

**School of Built Environment
Department of Urban and Regional Planning**

**The role of economic development and urban planning in the
development of knowledge-based regions in secondary
economic centres:**

A comparative study of Australia and Japan

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To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signed

Kirsten R. Martinus

Abstract

Knowledge development and innovation have frequently been linked to rapid sustainable economic growth. Recent unprecedented globalisation and technological advancements have made understanding this relationship more important than ever. Indeed, innovation occurs through a complex process embedded in individual and collective human knowledge, experience and space, leading some to advocate the importance of fostering the social capital and creative capacity of local urban environments. This thesis hypothesises that urban planning and city design act as a framework for human interaction, movement and connectivity, influencing the efficiency of knowledge productivity and the innovation process.

It contends that urban form impeding the interaction of soft infrastructure (social capital) is likely to require more government intervention and resources to overcome inefficiencies of low connectivity, accessibility and urban vibrancy. In contrast, urban form that enhances social capital tends to have better living and more accessible environments for all residents irrespective of socio-economic standing or aspiration. This thesis proposes that the high human attractiveness and movement of the latter improves the efficiency of knowledge exchange and innovation systems. Being the accumulative sum of all local systems, it is argued that a regional or national innovation system can be enhanced by local urban environments which better facilitate the flow of knowledge and innovation.

This thesis presents the results of a four-year cross-national study exploring how urban form can leverage the socio-economic aspects of a city for new economy growth. It pays particular attention to the mechanisms linking new economy factors and the constructed urban environments in the case studies of Perth's Northwest Corridor in Western Australia, Australia, and Kansai Region in Japan. It identifies infrastructure types and the importance of urban form in generating an environment which facilitates knowledge development and innovation. This thesis contends that the environment of activity centres, for example train station developments, may be more supportive of national innovation and productivity priorities than others. Understanding how the urban space of such developments contributes to regional transfer mechanisms and flows can enable government policy to better identify and address regional innovation and knowledge gaps. Evidence presented suggests that urban planning not sensitive to the new economy contribution of urban space is likely to place unnecessary barriers in the innovation process.

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TABLE OF CONTENTS

CHAPTER 1: CONCEPTS AND DEFINITIONS	9
1.1 Introduction	9
1.2 Research objectives	10
1.3 Background concepts	11
1.3.1 Knowledge and the economy	11
1.3.2 Secondary economic centres	14
1.3.3 The dual paradox of globalisation	18
1.3.4 Competitive and innovative knowledge-based city	22
1.4 Thesis outline	23
1.5 Significance of the research	26
CHAPTER 2: ECONOMIC THEORY AND CITIES	27
2.1 Introduction	27
2.2 Knowledge productivity	28
2.2.1 Incorporating knowledge into the goods and service production function	29
2.3 Enhancing innovation through urban form	31
2.3.1 Density argument	33
2.3.2 Argument for infrastructure and amenities	34
2.4 Infrastructure and amenities for innovation and knowledge	35
2.4.1 Connectivity	38
2.4.2 High education and skills	40
2.4.3 High creativity and cultural vibrancy	40
2.4.4 Strong industry and business networks	41
2.4.5 Diversity	42
2.5 Conclusion	43
CHAPTER 3: INNOVATIVE CITIES	45
3.1 Introduction	45
3.2 Responding to the growing global need to access local knowledge resources	46
3.2.1 Urban network strategies	47
3.2.2 Community strategies	48
3.3 Cities fostering innovation	50
3.3.1 Site selection	50

3.3.2 Methodology	51
3.3.3 Analysis of four cities	58
3.3.4 Average results for the four cities	67
3.4 Conclusion	69
CHAPTER 4: RESEARCH INQUIRY PARADIGM	71
4.1 Introduction	71
4.2 Ontology: constructivist	71
4.3 Epistemology: interpretivist	71
4.4 Research approach: case study	73
4.4.1 Literature review	75
4.4.2 Sampling	75
4.4.3 Data collection methods within the case studies	76
4.4.4 Data analysis	82
4.4.5 Ethical issues	85
4.4.6 Data storage and retention	86
4.5 Limitations and strategies to address limitations	86
CHAPTER 5: URBAN INNOVATION SYSTEM	89
5.1 Introduction	89
5.2 The urban framework of innovation	90
5.2.1 Innovation in the urban environment	91
5.2.2 The contribution of local space	94
5.3 Train station survey	97
5.3.1 Site selection and survey methodology	98
5.3.2 Observations and survey results	100
5.4 Conclusion	108
CHAPTER 6: NATIONAL CONTEXT OF CASE STUDIES	111
6.1 Introduction: Countries of focus	111
6.2 Australia	112
6.2.1 Innovation and knowledge-based directions	112
6.2.2 Urban planning	115
6.2.3 Issues and urban form of particular relevance to this research	121
6.3 Japan	124
6.3.1 Innovation and knowledge-based directions	125
6.3.2 Urban planning	132
6.3.3 Issues and urban form of particular relevance to this research	141

6.4 Conclusion	143
CHAPTER 7: REGIONAL CONTEXT OF CASE STUDIES.....	146
7.1 Introduction.....	146
7.2 Case study selection	146
7.3 Perth’s North-West Corridor (PNWC), Western Australia.....	152
7.3.1 City of Joondalup	154
7.3.2 City of Wanneroo	158
7.4 Kansai Region, Japan	165
7.4.1 City of Kobe	170
7.4.2 Kansai Science City	179
7.5 Conclusion	181
CHAPTER 8: STATIONS IN CASE STUDIES	185
8.1 Introduction	185
8.2 Site selection and methodology	185
8.3 Perth’s Northwest Corridor, WA, Australia.....	188
8.4 Kansai, Japan.....	193
8.5 Comparing study regions to innovative cities.....	197
8.6 Conclusion	200
CHAPTER 9: INTERVIEW ANALYSIS	202
9.1 Introduction	202
9.2 Elite interviews.....	202
9.2.1 Participant selection process	202
9.2.2 Interview questions	203
9.2.3 Interview process	203
9.3 Interview findings and analysis.....	204
9.3.1 Participants background	204
9.3.2 Which industries define future competitive advantage in your region?	207
9.3.3 What government economic development policies inform urban planning in your region?	215
9.3.4 How important are single-use and mixed-use planning zones to the future economic development of suburbs?	225
9.3.5 How successful has the existing planning in your region been in achieving the following?.....	232
9.4 Conclusion	255

CHAPTER 10: CONCLUSION.....	260
10.1 Introduction.....	260
10.2 Summary.....	260
10.3 Research significance.....	266
REFERENCES.....	268
Appendix 1: General survey questions.....	296
Appendix 2: Elite interview questions.....	298

CHAPTER 1: CONCEPTS AND DEFINITIONS

1.1 Introduction

Knowledge has often been the basis for rapid sustainable economic growth, transforming economies and lifestyles. Mokyr (2000) argued the technological, economic and social changes of Britain's Industrial Revolution during the late 18th Century were driven by the increasingly greater contribution of knowledge. It is the same today with improvements such as those associated with telecommunications transforming the production process (Garicano & Rossi-Hansberg, 2006).

The social consequences of replacing localised cottage industry by global mass production are unmistakable, effecting all aspects of work, thinking, consumption, family and social lives. The move from cottage-based to industrial economy and from agricultural to capitalist society has spurred economic growth and seen large industrial towns spread over Europe and North America (Blinder, 2006; Toakley, 2004; Wrigley, 1988). Many argue that these historical events are related to future economic growth in a path dependent and uncontrollable relationship (Mandle, 2005; Toakley, 2004). Friedman (1996) stated that this path-dependent relationship was the foundation of the information economy, arguing that the flow of information and ideas joined that of human energy to govern the world's economy. Toakley (2004) noted that globalisation and urbanization are inevitable manifestations of the Industrial Revolution.

Indeed, some argue that globalisation is transforming the 21st Century in the same powerful way that the Industrial Revolution shaped the 19th and 20th Centuries (Mandle, 2005; Manzella, 2008; Toakley, 2004; Thurow, 2005). Globalisation is defined by Monash University's Australian APEC Study Centre (2002) as „the rapid increase in cross-border economic, social, technological exchange under conditions of capitalism“. It is characterized by progressively more advanced „technologies in communications, information processing, storage and retrieval, and transportation“ (Mandle, 2005, p.353).

Though it is unknown exactly how current rapid globalisation and technological progress will change future economic, social and urban landscapes, the importance of knowledge and innovation to regional economic competitiveness is apparent (Knight, 1995; Lambooy, 2005). It is revolutionising spatial relationships between economic actors (Audretsch, 2003; Vale, 2004). Friedman (1996) suggested these structural changes will occur at a multiplying rate the more information technology permeates economic, social and cultural patterns. This places pressure on cities to foster regional competitiveness as new economic powers emerge from shifting socio-economic equilibriums (Begg, 2002; Morris, 2002).

