similar path of inner city regeneration on former industrial quarter: “Poblenou district (where 22@bcn area is now located) originates from the beginning of the 19th century, when several textile factories were placed in this area... [and then] became well-known as the ‘Catalan Manchester’ due to its industrial concentration” (Clua and Albet, 2008: 136).

Branding

In today’s knowledge economy and culture, image making has become a central basis for successful competition. In this sense knowledge precinct development has a great *symbolic value* and it brands a particular area with a distinguishing identity. Many cities of knowledge economies worldwide apply innovative strategies, including forming new niche markets through knowledge precinct developments, for transforming themselves successfully into knowledge cities. 22@bcn in Barcelona, for example, is a recent effort of city’s long standing urban regeneration policy under the rubric of Barcelona model that gave rise to city’s ‘city of knowledge’ vision. Brand 22@ is symbolises from the past of industrial of 22a Poblenou to

the knowledge-based 22@. This brand is an effective marketing of the idea and the project and creates a powerful coalition between professionals, technicians, land promoters, neighbourhood associations, councillors of the municipality, and so forth (Clua and Albet, 2008). As exemplified in Barcelona model, specifically in 22@bcn, new knowledge precinct development has great *design value* (i.e. Agbar Tower, designed by famous French architect Jean Nouvel, is now the gateway to the 22@bcn) that brought major physical transformation to the city and an explicit discourse of producing knowledge vision of Barcelona. Taipei 101 is a good example of branding and vertical knowledge precinct development. The precinct, located in the highest building in the world, provides space for high-tech firms by occupying half of the building's space. The combination of technology applied to architecture and design and the focus on providing a creative environment where to work, shop and relax without leaving the building creates an exclusive working environment and 'the place' where high-tech companies prefer to be located at.

Learning and Playing

Research-intensive knowledge producers, R&D institutes and universities, as 'knowledge hubs' can be considered as the core of the formation of new knowledge precinct developments where the *learning value* has the prime importance (Marceau et al., 2005; Turpin and Martinez-Fernandez, 2006). Crossroads Copenhagen, for example, has special foci on research, experimentation, and testing that have created a distinctive university-centred knowledge precinct development. Another important asset in the development of new knowledge precinct is a sense of playfulness and experimentation that promotes creativity and innovation. Milla Digital (Digital Mile) knowledge precinct in Zaragoza has great *experimental value* in this sense aiming to attract the right players to create a true innovation ecosystem. Digital Mile is home to new technological experiments (i.e. memory paving,

digital water wall and sonic forest) within the organisation of Expo Zaragoza 2008 (MIT, 2005).

Connectivity

Connectivity can typically be interpreted as the seamless and interlinked option for communication among interested parties. In terms of knowledge precincts this can be done by creating medium for communication maximising the chance of social contacts. In contrast to the previous generation of science and technology parks, it is the case of Singapore's One-North that entire knowledge community precinct is intentionally designed to offer seamless connectivity not only at the level of business but also to the individual level. One-North's mixed use environment is the conscious effort of selection of different technology clusters (Biopolis, Fusionpolis, Infopolis, Vista Xchange) interconnected throughout the precinct. Its design intended to foster face-to-face interactions important for sustaining the innovation ecology of the knowledge economy (Baum et al., 2007). In the One-North case *social value* lays in the creation of such ecology that allows social networking and places of interaction for tacit knowledge transfer among social enterprises and citizen entrepreneurship.

Considerations for knowledge precinct developments in Australia

The KBUD process in Australia comprises strategic urban management actions aiming to develop knowledge precincts for global competition of major Australian cities. Knowledge precinct developments across urban Australia provides a strong potential for these cities by producing codified and tacit knowledge, supporting the shift towards the knowledge economy and boosting economic-social-human capitals within their (sub)urban settings (Yigitcanlar et al., 2008c). Among the Australian cities Sydney and Melbourne are one step ahead in the domestic competition since they have long been linked, one way or another, to the global

system. Australia's third largest city Brisbane's international links are more recent. Nevertheless, as the metropolitan heart of Queensland Brisbane has recently adopted 'Smart State' and 'Smart City' strategies targeting the knowledge-based development of the City and the State (Queensland Government, 2005; Yigitcanlar and Velibeyoglu, 2008). Now Brisbane is part of the competition to become Australia's first globally recognised knowledge city. Perth and Adelaide also want to reap the benefits of such recognition would bring.