Given the increasing importance of knowledge and information as dictated by the path dependency and globalization hypotheses, this thesis examines the urban form most likely to be economically efficient in the new economy and how urban planning can support knowledge development and innovation. It explores the relationship of urban planning and city design to economic production theory, and their influence on knowledge productivity and innovation.

This research finds that the urban form generated by different urban planning approaches is likely to place spatial limitations on soft infrastructure components, such as social capital, human movement and access to knowledge/information. It hypothesises that a development's spatial mix and level of infrastructure creates a unique socio-economic imprint, contributing to regional and national capacity for knowledge development and innovation. It finds that cities of innovation should be viewed as flows and connections of human capital rather than networks of roads and destinations, with the built environment affecting human movement and related aspects of urban vibrancy, human interaction and connectivity.

The remainder of this chapter offers an overview of the background concepts, objectives and methodology employed for this research.

1.2 Research objectives

The research objectives are as follows:

- Identify key socio-economic factors contributing to knowledge development and innovation.
- Understand how urban planning can leverage these factors and generate urban form supportive of knowledge development and innovation, in particular how this can assist new economy growth in secondary economic centres.

- Investigate how urban planning and economic development policy and strategy in Japan and Western Australia might support knowledge development and innovation.

1.3 Background concepts

This section outlines major concepts and definitions related to this research.

1.3.1 Knowledge and the economy

The development, organization and dissemination of knowledge have always facilitated human economic, cultural and social development (Mokyr, 2000; Thurow, 2005). The last few decades have experienced an increasing number of knowledge-intensive activities leading to comparatively more sophisticated innovative and technology-intense products. As such, knowledge is increasingly part of economic analysis (Ács et al., 2002; Houghton & Sheehan, 2000; OECD, 1996, 2001). Knowledge is not a consumable or finite commodity, but effects economic growth through its rising rate of accumulation (as more people hold and have access to it) (Howells, 2002; Wong et al., 2006).

In the 1950s, manufacturing value-added approximately 80% and knowledge only 20% to various processed products in the USA. By 1995, these proportions had become 30% and 70% respectively (Dunning, 2003; Park, 2001). It is estimated that in the USA the ratio of intellectual capital to physical and financial capital in most businesses is between 5:1 and 16:1 (Dunning, 2003). Despite changes in the assessment criteria for knowledge input, these figures highlight a general movement from industrial manufacturing to a knowledge-based industry (Florida & Tinagli, 2004; Park, 2001; Trewin, 2002). This trend towards a dynamic highly-skilled productive workforce highlights the need for government initiatives to encourage high-tech and knowledge-intense learning and skill development for individuals and business (OECD, 1996).

Indeed, the almost zero Gross Domestic Product (GDP) per head gap between the most and least rich countries of the 1700's had become approximately 140 to 1 in the 2000's (Thurow, 2005). In 1996, an estimated 50% of GDP for respective OECD countries was knowledge-based (OECD, 1996). Since 2001, these investments have grown at the same rate as GDP. In 2007, knowledge and innovation were the primary drivers of productivity and trade, and the growth of Information and Communications Technology (ICT) and business services industries (OECD, 2007).

Howells defined knowledge as the „dynamic framework or structure from which information can be stored, processed and understood“ (2002, p.872). Knight (1995) advocated differentiating between knowledge and information using pre-1700's concepts. He said that

information is a commodity being easily transferred, diffused, replicated and exchanged; and knowledge is „truth in judgment“ often culturally-based and existing in the mind. This aligns with the majority of literature classifying knowledge across a variety of industry, educational and human activities as either codified or tacit (Lambooy, 2005; Mokyr, 2002a; Simmie, 2003; OECD, 1996). Some ascertain that codified and tacit knowledge cannot be treated as separate forms of knowledge, but as opposing ends of a knowledge continuum (Simmie 2003; Wong et al., 2006). Van Geenhuizen (2002) suggested a third type was contextual. Table 1 summarises the comparative characteristics of the three, highlighting the importance of physical contact to tacit and contextual knowledge forms.

The increasingly rapid turnover of knowledge stock (tacit to codified) is intensified by technology, creating a tacit knowledge vacuum (OECD, 1996; Wong et al., 2006). Indeed, codified knowledge is highly accessible and readily transmitted through technology and communications. It is easily traded in the open market at almost zero marginal access cost. While tacit knowledge is interpretive and not easily transmitted, relying heavily on face-to-face interactions (Lambooy, 2002, 2005; Lever, 2002a; Mokyr, 2002a; OECD, 1996; Simmie, 2003). The highly person- and context-specific nature of tacit knowledge predicates „stickiness“, and therefore a tendency to remain in a locale or social group. Its transmission relies on physical interaction or institutional education to impart common codes, standards, routines, trust, mindset and language, thus, only embedded in and tradable through human capital (Lambooy, 2002; Lundvall, 2006).

Knowledge transmission mechanisms are part of a community’s social capital. The OECD defined social capital as „networks together with shared norms, values and understandings that facilitate cooperation within or among groups“ (Schuller, 2005, p.2). Social capital facilitates the effective transfer of tacit knowledge between individuals. It is therefore vital in knowledge economies (Lever, 2002a). Mokyr (2002a) ascertained that the efficacy of a knowledge society depended on the quantity of knowledge, its organisational capacity (how effectively it can be diffused throughout society) and marginal access costs. The more applicable the knowledge, the higher its economic value and *usefulness* (Lambooy, 2005). A society’s pool of *useful* knowledge is critical, and total capacity is defined as „the union of all the pieces of useful knowledge contained in living persons' minds or storage devices“ (Mokyr, 2000, p.256).

Knowledge spills and their importance to further knowledge creation and innovation are well-documented (Audretsch, 2003; Howells, 2002; Simmie, 2002; Vale, 2004). Howells (2002) stated that through spillovers, „publication, patents or informal sharing“ (p.875), knowledge becomes a free public good with its creator unable to dictate who uses it.

Table 1: Characteristics of knowledge communication types

Characteristic	Codified	Tacit	Contextual
Content	Objective knowledge (facts, figures, formulas)	Subjective knowledge (ideas, perception, personal experience)	Subjective knowledge about perspectives and interpretative frameworks
Environment	Between individuals	Mainly between individuals sharing culture	Between individuals of different cultures and frame of reference
Transfer method	Standard codes	Observation, interactive participation and practice	Continuous real-time interactive learning
Transfer background	Planned	Often by chance	Planned, but without pre-defined aim
Facilitators	Uniformity of codes	Trust, share of interpretative framework	Different frames of interpretation
Characteristics	Standardisation, replicability, reliability, speed, efficiency, automatic processing	Flexibility, variability, management of ambiguity	Innovative content, context exploration, richness of form and content
Constraints in electronic transfer	<i>Few</i> Shortage of formal communication means	<i>Substantial</i> <ul style="list-style-type: none"> • Intelligent agents: problems of validity, learning in unexpected situations and trust in delegating tasks • Multimedia using interactive tools: impossible to integrate all functions with universal applicability 	<i>Structural</i> <ul style="list-style-type: none"> • Frustration of basic needs: continuous real-time interaction, broad range of information without pre-defined language, variety of means • No predefined aims and expected results (and costs)

Source: Adapted from van Geenhuizen (2002, pp. 3-4)

Lundvall (2006) argued that this creates a disincentive leading to underinvestment in knowledge and the case for government support. He suggested that knowledge is neither a truly private nor public asset, but a non-marketable community resource. He cited the strong competitive advantage and externalities gained through industry clustering, and the persistent unequal access to knowledge pools by members of the same community.

This thesis contends that the effective transfer of all and any knowledge types between individuals is critical for economic efficiency in the current globally-networked knowledge- and technology-intense post-industrial societies. Various prefixes, such as *knowledge*, *knowledge-based*, *knowledge-driven*, *global*, *network* or *new*, have been attached to *economy* to describe this phenomenon (Wong et al., 2006; Simmie 2003). This thesis uses these terms interchangeably, adopting the general definition of it being „the production, distribution and use of knowledge and information...(and) reflected in the trend in OECD economies towards growth in high-technology investments, high-technology industries, more highly-skilled labour and associated productivity gains“ (OECD, 1996, p.7). Raspe and Van Oort (2006, p.1213) summarized this as:

Knowledge...is the adding up of abilities (capabilities, creativity and persistency) to recognize and solve problems, by collecting, selecting and interpreting information. „Change“ is an essential element in this. The knowledge economy then is the use of knowledge in interactive relations between market actors and others, while producing and using goods and services, from the first idea to final products.

Sustainable economic growth and wealth in the new economy is achieved through creative, innovative and knowledge-related activity. This needs a ready-supply of human talent and efficient flexible knowledge organisation systems (Wong et al., 2006).

For the first time in human history, it is possible to be fabulously rich by controlling knowledge...In a very real sense, intellectual conquest has replaced geographical conquest (Thurow, 2005, p.8).

This research will investigate whether urban form supportive of physical connectivity and vibrancy can support tacit and contextual knowledge transmission. This is based on the hypothesis that such environments can generate economic efficiency for knowledge-related activities.