Australia is a vast continent with more than two-thirds of its land of a remote or rural nature. Population concentrates in a few large metropolitan regions (Sydney, Melbourne, Brisbane, Perth and Adelaide). The geography of knowledge follows population concentrations both in dense metropolitan regions and in regional centres. Technology Precinct Bentley WA, La Trobe Research and Development Precinct VIC, Queensland University of Technology Kelvin Grove Urban Village QLD, Adelaide University Research Precinct SA are among the better known of the 30 plus knowledge precincts in Australia. There are also some notable examples in remote areas such as the Desert Knowledge Co-operative Research Centre (CRC) based in Alice Springs and covering most of Western Australia and the Northern Territory, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) research concentration in Narrabri, Northern NSW at the Australia Telescope National Facility and the Australian Cotton Research Institute (ACRI).

The Australian knowledge precinct policy dates back to as early as 1980s (Joseph, 1997). There is not, however, a clear understanding of what a 'knowledge precinct' actually needs to include generating those highly innovative knowledge flows and innovation outputs produced by the famous Silicon Valley. On the one hand, the issue of having high-tech designed buildings in closed precincts where the separation from the rest of the suburb is evident

through gates and security enforcement (i.e. Griffith University Knowledge Precinct, Gold Coast). And on the other hand, the open urban space where the 'living space' is integrated with the working space (a model similar to the old European university cities such as Salamanca or Cambridge where scientist, students and business 'walk into each other's spaces') (i.e. Queensland University of Technology Kelvin Grove Urban Village, Brisbane). Both concepts imply a very different planning system and the strategies for residential, recreational and commercial development and land use would also be very different.

The highly urbanised form of Australian regions and the notable coastal urban growth together with the demands for a knowledge economy sets up questions about the organisation or reorganisation of knowledge and its effects in Australian regions. In Australia, it is often important for firms and organisations to locate close to universities, research institutes, CRCs or CSIRO to maximise their access to information concerning products and services developed by local knowledge-intensive institutions (Yigitcanlar and Martinez-Fernandez, 2007). This is also important for knowledge institutions so that the knowledge they generate is used and transformed in new knowledge.

Recent research suggests that innovative activities, especially in producer services and the creative industries are concentrated in knowledge precincts in globally linked cities (Yusuf et al., 2003). Within this context, external links of firms in a knowledge precinct plays a critical role in innovation and knowledge production. This brings the question of proximity to the discussion as most knowledge travels through networks and, in fact, some knowledge producers might be more close to users at the other end of the planet than to those next door within the same building or precinct. This means that geographic proximity does not automatically imply that the different parts of the local/regional innovation system will

generate, share, transform and adopt knowledge. Strategic planning and policy measures might be needed to ensure that knowledge circulates through the urban system, creating new opportunities for players that otherwise would not have access to specialised information, skills or technology (Yigitcanlar and Martinez-Fernandez, 2007). An example of isolated systems in closer proximity is Australian knowledge-intensive mining sites in remote communities. These mining sites are innovation-intensive locations where service providers and staff of the mining company built new capabilities day to day. Despite this high concentration of knowledge and problem solving skills little of these innovation processes are leaked to the businesses and organisations of the hosting towns. In the long-term the disconnection of these two innovation systems leaves the mining town in a weak position to face the future beyond mining operations resulting, in most cases, on shrinkage of population and economic prosperity.

Knowledge precincts represent a regional economic system constituted by economic actors whose success and survival depend on their capabilities to create new knowledge and then innovation (Petruzzelli et al., 2007). The intensity of the knowledge produced and transmitted makes knowledge precinct a 'system of activities' and while the boundaries are not limited at the geographical level, the organisation at the core of the precinct does need to be in geographic proximity (Acs, 2002). In this regard, North Ryde in Sydney there is both a strong presence of public research institutions with Macquarie University and the CSIRO and also a concentration of ICT companies (a prospective knowledge precinct) (Searle and Pritchard, 2004).

The development of knowledge precincts needs to consider the three main functions of knowledge: generation (e.g. research); transmission (e.g. knowledge workers, graduates), and

transfer (e.g. commercialisation and industry application) of knowledge. The way these three elements are combined is dictated by the talent involved and the environments where this talent results in innovation. For example Western Sydney is the third largest economy in Australia and a global manufacturing hub activity and commercialisation, and these three elements can be targeted for the successful knowledge-based development of Western Sydney: type of knowledge workers to be attracted, type of industries rich on KISA and type of knowledge-based occupations of major revenue in terms of knowledge (Yigitcanlar and Martinez-Fernandez, 2007). A possible typology is presented in Table 2 below.

Table 2: A regional knowledge guide for knowledge precincts (Martinez-Fernandez and Sharpe, 2007:53)

KNOWLEDGE WORKERS	RICH KNOWLEDGE INTENSIVE SERVICE ACTIVITY ENVIRONMENTS	KNOWLEDGE-BASED OCCUPATIONS
<ul style="list-style-type: none"> - Information & Communication Technologies - Business & Financial Services - Managers (general & specialists) - Technical Workers - Scientists - Engineers 	<ul style="list-style-type: none"> - Business Services - Banking - Finance - Insurance - Marketing - Education - Health 	<ul style="list-style-type: none"> - Engineering & Building - Scientific - Business & Information - Craft & Trades - General Management

Porter (1998) points out that knowledge clusters can not be ‘created’ but rather ‘stimulated’ through the right environmental conditions such as the support of knowledge-intensive and networking activities in strong knowledge industry sectors. Following to Porter’s point many cities worldwide have been trying to provide the best environmental conditions to stimulate such KBUD. An innovation policy study analysed Sydney in terms of its knowledge environment and concentrations, and this study has formed the bases of important policy documentation for the Sydney Metropolitan Strategy (DPNR, 2005) where pockets of knowledge were identified across the Greater Sydney Region. Organisations identified include university campuses, CSIRO units, hospital and medical research units and CRCs’

headquarters. There are clear concentrations of knowledge producing institutions in the eastern and central suburbs of Sydney and in Ryde (Figure 1).

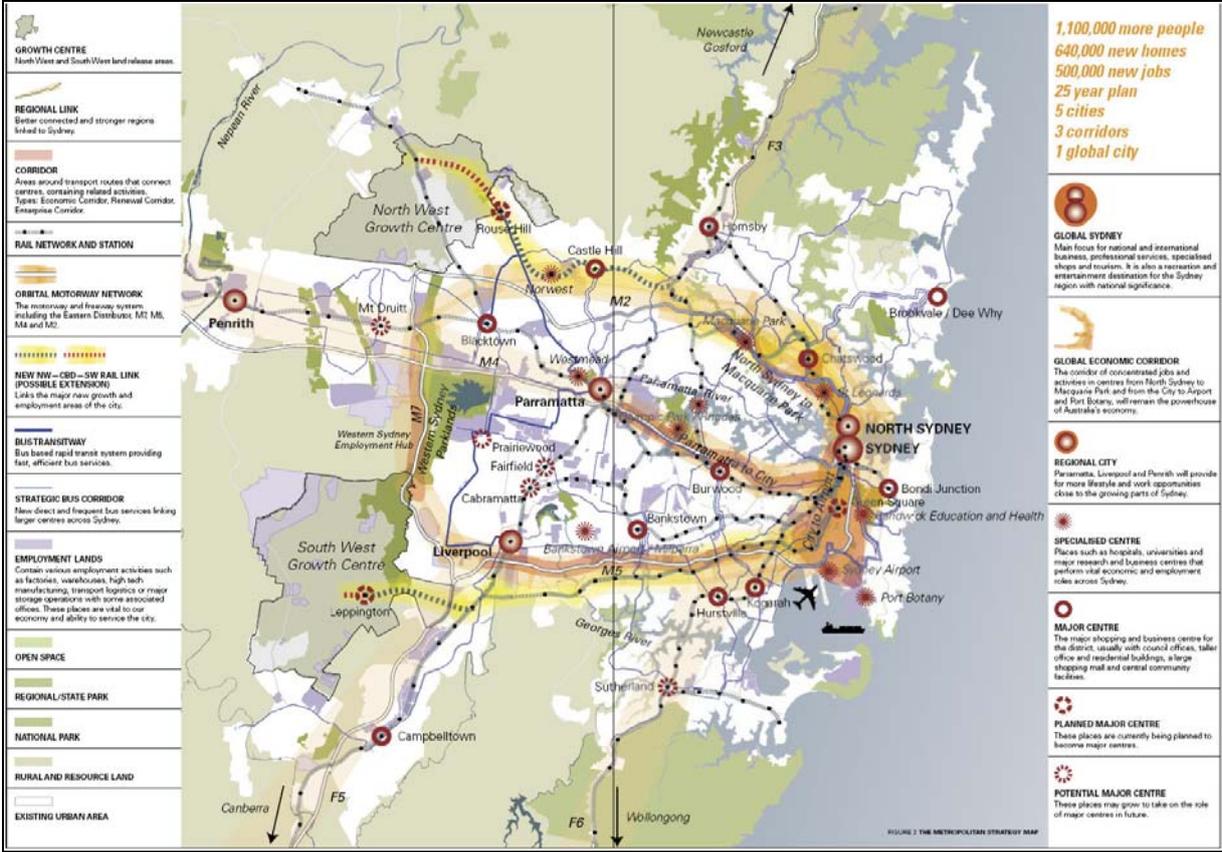


Figure 1: Sydney’s knowledge hub locations (DPNR, 2005: 11-12)