1.3.2 Secondary economic centres

A secondary economic centre is a broad term used in this thesis to describe the secondary economic function of a particular area compared to another more dominant economic area in the same city, region or nation. This aligns with studies defining city hierarchies, such as the

alpha, beta and gamma categories of GaWC (2008; 2011) and the global or world city rankings of Sassen (2001), where some cities are said to occupy positions of secondary global economic importance to others. This thesis assumes that similar rankings may be applied to describe the economic importance of cities within a nation and of urban centres within a city.

The „urban centres within a city“ comparison is a critical part of the analysis of this thesis given that increasing globalisation and advancing technologies have enabled the decentralization of economic activities, facilitating a greater contribution of the local milieu to national wealth. Chapters Three and Four discuss this further. Such economic areas are part of a city, with outlying metropolitan areas or suburbia areas often less competitive and productive in new economy industries than inner city counterparts. As presented throughout this thesis, many believe it is associated with lower levels of vibrancy, amenities, greater urban sprawl and more disadvantaged socio-economic and unskilled residents. Given that the majority of human capital actually resides in these outlying areas, their economic disadvantage is of increasing relevance to the health of a city as a whole. These outlying areas are typified by:

“...established urban structure of metropolitan concentration based on industrial growth surrounded by economically inert, provincial and dormitory-based suburbs...shift(ing) to increasingly economically active, poly-nucleated and amorphous suburbs with a less-dominant central city” (Essex & Brown, 1997, p.260).

“... no longer suburbs because at 9 in the morning, people no longer leave them, but rather head towards them to go to work. They have all the functions a city ever had. They are not sub-anything” (Garreau, 1999).

Many terms, such as „edge cities“, „technoburbs“, „exopolis“, „silicon landscapes“, „cyburbia“, „geographical city“ and „suburban downtowns“, have described a city’s evolving globalised suburban landscape. Each is steeped in the historical context of the originating country reflecting a particular angle of research (Essex & Brown, 1997; Lee, 2007). For example, Garreau’s *edge cities* (1992) of the USA, which have drawn wide commentary and analysis (Dietsch, 2001; Lee, 2007; Lewis et al., 2002; MacGillis, 2007; McKee & McKee, 2004; Phelps et al., 2006). Garreau (1992) argued that edge cities reflect the distinctive energy, aspirations and life-style choices of residents. He noted they were similar to conventional cities being a product of rapid population growth or cultural transformation adjacent to a metropolitan core.

The *edge cities* key premise that jobs follow people has ignited a debate with those who believe that people follow jobs (Ding & Bingham, 2000; Mattsson, 2007; O'Connor & Healy, 2006). Ding and Bingham (2000) demonstrated that the extent to which edge city formation effects the spatial distribution of population depends upon economic sector and occupation type. Further work by Zhang and Sasaki (2005) identified edge cities as „formed by a large scale developer’s (or city government’s) strategic development of a suburban area or outside of an existing core city, while sub-centre formation or suburbanization are the result of economic reactions to higher land rents and wage rates and/or traffic congestion in the central area or a city” (p.523). That is, edge cities are the result of calculated economic and urban planning to „predict the future size of the business district and residential area” by estimating firm and household „economic behavior” (p.523). Zhang and Sasaki stressed the negative effect of edge city attraction being that businesses vacate shrinking the central city area. They contended that business follows household preference to increase utility and decrease commuting time by locating workplaces closer to residential areas.

Many believe that *edge cities* are distinctly American and do not encapsulate the diversity and trajectory of urban city developments in other countries. Lang (2003) found the modern city to be edgeless with jobs dispersed throughout a metropolitan region not concentrated centres. Lee (2007) demonstrated that the propensity of employment to follow people into suburbs is far more than previously assumed.

There appears to be various „self-styled” forms of edge urban areas throughout the world, with most having comparable socio-economic functions characteristic of 21st Century urban spaces (Fujii et al., 2006; Phelps & Parsons, 2003; Phelps et al., 2006). For example, Phelps & Parsons (2003) thought different forces shaped Europe and USA counterpart „edge cities”. They suggested this was because, firstly, European economic development tended to be „government-led” and more susceptible to local and state public sector intervention. Secondly, European city-region planning philosophy more closely linked the welfare of edge urban areas with their central core. Lastly, the geographical scale of European edge areas implied a more highly integrated relationship with the core city and other edge urban areas, complicating their political, social and economic autonomy.

Others use different spatial descriptions to identify the socio-economic pattern of a city. In Europe, the city-region planning framework uses travel-to-work geography to describe a city’s „economic footprint”. City-regions are defined as „the area over which key economic markets (such as labour markets measured by travel to work areas, housing markets and retail markets) operate...includ(ing) the whole area from which the urban core draws people for work and services” (Jones et al., 2006, p.19). Though city-region philosophies acknowledge the value in strengthening regional networks to form strategic areas, they

underestimate the importance of the global networks and institutions in edge urban areas (Phelps & Parsons, 2003).

European outer suburbia forms *peri-urban zones*, which are „new areas at both the local and the regional level where the urban and rural meet and mingle to form a new territorial unit“ (Peri-Urban Regions Platform Europe Regional Policy Subgroup, 2006, p.1). Economic processes reflect the manufacturing/production and industrial activity of a central metropolitan core, denoting over-reliance on a well-serviced city core. Larger households are displaced by rising rents perpetuating economic disadvantage and social problems (Ding & Bingham, 2000; Feng, 2004).

Australian *edge cities* are less defined with less developed freeway infrastructure and interchanges and significantly different inter-suburb work patterns, (Forster, 2006, O'Connor & Rapson, 2003). O'Connor and Rapson (2003) suggested that the city-region model more adeptly described Australian urban-economic spatial patterns. Armstrong (2005) noted „Australian cities are somewhere between the privatised landscape of the North American cities and the urbanised landscape of growing European cities“ (p.4). Many core urban centres and surrounding advantaged inner suburbs are gaining economic strength, while outer metropolitan employment is located in „a complex mix of dispersed locations and specialized cores“ (Forster, 2006, p.174).

A pattern of socio-economic change is observed to have created disproportionate income and social disparities between the inner and outer metropolitan areas of Australia cities (Baum, 2005; Kenna, 2005). A study (Nygaard et al., 2005) of wealth disparities in Sydney, Melbourne and Adelaide found that overall economic and urban robustness was appropriate for and corresponded to their position in the global economic hierarchy:

...the geography of income inequality in Sydney and Melbourne is more unequal and has in recent years worsened relative to Adelaide. More unexpected is a finding that per capita income growth in Sydney and Melbourne's poorer communities has fallen behind that of their counterparts in Adelaide (p.16).

Their findings concurred with those who believe greater world market integration causes increasingly divergent wealth between regions of the same city: the highly-connected, globally-linked and highly-skilled „*haves*“ and the poorly-skilled and minimally-connected „*have nots*“ (Baum, 2005; Bill, 2005; Kenna, 2005; Legge, 2005). This disparity confronts housing affordability, a core principle of Australian urban planning as reflected in its low urban density and continuing sprawl (Gwyther, 2003; O'Connor & Healy, 2004).

As sustainable urban planning rises on the political agenda, Australian urban policies have reflected principles of urban consolidation focused primarily on housing density. However,

inadequate integration of daily work spatial movements has had limited effect on addressing socio-economic urban design inefficiencies and sustainability (O'Connor & Healy, 2004). Journey-to-work data characterise Australian cities as having a high number of residents travelling across local government boundaries for work. This is true even by residents of high employment areas (Forster, 2006). As argued by O'Connor and Healy (2006):

...planning policy to sustainably manage urban development will need to pay as much attention to the distribution and density of jobs as it will the location of housing and residential populations (p.30).

Recent submissions to the Australia Federal government focus on the importance of infrastructure provision for the successful economic and social growth of outer metropolitan regions (NGAA, 2011). The capacity of urban planning to contribute to work/life balance is particularly important in often less-endowed outlying metropolitan areas, but nevertheless secondary economic centres, and therefore an important consideration in this study.

1.3.3 The dual paradox of globalisation

Globalisation and advancing technologies have created a dual paradox for outlying urban regions. Firstly, it has created a „new“ knowledge-driven economy thrusting local communities in the global arena (Atkinson & Court, 1998; Essex & Brown, 1997; Sorensen, 2003; Toakley, 2004). Secondly, the long-established manufacturing and industrial relationship of outer areas with the metropolitan core is under siege by developing countries producing goods more cheaply and efficiently (Blinder, 2006; Broga, 2007; Dunning, 2003; Lambooy, 2005; Lever, 2002b, 2002c; Mandle, 2005; McKee & McKee, 2004).

Local-global paradox 1: Coupled with increasing economic deregulation and the spread of ICT, globalisation is causing unprecedented regional and local specialisation in markets of competitive advantage, higher productivity and innovative activities (Houghton & Sheehan, 2000; Manzella, 2008; Toakley, 2004). It is facilitating socio-economic polarization at the metropolitan level generating a world hierarchy of cities (Beaverstock et al., 1999; Douglass 2000; Nygaard et al., 2005; Sassen, 2001). This is also true at the local level, creating inherent disadvantages in areas of structurally high social exclusion and with difficulty attracting business from commercial and industrial centers (Peri-Urban Regions Platform Europe Regional Policy Subgroup, 2006). Regional economic and built-environment sustainability is becoming increasingly important:

By the year 2025, almost two-thirds of the world's population will be urban dwellers. The world of the 21st century will be dominated by cities. Among the economic and social factors influencing this process are demographic growth and

migration, real and perceived employment opportunities, cultural expectation, changing consumption and production patterns, and serious imbalances and disparities among regions (United Nations Conference on Human Settlements quoted in Toakley 2004, p.314).

Table 2 demonstrates the paradoxical relationship between highly networked local economies and a region's global competitiveness under ever-increasing globalisation and advancing technologies. Other examples are in widely-documented geographical and industrial clustering (Porter, 2000; Potts, 2002; Raspe, 2007), where the strength of local networks provide the foundation for globally positioning a region. These will be discussed further in Chapter Two.

Local-global paradox 2: By the 1970's, acute income and standard of living differentials between developing and developed nations occurred as a result of large industrial changes (Mandle, 2005; Maruno, 2001; Thurow, 2005; Toakley, 2004). Kapur (2001) argued that these disparities arose from differences in social capital, such as skill, institutions, governance structures and „entrepreneurial spirit“. Toakley (2004) suggested that „increased international trade, the wider availability of capital, improvements in communication, the internationalization of education and the transfer of technological and managerial skills“ (p.311) lay foundations for the surging economic growth of developed countries during industrial and post-industrial eras.

Ironically, this same escalating globalisation is now eroding these differentials and the comparative advantage enjoyed post-war by richer countries in medium-tech growth industries, such as the automotive and machine tools (Audretsch, 2003; Toakley, 2004). As a result, some argue that regional strategies should not overly-strengthen globalisation and knowledge economy objectives as globalisation creates an environment where low-income earners of rich countries directly compete with those in poorer countries to ensure the lowest manufacturing cost (Lambooy, 2005; Mandle, 2005). It is offering developing countries, formerly seen as „suppliers of raw or agricultural products“, the opportunity to readjust developing/developed country differentials in both emerging markets and manufacturing (Mandle, 2005, p.353). Other literature supports this view (Blinder, 2006; Broga, 2007; Dunning, 2003; Lever, 2002c; McKee & McKee, 2004).

Some, such as China, are joining the *new* economy by increasing knowledge capacity and organisational capabilities (Dahlman & Aubert, 2001; OECD, 2007a). This is threatening global leaders (Brelade & Harman, 2007; Task Force on the Future of American Innovation, 2005) such as the USA who is being urged to „act now“ or face the prospect of diminishing

Table 2: Characteristics of „old“ and „new global“ economies

Issue	Old economy	New economy
General		
Markets	Stable	Dynamic
Scope of competition	National	Global
Organisational form	Hierarchical, bureaucratic	Networked
Industry		
Organisation of production	Mass production	Flexible production
Key drivers of growth	Capital/labour	Innovation/knowledge
Key technology driver	Mechanisation	Digitalisation
Source of competitive advantage	Lowering economic cost through economies of scale	Innovation, quality, time-to-market, cost, niche market, access to services
Importance of research/innovation	Low-moderate	High
Relations with other firms	Go it alone	Alliances & collaboration
Workforce		
Policy goal	Full employment	Higher real wages & incomes
Skills	Job specific	Broad skills & cross training
Requisite education	A skill or degree	Life-long learning

Issue	Old economy	New economy
Labour-management relations	Adversarial, alienation	Collaborative, decentralisation, autonomy
Nature of employment	Stable	Marked by risk and opportunity, two-tier workforce: core (highly educated & flexible working conditions) & peripheral (low-skilled, low-security, part-time)
Government		
Business-government relations	Impose requirements, bureaucratic	Encourage growth opportunities
Regulation	Command & control	Market tools, flexibility, deregulation, new local governance structures
Urban Planning		
City landscape	Urban core surrounded by economically inert, dormitory suburbs	Decentralisation of city and services, economically & socially vibrant suburbs
Regulation	Prescriptive	More flexible zoning
Public involvement	Limited	Community consultation & empowerment
Outcome	Controlled development maintain „status quo“	Conflict and contested space

Source: Adapted from Atkinson and Court (1998, p.7), Essex and Brown (1997, pp.261-262)

„global leadership“ and „talent pool required (to) support (the) high-tech economy“:

...[T]he U.S. government has seriously underfunded basic scientific research in recent years... [T]he inadequacies of our systems of research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine. American national leadership must understand these deficiencies as threats to national security. If we do not invest heavily and wisely in rebuilding these two core strengths, America will be incapable of maintaining its global position long into the 21st century (Task Force on the Future of American Innovation, 2005, p.2).

Globalisation is restructuring *old* industrial economies through new global spatial relationships in both their scope (number) and depth (intensity) (Dunning, 2003). Houghton and Sheehan (2000, p.15) noted that „policy failure and inaction“ would further exacerbate regional specialisation and polarising income and standards of living, a result of increasing returns to networking and knowledge accumulation (Dunning, 2003; Houghton & Sheehan, 2000). This thesis presumes that the location and infrastructure disadvantages of outer metropolitan areas put them most at risk, and that such risks may be alleviated by better integrated socio-economic planning and development.

1.3.4 Competitive and innovative knowledge-based city

Some believe that city urban and community development arising from each period of industrial progress reflects its dominant economic structure (Baum et al., 2002). Fundamental differences between industrial and knowledge economies have redefined economic and social systems (Wong et al., 2006), where declining industrial activities mean cities are returning to their historical function to congregate knowledge and culture. The struggle to move from the *old* industrial to a *new* knowledge base is compounded by the simultaneous move from *physical* (face-to-face) to *virtual* (using ICT) (Malecki, 2002). Cities can support competitiveness in related innovation processes by concentrating knowledge sources and providing quality *soft* infrastructure (Edvinsson, 2006; Knight, 1995; Wong et al., 2006). As a result, there has been a distinct movement since the 1990's to understand the economic impact of soft infrastructure on national wealth creation and productivity, and how to increase the global competitiveness of local economies. This will be further discussed in other chapters using the following concepts and definitions.

- *Soft* infrastructure are human interactions (cultural, social either directly or through communications technology) necessary for knowledge gathering activities (Malecki, 2002; WAPC, 2003; Wong et al., 2006).

- *Hard* infrastructure is the physical hardware (telecommunications, roads, institutions, buildings, supporting services such as transport) linking soft infrastructure to the global community (Malecki, 2002; WAPC, 2003; Wong et al., 2006).
- *Amenity* relates to the appeal of both public and private aspects of an environment have to visitors of an area, as well as the enjoyment of residents of an area (Fenwick Elliot Grace, 2007). This may include natural amenity (like the view, nature, clean air) and constructed amenity (like convention centre, toilets, sporting facilities) (Clark, 2004).
- *Competitiveness* is defined as „the efficient use of the resources of firms (as organisations) in dynamic environments, in order to acquire products or gain a leading position in the market, or (for cities), to attract more funds and inward investment“ (Lambooy, 2002, p.1020). It forces regions to look beyond their generic business environment to develop niche comparative advantages for global strategic development (Houghton & Sheehan, 2000) focusing on regional specialisation, innovation, knowledge and quality (Simmie, 2002).
- *Innovation* (the application of knowledge) appears to be a precondition of knowledge-based economic growth (Simmie, 2002). It is defined as „the implementation of knowledge acquired through R&D or experience in life and in markets, combined with certain person-specific competencies“ (Lambooy, 2002, p.1020). It has replaced production cost efficiency as a regional source of competitive advantage making local economies more relevant than ever (Goldberg, 2006).
- *Sustainability* is used in this thesis as an economic, social or planning outcome that respects the need for future generations to have equal access to the opportunities enjoyed by the present generation.

1.4 Thesis outline

As the creators and wardens of tacit knowledge, human capital is a primary commodity or resource in a knowledge-based economy. This thesis discusses the idea that by facilitating and optimising knowledge transfer and innovative activity, city planning can generate a natural competitive advantage. The agglomeration of human capital in such cities can facilitate innovation beyond the natural capacity of any individual human economic unit. This is corroborated by evidence of the comparative advantage found in clustering for small firms (Goldberg, 2006). Malecki (2002) suggested human capital and firms operated

similarly in the knowledge-intensive economies. He argued that human capital growth was nurtured by urban frameworks which incorporated the same vertical and horizontal production linkages traditionally supplied by corporations in industrially-based economies. This was supported by Mattsson (2007), who found that government policy and regional development innovation and production strategies were increasingly moving from macro- to micro-economic factors (i.e., moving from aggregate business to the individual firm).