The organisation of knowledge in Australia’s most global city, Sydney (Melbourne and Brisbane would follow similar patterns), where the central business district acts as a magnet attracting knowledge workers and knowledge institutions. As illustrated in Figure 1 the right environmental conditions seems to be provided at Sydney’s global arc (the knowledge corridor including CBD and the airport). Same statement is not valid for Western Sydney as only few knowledge institutions are located in the far west side of the Sydney corridor despite the growing population in Western Sydney and therefore this creates a disadvantage in accessing knowledge to both a significant part of the population and to important contributing

industries to the state of NSW and the nation (Yigitcanlar and Martinez-Fernandez, 2007). Traditional macro-economic strategies such as fiscal and labour force policies and international trade are important but perhaps it can be argued that if the geography of knowledge precincts, producers and users matters for the knowledge-based development of Australian cities and for the attraction of talent then knowledge strategies need to be linked to the development and planning priorities in the local area or region so that support policies can be more effectively designed.

Concluding remarks: some reflections on the success of knowledge precincts

In this paper we emphasise knowledge precincts as the spatial nexus of KBUD, where the main promise of KBUD is a secure economy in a human setting, in short, sustainable urban and economic development. Velibeyoglu's (2001) research on 'technopoles of global information economy' finds that knowledge precincts are evolved from science and technology, innovation and business parks, and the articulation of technopolis concept over a long period of time. In addition to that, Searle and Pritchard's (2008) analysis on three most common types of knowledge precincts proves that the evolution is not yet completed. Early knowledge precincts continued the mission of innovation parks by being solely economic activity oriented (e.g. Desert Knowledge Precinct, Australia), while more recent ones, or new generation knowledge precincts, are identified by having a more integrated and mixed land use pattern and focus including residential and recreational uses within the precinct (e.g. One-North, Singapore). The latter one forms a better model for the knowledge-based development of the 21st century's rising knowledge cities.

The important question many policy-makers face today is that "whether knowledge precinct development is a panacea of our most recent obsession of knowledge city formation" or in

another words “whether urban policy and management strategies can promote knowledge precinct development, and if so, how this should be done?”. We suggest the following several key points mainly considering KBUD’s three purposes, economic development strategy, human and social development, and spatial relationship between urban development clusters, to be considered for the successful development of knowledge precincts.

Firstly, there is a danger in successfully fulfilling economic development purpose of KBUD for knowledge precincts by focusing on a particular type of technology or picking a winning knowledge base occupation. For instance government regulations in favouring certain knowledge fields can hamper other forms of new knowledge resulting on decline in knowledge attraction and, maybe, urging scientists to emigrate. Policies oriented to strengthen innovation systems therefore need to look not just at supporting the ‘favourite knowledge industry of the month’ but also knowledge that might be more basic, fundamental and from which commercialisation outcomes might not be clear at the present moment.

Secondly, to fulfil human and social development purpose of KBUD, building networked infrastructures (both hard and soft) of a knowledge precinct with state of the art offices surrounded of research centres or industry incubators is not sufficient enough to form a knowledge society and foster knowledge and commercial innovations unless a functional understanding of the dynamics of knowledge (generation, transmission and transfer) forms part of the equation. For example, universities today are magnets of specialised knowledge and much knowledge migrates with the scientific and research staff of universities; this alone is a strategic tool for policy aimed at bringing knowledge into a city or region as supporting knowledge society and scientific workers, and facilitating their participation in urban and regional networks would facilitate the circulation of knowledge. It is then necessary to ensure

that this knowledge mix, match and expands through participation in networks. Policy-makers also need to be aware of the science and technology conditions operating in our globalised world today. There is an increasing competition from other regions to attract scientists and industry talent; knowledge carriers are often targeted by other players to move institutions and knowledge bases.

Thirdly, to fulfil strong spatial relationship purpose of KBUD, planning policy and commercial strategies can certainly be structured to directly enhance the relevance of knowledge produced in a knowledge precinct but the conditions for high intensity of knowledge traffic are much more complicated than, for instance, the strategic use of land. A different set of skills are needed to develop knowledge networks where ideas can be trialled and discussed. Government policies, also at the local level, have a critical role to play in fostering the conditions and spatial relationships of urban development clusters where accessibility, connectivity, integrity and intellectual vitality are made up of intensive collaboration networks that attract and retain knowledge carriers (agents, firms and workers). In part this responds to the view that local institutions, businesses and organisations are partners in fostering local development and are part of the local innovation system where they are embedded.

Lastly, we recommended that future research on the topics and issues addressed in this paper to be conducted within the strategic context of KBUD research. The analysis of 'knowledge hubs' and their elements and processes still in its early infancy and to extract lessons and conclusions that can be replicated into small scale 'knowledge precincts' needs further exploration. Additional empirical research should focus on knowledge precincts and their

contribution to the knowledge-based development of rising knowledge cities and urban-regions.

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