This thesis is organised into nine chapters presenting the results of a four-year cross-national study. Chapter One outlines objectives, general concepts and definitions associated with the study. Based on a literature review of urban planning and economic growth, Chapter Two provides theoretical foundations exploring the capacity of hard infrastructure and amenities to influence the socio-economic imprint of urban space. It reviews the debate between urban density and infrastructure. Drawing on empirical evidence and economic production theory, it explores the spatial links between economic growth, innovation and knowledge productivity. Arguing that the growing role of human capital in the production process has linked productivity to a city's mix and level of infrastructure and amenities, it reviews five key infrastructure types likely to support innovation.

Chapter Three looks at the localised spatial characteristics of infrastructure conducive to innovation in the highly innovative mid-size cities of Boston, Portland, Stuttgart and Dusseldorf. It briefly reviews urban networking and community-based urban planning models, particularly their capacity for global knowledge flows and to create human-scale environments. It maps the presence, relative density and distribution of infrastructure for innovation around major train stations in the four cities, suggesting that their urban form is conducive and supportive of innovation and knowledge development.

Chapter Four outlines the research inquiry paradigm for case studies in Western Australia, Australia, and Kansai, Japan. It is comparative and exploratory, assuming a constructivist perspective based on an interpretive epistemology. Both qualitative and quantitative data is collected, using a case study approach primarily relying on document analysis and interviews. Sampling of elite interview participants from both regions has been purposeful. Grounded theory is employed, triangulating data to encourage emergent theory and hypothesis.

Chapter Five explores human attraction to urban space, reviewing literature of innovation systems and the contribution of 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. This chapter also 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.

Existing and proposed major policies and strategies relating to innovation and urban planning at the broader Western Australia State and Kansai Prefectural level are explained and critically assessed in Chapter Six. Unlike the Western Australian case, Japan is found not to clearly distinguish between industrial and urban planning policy using urban planning appears as a tool for economic growth, which has resulted in more highly integrated and networked socio-economic regions. However, it also observed that the policy and other documents to date of both regions only vaguely acknowledge the role of the local urban environment in supporting activities associated with innovation and knowledge development.

Existing and proposed major policies and strategies relating to innovation and urban planning at the city and neighbourhood level for both case study areas are explained and critically assessed in Chapter Seven. It finds that Perth's Northwest Corridor (PNWC) has only weak links connecting new economy policies and strategies to the planning of cities and neighbourhoods, and that economic development policy has no clear role in the strategic and implementation process. In contrast, Kansai cities, such as Kobe, were noted to have strongly integrated economic development and urban planning strategies linked to national policy directions. This included projects leveraging the connectivity and mobility of people to develop and support industrial and innovation growth.

Chapter Eight analyses case study region train stations for their capacity to foster factors supportive of knowledge development and innovation. It found that train stations in the car-dominated PNWC had relatively lower levels of infrastructure supportive of innovation and knowledge development than those of the pedestrian-oriented train stations of Kansai. In addition, the urban form around the Kansai stations appeared to support the longer and more vibrant human flow lines, as retail and commerce were used to form reticulation lines of human movement towards major destination points.

Chapter Nine details the results of fieldwork observations, document collection and a series of elite interviews conducted in each of the case study areas. The interview looked primarily two things: 1) the attitudes and understandings of connections between urban planning and economic development; and, 2) specific planning highly supportive of knowledge economy objectives. It found that the national economic vision was better communicated to Japanese participants than to PNWC counterparts, with the urban growth boundaries and limited land supply in Japan making cities more highly mixed use and pedestrian oriented. Japanese planning was also found to be more supportive of global and local pedestrian flows. Both regions were noted as having low connectivity to employment areas and large car-based

retail shopping centres in outlying metropolitan areas. Western Australian participants generally felt that with the right pedestrian balance, the car had a role in generating city centre vibrancy. Acknowledging the importance of the car, Kansai participants focussed on urban planning which created sensory experience to concentrate pedestrian activity and movement. Chapter Ten summarises research conclusions and significance.

1.5 Significance of the research

This thesis deals with a broad range of strategic and practical socio-economic concerns. It contributes towards understanding how urban form can leverage social aspects of a city for economic growth. Using an inter-disciplinarian approach, it provides insights into infrastructure types and importance of urban form for knowledge development and innovation. It contends that well-planned developments can be leveraged to fulfill national innovation and productivity priorities. This research makes significant contribution towards understanding the following:

1. Role of infrastructure and amenities in supporting knowledge-based and innovative activities.
2. Integration of economic and urban development policies and initiatives.
3. Optimizing of human flow and movement through urban planning in highly-urbanized successful knowledge-based societies.
4. Increasing the efficiency of knowledge-based economy in secondary economic centres and outlying metropolitan regions.

Versions of many of the chapters of this thesis have been published in a range of multi-disciplinarian international journals, books and conferences. The table below details these.

Chapter	Publication
Chapter 2	<ul style="list-style-type: none"> • International Journal of Knowledge Management (Martinus, 2010a).
Chapter 3	<ul style="list-style-type: none"> • 2010 Knowledge Cities World Summit (Martinus, 2010b). • Journal of International Knowledge-Based Developments (Martinus, 2012b, forthcoming).
Chapter 5	<ul style="list-style-type: none"> • 2010 Knowledge cities World Summit (Martinus, 2010c). • Book titled „Building prosperous knowledge cities: policies, plans and metrics“ (Martinus, 2012a).
Chapter 6, 7 & 9	<ul style="list-style-type: none"> • 2011 World Schools Planning Congress (Martinus, 2011b).
Chapter 8	<ul style="list-style-type: none"> • Journal of International Knowledge-Based Development (Martinus, 2012b, forthcoming).

CHAPTER 2: ECONOMIC THEORY AND CITIES¹

2.1 Introduction

Over the last century, city structures have shifted from a dominant city centre to one of multiple strategic and regional centres offering a range of lifestyle and work opportunities. The reason for this shift is a complex mix of economic and social factors driven by globalisation, technological advances and competitive advantage, all largely associated with the new or knowledge economy. Innovation and human capital development are generally accepted as the propelling agents of economic growth in this economy. They enhance all inputs irrespective of industry, contributing to national productivity, competitive advantage and industrial performance (Goldberg, 2006; OECD, 2007b; Orlando & Verba, 2005). This has brought the knowledge component of labour productivity into focus, given its capacity to value-add to resources, reduce costs and raise profitability and wages (APEC, 2000, 2004). Urban planning which enhances proximity to knowledge sources and access to social capital networks can potentially supplement national policies to increase regional labour productivity, supporting greater levels of national innovation and productivity.

Economic sustainability into the next century requires city planning to consider how urban form affects innovation and knowledge-based activities, and leads to higher knowledge productivity. This chapter explores the empirical evidence and economic theory supporting the hypothesis that differences in infrastructure levels and mix can make some spaces more structurally efficient in generating innovation and knowledge. The next section examines the increasing importance of labour productivity in the context of the production function. Section 3 reviews the debate between urban density and amenities in the context of enhancing productivity and economic wealth. Section 4 discusses the importance of hard and soft infrastructure for cities of innovation, reviewing five infrastructure types supportive of innovation and knowledge development in Sections 4.1 to 4.5. It concludes by discussing

¹ A version of this chapter was published in the International Journal of Knowledge Management (Martinus, 2010a).

how integrating hard and soft urban infrastructure consolidates a city's capacity to enhance local social capital, influencing its potential for knowledge development and innovation.

2.2 Knowledge productivity

OECD (2001, 2003) and APEC (2003, 2004) reports indicate a fundamental restructuring of economies where some countries have experienced stronger growth than others. Some of these growth rates coincide with the adoption of technologies enabling greater efficiency in production inputs (e.g., labour and capital). This has led to better labour utilisation and higher productivity, resulting in productivity being frequently used as a new economy measure of comparing economic growth levels and benchmarking regions and countries (Drew et al., 2001; OECD, 2001, 2003). Productivity efficiency improves as input quality rises (e.g., more highly-skilled labor). It enhances value-add for resources, reduces costs and raises profitability and wages. Steady productivity increases have been linked to human capital growth rates (Chen & Kee, 2005) and innovative activity across all industries (not just high-tech related industries), causing a shift towards a more highly-skilled and educated workforce (APEC, 2000, 2004). The extent to which innovation and knowledge development enhance productivity and drive economic growth is difficult to isolate and test given the complex industrial, social, political and economic nature of cities. Some contend that current statistics inadequately reflect new economy structural changes (Harvie et al., 2007; Haskel, 2007). Despite this, there is sufficient global evidence to support the concept that innovation and knowledge development are critical to both.

Diverse informal localised linkages and knowledge flows (eg, spillovers) are often cited as core components of a dynamic and productive knowledge economy. Testing these links, Varga and Schalk (2004) concluded that localised spillovers contribute significantly to technological change and economic growth. They suggested that macro-economic theory should incorporate the local spatial dimension, believing this would more accurately represent the interplay between density (population and employment) and knowledge spillovers in driving national economic growth. Many academics appear to agree as there has been an increase in research modeling economic growth, knowledge spillovers and innovation using the knowledge production function (Acs et al., 2002; Arnold, 2006; Berliant et al., 2006; Li, 2002; Nocco, 2005; Varga & Schalk, 2004).

In Jones' (2002) widely-referenced work on the knowledge production function, US long-term per capita income growth was found to have not significantly increased over the past decades despite rising education and R&D levels. This contradicted prevalent long-term economic growth models. His calculations showed rising educational attainment and R&D

intensity explained 80% and rising world population only 20% of US national growth. As a result, he proposed an R&D model based on long-term growth „driven by the discovery of new ideas throughout the world“ and dependent on population increases (p.221). That is, economic growth is determined by a global pool of new ideas, human capital growth and physical capital.

Growth in any particular country is driven in the long run by the implementation of ideas that are discovered throughout the world. In the long run, the stock of ideas is proportional to worldwide research effort, which in turn is proportional to the total population of innovating countries (Jones, 2002, p.234).

The inputs (human capital and ideas) and outputs (innovation or knowledge) of the knowledge production function differ from a production function where inputs of land, labour and capital generate one unit of a good or service. The fundamental differences between these two economies derive economic efficiency and competitive advantage from different city structures. As labour is said to contribute comparatively low levels of knowledge or skill in a manufacturing economy, economic efficiency is maximised when large areas of single land-use are set aside for the delivery of services and the manufacture, storage and transport of goods. Labour can occupy residential areas adjacent to these single-use manufacturing zones, given its low daily journey-to-work costs (including opportunity cost of time). Organising a city in such way will minimise the manufacturing and transportation costs of goods, ensuring comparative advantage and economic competitiveness in the global market place for an industrial economy.

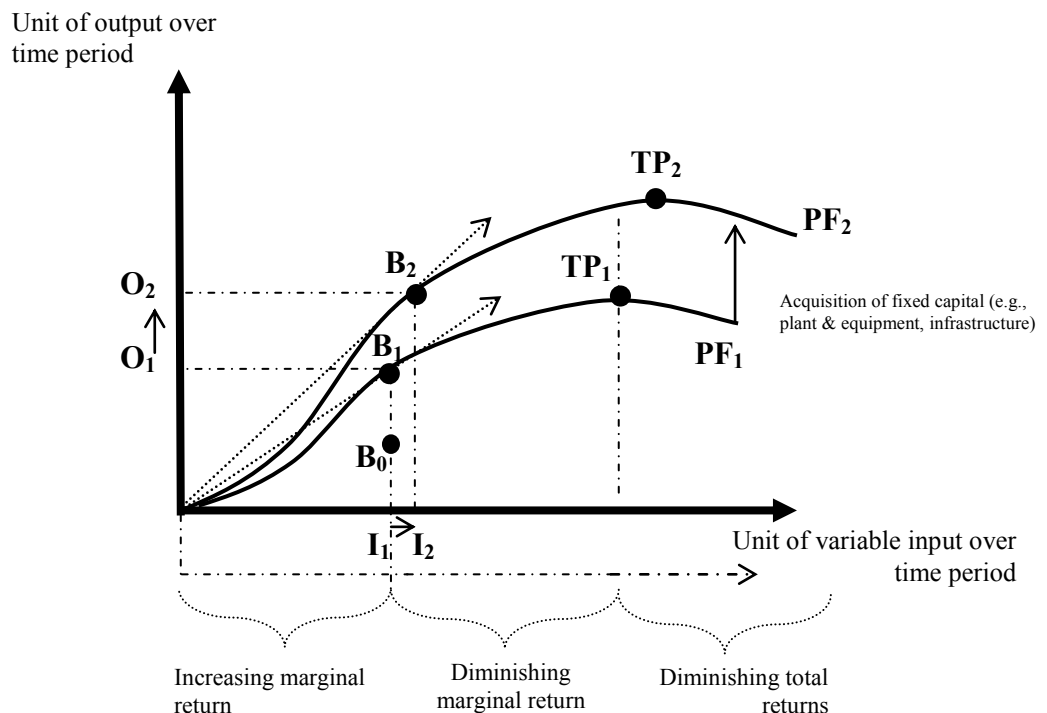
The economic relationship between inputs, fixed assets and outputs is described by the „goods and service“ production function presented in fundamental microeconomic textbooks (For example in Case & Fair, 1994; Melotte, 1995; Solomon, 1980; Tregarthen & Rittenberg, 2000). Most goods are produced using a combination of material inputs and technologies, and firms are assumed to maximise profits and minimise costs by operating at technical efficiency. Despite criticisms of these assumptions, this production function is useful in understanding the implications of a production shift from manufacturing to knowledge-based output.

2.2.1 Incorporating knowledge into the goods and service production function

An aggregate „goods and service“ production function describes the resource allocation efficiency for an aggregate number of single firms in a specific economy – that is, an industry sector, city or even nation. Profit maximization for any economy is defined as the most efficient allocation of aggregate inputs (Mishra, 2007). The aggregate production

relationship is described in Figure 1. For economies operating along the function, PF_1 , profit maximization for input units of I_1 (land, labour, capital, resources) will occur at B_1 producing O_1 of output (product or service). At inputs less than I_1 for the given technical constraints of PF_1 , the economy is operating in the range of increasing marginal returns (any unit increase in input of $x\%$ will generate increasingly more output, that is more than $x\%$). Using input quantities between the points B_1 and TP_1 (turning point) implies the economy is operating in the range of diminishing marginal returns (any unit increase in input of $x\%$ will generate decreasingly more output, less than $x\%$). Using inputs quantities after TP_1 (Turning Point) will push the economy to operate in the range of diminishing total returns (output will fall at an increasing rate as more input is added). This is known as the Law of Diminishing Returns. Economies not at technical efficiency for a given level of fixed assets will operate somewhere under the associated production function curve (e.g., B_0 which will be inefficient given technology capacity of PF_1). The production function curve along which an economy operates will shift up (i.e., move from PF_1 to PF_2) if there is an increase in the number of fixed capital assets (eg, investment in plant, equipment or infrastructure). An increase in technical capacity moves an economy's production function to PF_2 , where I_1 will generate larger quantities of output (O_2).

Figure 1: Aggregate production function



Though this represents a highly simplified view of how firms contribute to overall national output, it enables comparisons of different resource allocation choices and outputs for the

range of firms found within any economy (Mishra, 2007). Knowledge-based outputs will similarly rely on inputs of land, labour, capital and resources, with a focus on increasing those components which enrich an economy's capacity for innovation and knowledge development. From the production function relationship, it is clear that increasing knowledge-based output across all industry may be achieved by regional or national policies targeting:

1. Labour by attracting human capital with higher levels of education, experience, skill, creativity, sense of inquiry or passion, etc.
2. Capital assets through more investment in ICT or transport networks, education facilities, etc.

Such policies are consistent with evidence presented throughout this chapter of the links between increases in labour and infrastructure investment to productivity and economic growth. Production theory also provides a theoretical understanding of the role of urban form (density and infrastructure) in supporting innovative activity and productivity, given its capacity to facilitate knowledge spillovers and spark creativity. This is explored in the following sections.

2.3 Enhancing innovation through urban form

The exact relationship between economic growth, innovative outcomes and knowledge productivity to elements of the planned urban environment is unclear. The majority of literature has focused on the economic contribution of different political or soft socio-economic elements of cities. For example, Porter and Stern suggested innovation variances across the OECD (2001) were „subtle aspects of a country's institutional and micro-economic environment play(ing) an important role in determining the productivity of investments in innovation“ (p.5). They suggested that this defined the innovative capacity of a particular location, which contributed to overall national innovative capacity. Their approach concentrated on factors relating to the business environment, such as innovation policy and linkages between clustered firms and common innovative infrastructure. Raspe and Oort (2006) argued that models of regional economic growth must incorporate indicators of more human-related factors: *knowledge workers*, *R&D* and *innovation*. They observed that *innovation* and *knowledge workers* were more highly correlated to urban employment and productivity than *R&D*. Still others cited further factors such as education and skills (Glaeser & Saiz, 2003) or creativity and diversity (Florida & Tinagli, 2004).

Each targets a specific part of the new economy seeking to capitalize on the economic and human capital advantages of a city. Each provides a logical and marketable base for policies

to make cities better, more liveable and more globally competitive in a rapidly changing world. However, the complexity of consumer choice and its relationship to hard (built form) and soft (human-related) infrastructure has made practical application difficult; and often even well-planned cities fall short of expected economic outcomes. Needless to say, practical implementation of seemingly logical arguments is often difficult. The creative class argument is a good example of this. Florida (2002a, 2002b, 2002c) asserted that high-tech and economic growth was driven by urban vibrancy and the presence of „bohemians“, who were attracted to cultural diversity and amenities. This was partially supported by: 1) Wenting et al. (2008), who found that the Dutch creative class, as measured by fashion designers, preferred urban amenities over density, and; 2) Boschma and Fritsch (2007), who noted a positive link between the presence of „bohemians“ (e.g., artists, musicians) and population density in Europe, and the negative link between other high-value creative professionals and population density who appeared more strongly drawn to a cultural climate. However, others have questioned the creative class link with city density or amenities, contending that the social aspects of the city are more important.

For example, Hansen and Niedomysl (2008) found that social relations were of greater consequence than urban amenities in a study of Swedish creative class migration patterns (as defined by Florida). Ruef (2002) found that business innovation capacity was highly dependent on the surrounding social infrastructure. This was supported by Breschi and Lissoni (2006), who found *social* proximity (professional ties, social networks) played a larger role in knowledge spillovers than physical proximity. Baldwin et al. (2007) argued that the highly location-specific nature of knowledge spillovers meant that knowledge development required a local milieu.

Despite differences, all the studies appear to support the notion that social capital is highly relevant to knowledge-based industry. This is refocusing research towards a wider community building approach to city and economic development. There are two ways that social capital manifests in the production function, as a function of: 1) the quality of human resources present in a city (labour); and, 2) the capacity of urban form to act as a catalyst for social interaction and network building (capital asset). Understanding the aspects of urban form which optimise the capacity of human capital to generate innovative outcomes is an objective of knowledge-based developments. Such developments provide a wide scope for social capital building, as a broad range of mixed socio-economic functions make them highly socially inclusive. Both density (population and employment) and quality amenities and infrastructure appear to be significant contributors to the formation of social capital. The following section discusses the debate over which has greater influence over growing regional wealth and income differentials.

2.3.1 The density argument

Population and employment density (numbers of people and jobs per square metre) is often used in economic development, as it leverages economies of scale and size to enhance a city's economic competitiveness. Empirical evidence supports this. Tse (2008) noted that though advances in ICT allowed information to be transferred independent of urban density, denser environments facilitated the flow of tacit knowledge and learning. Studies by Baldwin et al. (2007) found that the impact of knowledge spillovers on productivity was confined to, at most, a 10-kilometres radius of a specific plant. Regression analysis by Harris and Ioannides (2000) of density and population against productivity revealed a strong positive relationship, where doubling density increased income by an estimated 6%. This is consistent with related findings that a two-fold increase in employment raised productivity by 6% (Ciccone & Hall, 1996), and a 10% rise in density increased household median income by US\$206 in US counties (Glaeser & Kohlhase, 2003). Glaeser and Kohlhase further found that density had positive wealth and economic benefits even when denser areas were controlled for higher numbers of educated persons. Bettencourt et al. (2007) noted that population and rate of invention did not increase proportionally with city size, but rather demonstrated increasing returns to scale. A disproportionate increase in the number of inventions to city growth was linked to the growing number of inventors, rather than the network of inventors themselves. That is, larger cities appeared to generate more innovative people at an increasing rate, however, whether this was done by attracting more people or by influencing more of the resident population to innovate was unclear.

The capacity of employment density to enhance both firm and worker productivity has been well-documented, and will be explored in Section 4.4. However, the relationship between such clustering activities, city density and overall economic wealth is less clear (Glaeser & Gottlieb, 2008). For example, there remains uncertainty as to how this relates to the overall economic structures of cities or urban regions, and why productivity benefits of density are not felt evenly by all industry across a city regardless of cluster maturity. Some research has suggested that perhaps: 1) the advantages of industries and workers in the dominant regional industry cluster may be offset by disadvantaged sectors, generating little (if any) overall productivity gains; and 2) increasing density brings negative externalities, such as congestion and crime, which may impact negatively on local social capital formation (Glaeser & Gottlieb, 2006; Glaeser et al., 2001). This was corroborated by Lever (2002), who using a composite measure of tacit knowledge, codified knowledge and knowledge infrastructure, noted the positive relationship between knowledge infrastructure and economic performance in small cities. The strong negative correlation found in large global cities (London and Paris) once their dominant finance sectors were taken into account lead

to the conclusion that the negative externalities of density (e.g., higher rent, wages, crime, cost of living, congestion) overshadowed benefits gained from the concentration of knowledge resources.

Indeed, one of the major issues with urban density is its diseconomies of scale, particularly the negative socio-economic externalities (pollution, congestion, crime, etc) of the city (Carlino & Hunt, 2007; Glaeser et al., 2001) and in the way humans interact (Glaeser & Gottlieb, 2006). Referring to the production function of Section 2, the positive economic externalities of population increases (i.e., inputs) are limited by a city's capital asset base (e.g., infrastructure). Looking at Figure 1, optimal density for an economy operating at PF_1 level of infrastructure is found at B_1 . A shift up of production lines (a move from PF_1 to PF_2 in Figure 1 with a capital asset purchase, such as infrastructure investment) will support higher levels of population and density, *ceteris paribus*, before negative outstrip positive externalities. This concurs with Glaeser and Gottlieb's (2006) study of the relationship between density and human interaction on positive (socialising, dating, etc) and negative (crime, congestion, etc) aspects of social interactions. They found that density was not related to civic engagement. Instead, civic engagement was positively correlated to amenities. They, perhaps controversially, concluded that urban sprawl is *not* a barrier to human interaction and has *not* damaged the social fabric.

Given the importance of civic engagement and social capital formation to cities of innovation, these results have profound implications on urban development in a knowledge economy. They challenge mainstream assumptions that the success of cities is a function of population and industry density, and give hope to the natural competitive advantages of small cities or the less dense urban fringe of large metropolitan cities.

2.3.2 Argument for infrastructure and amenities

Research suggests that there exists an optimal city size and urban density to maximise innovative activity (measured by patent intensity) for any given city (Carlino & Hunt, 2007; Carlino et al., 2007). In these studies, coefficients of city size and density (such as R&D and human capital), external to the firm but not the city, exhibited increasing returns to scale for innovation (that is, innovation rose at an increasing rate with city size and density). If density was held constant, innovation appeared to settle at an optimal point, after which further density increased congestion causing decreasing returns to scale (innovation decreased with density increases). More competitive mixes of industry and technology (rather than specialisation, as is argued in models of industrial or regional clustering) and differing levels of R&D inputs (particularly human capital) appeared to explain regional innovation differences. These studies demonstrated that there are both inter- and intra-

industry benefits from population spillovers in larger cities, but that optimal city size for innovation varied according to industry. It concluded that further research into how industry- and firm-level mechanisms are affected by city characteristics would give further insight into the dynamics of different localised productivity and innovation levels.

Various other studies have similarly concluded that amenity levels (being the level of features a development has making it more attractive or valuable) and infrastructure constrain innovation capacity for any given density (Arnott, 2004; Behrens & Murata, 2009; Kanemoto et al., 1996). Kanemoto et al. (1996) estimated that doubling the size of a Japanese city increased productivity by: 1) 25% in cities of populations between 200,000 and 400,000 residents; 2) 7% in cities of populations more than 400,000 residents; and, 3) 1% in cities of populations of less than 200,000 residents. They suggested that the point at which city density optimises innovation is determined by a unique set of fixed hard and soft urban infrastructure, *ceteris paribus*, which spatially constrains economic activity and social capital formation. These spatial constraints were tested by Rappaport (2006) who observed a shortfall between the minimum estimated and actual productivity figures to support a population of above-average density. His empirical analysis found that differences in amenities (denoted by two measurements of quality of life) explained regional density capacity, such that „differences in amenities valued at 30% of average consumption expenditures suffice to support a twenty-fold difference in population density“ (p. 1).

Though this evidence is not conclusive, it suggests 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. This is consistent with production theory. If innovation is both an output and input of the production function of the new economy, then the connectivity, mobility and creativity of quality human capital becomes crucial. Facilitating the human function of cities at the local level will allow greater resource allocation and economic efficiency. The next section reviews the infrastructure types important for innovation and economic growth.

2.4 Infrastructure and amenities for innovation and knowledge

The complex nature of consumer choice and its relationship to hard and soft infrastructure make it almost impossible to include all permutations of amenities and other urban features driving it. However, a rising amount of research supports the notion that infrastructure and amenities are prime drivers of economic growth, giving credence to the importance of urban form in the new economy. Using the number of tourist visits (for leisure) as a proxy for

demand on urban amenities, Carlino and Saiz (2008) found population and employment grew 2% more in areas with double the leisure visits, *ceteris paribus*. Growth rates in these areas appeared to occur faster than in those metropolitan areas lacking recreation and leisure facilities, even in difficult economic periods. They suggested that the attractiveness of an area (evident in demographic and growth patterns) depended upon its distance from centres of recreation and leisure, rather than from a city centre as is commonly used (Carlino & Saiz, 2008). This is consistent with Glaeser et al. (2001) findings that US cities with more amenities have grown faster than those with less. They suggested that this was because more highly-oriented consumer cities are more attractive to human capital. Similar studies of various other city amenities have also reported strong positive links to economic growth (Carlino & Saiz, 2008; Florida, 2002b, 2002c, 2004; Glaeser et al., 2001).

Public transport is perhaps the most obvious and widely-referenced example of infrastructures' contribution to city growth and worker productivity, given its capacity to condense physical distance and widen regional social capital and job networks (Graham, 2007; Venables, 2007). Adamson et al. noted:

Construction of better public transportation that significantly reduces commuting times may be quite appealing to high-skilled workers due to their greater opportunity costs of time. The same point likely follows for reducing crime and improving schools (2004, p.221).

Indeed, Venables (2007) argued that cost-benefit analyses of new public transport should include the additional productivity benefits generated for „new city workers and...existing city workers reaping the benefits of a larger agglomeration“ (p.1). Total gains are estimated to be considerably larger for calculations using Venables' transport benefit model than standard cost-benefit analysis. Graham's (2007) results for both service and manufacturing sectors in the UK were consistent with Venables conclusions that public transport infrastructure has a profound regional impact. Indeed, its mass people-moving function makes it a natural focus for policies seeking to increase the urban vibrancy, human movement and interaction of local urban spaces. Such objectives will become of increasing importance given that the comparative advantage of many economies has become the speed at which they can convert knowledge to economic outcomes (APEC, 2004).

Table 3: Hard and soft infrastructure: examples of facilitators of innovation

Facilitators of innovation	Soft amenities/infrastructure examples (level of)	Hard amenities/infrastructure examples (pedestrian accessibility of)
Connectivity	<ul style="list-style-type: none"> • ICT usage • Pedestrian-friendly commuting mode • Mobility and knowledge cross-pollination (journey-to-work data/overseas visitors) 	<ul style="list-style-type: none"> • Wifi access points • Transport infrastructure • Amenities • No. of intersections in given area • Public meeting places (parks, cafes)
Education & skills	<ul style="list-style-type: none"> • Education • Students to population • International students/academics • PhD students/researchers • industry/government/community network • Knowledge workers 	<ul style="list-style-type: none"> • University/ /R&D centre • Technical college • Library
Creativity & cultural vibrancy	<ul style="list-style-type: none"> • Creative industry • Youth (18-30 year olds) • Entrepreneurial activity • Patents to population / employment 	<ul style="list-style-type: none"> • Arts, culture or historic districts • Amenities • Development density
Industry & business network	<ul style="list-style-type: none"> • Industrial clustering • New firm formation, patent applications, regional productivity • Regional export (relevance to global community) 	<ul style="list-style-type: none"> • Mixed-use development • Airport/port • Business district/industry park
Diversity	<ul style="list-style-type: none"> • Employment participation rate • Cultural/religious diversity • Low-skilled service sector • Housing choice 	<ul style="list-style-type: none"> • Access points to natural amenities (weather, water, crime rate) • General amenities (bars, night clubs, good schools, golf courses, etc) • Creative amenities (ethnic restaurants, cafes, bookstores, health clubs) • Landmarks (Tourism, public squares, commercial)

This chapter aims to provide a conceptual framework to understanding how infrastructure and amenities in general can enhance the knowledge productivity of local inputs by

facilitating human spatial movement and providing opportunities for knowledge spillovers. Such objectives are capable of fulfilling new economy policy objectives. Recent research has shown that spatial elements and place quality of urban design provide a logical platform to design more socially-inclusive local network strengthening social capital formation (Hanna et al., 2009). These outcomes are likely to become increasingly relevant for cities of innovation. Hanna et al. (2009) contended that place quality may not only contribute to social capital but be an indicator of its capacity. They recommended that an understanding by planners and related practitioners of the interaction between space, place and social capital is important to network mobilisation and social capital capacity building. Their study of a small rural community in Canada proposed that description of quality of place „may emerge as a proxy for relating or representing social capital“ (p.31). Hanna *et al.* noted that in terms of existing social capital:

Without access to critical connectivity through deliberative planning processes these networks may lack diversity, be rooted in opaque multifunctional ties or based mostly in well-established but restricted trust. There is an indication that they exist and support bonding capital, but are exclusionary...new developments forms were linked to the interests of „established business interests“ and „clique“ like economic arrangements (p.42).

This study included a review of empirical research of how cities and urban form have facilitated a competitive global advantage in the new economy. Based on human qualities associated with innovative activity, the emergent themes were divided into five key soft (human) and hard (built form) infrastructure types: 1) connectivity; 2) education and skills; 3) creativity; 4) business networks; and, 5) diversity. Examples of these infrastructure types are given in Table 3. The empirical links between each infrastructure type and new economy development are detailed in the following Sections 4.1 to 4.5.

2.4.1 Connectivity

High connectivity and a free flow of and accessibility to ideas are crucial for cities of innovation (Lobo & Strumsky, 2008). This can be achieved by enhancing all levels of human connectivity and mobility. The importance of physical (face-to-face) aspects of the city is increasing as intimate pedestrian-oriented spaces are highly compatible with the virtual (Internet, email, etc) world (Salingaros, 2003). Information can now transfer instantly between persons irrespective of spatial distance, while complex locally-embedded tacit knowledge can only be transferred through the physical connectivity of local spaces. Innovative cities require a well-organised system for the flow of all types of knowledge. The capacity to transfer codifiable information and tacit knowledge through virtual and physical

connectivity becomes a key infrastructure consideration, given its capacity to enhance knowledge productivity and economic growth in cities of innovation.

Virtual connectivity compresses local and global spatial elements. It has aided the rapid progress in innovation and global growth, decreasing the cost of accessing knowledge, increasing information pools and the circulation of ideas. For example, regional changes in ICT (Information and Communications Technology) usage between 1998~2002 were emulated by changes in temporary migration of global labour. ICT infrastructure advancements appear related to the lowering of regional income and productivity gaps. For example, since 1995, USA productivity has grown 1% higher than expected (1.2% per year). ICT development is a key policy direction for APEC (2000, 2002, 2004) and OECD countries. It has boosted GDP more than other similar investments propelling some OECD economies to higher productivity and growth paths (OECD, 2001).

Physical connectivity includes the capacity of hard and soft infrastructure to draw global human movement into a local economy. Power and Lundmark (2004) asserted that global flows of highly-qualified people are highest in growing innovative clusters, essentially functioning as a conveyor belt of new knowledge and influence. Salingaros (2003) argued that organic geometric urban design (transport, communications, pedestrian, etc) supported greater human movement and social capital building by optimising connectivity and mobility, and by restoring urban vibrancy and pedestrian functions of the *human* city. Other studies have supported this with evidence of public transports' role in increasing productivity and economic prosperity (Gospodini, 2005; Kantor, 2008). Public transports' contribution toward the compression of space and time appear well-suited to the fast adoption and creation of new innovation, and to addressing new economy issues such as lack of time, increased human connectivity and firm clustering requirements. Some believe that it is more efficient than cars at keeping the physical flow of ideas and tacit knowledge abreast of the speed of virtual information transfer (Graham, 2007; Knox, 2006).

In summary, traditional perceptions regarding spatial proximity between the global and local spheres have been redefined by the increasing integration of interactions between the virtual (ICT) and physical (face-to-face) networks. ICT networks create good connectivity and the transfer codified knowledge (information) between individuals on a wider global scale, while human-scale urban development enable face-to-face connectivity and the transfer of tacit knowledge between individuals on a local scale. Thus, the ICT and human scale components of the urban framework are treated within this research as an interlinked system facilitating human capital connections and movements in the virtual and physical domains, building global and local social capital networks.

2.4.2 High education and skills

Human capital (eg, education and skills) has been a leading source of the productivity disparities between and economic growth of regions from the 1990's (OECD, 2001, 2003). Education and skills (both soft infrastructure) enhance all levels of industry knowledge development (creation, dissemination and application) (APEC, 2003). This facilitates greater entrepreneurial success (Glaeser, 2007), global connectivity (Lopez-Rodriguez et al., 2007), labour participation and national productivity (Dolman *et al.*, 2007). Indeed, an extra year of average education was found to increase total factor productivity by 2.8% in US cities (Gottlieb & Fogarty, 2003) and 11-13% in Chinese cities (Liu, 2007). Some believe that cities valuing high levels of education and skill over aesthetic attractiveness have superior growth rates as they are more *economically productive* and more adaptive to economic shocks. This suggests that human capital accumulation occupies a key position in ensuring sustainable regional prosperity and economic development (Glaeser & Saiz, 2003).

Current research supports this, with higher education levels linked to increases in regional innovation and industrial activities (Goddard, 2007; OECD, 2007a), and with opportunities to access to quality education associated with regional socio-economic wealth variations (OECD, 2001; Vintila, 2003). Universities (hard infrastructure), in particular, add creative vibrancy (soft infrastructure) being producers of human capital, employers of knowledge workers and gatekeepers of information and communication. They have a vital function in the global connectivity of knowledge workers and the knowledge exchange process, being involved in both the local industrial structure and the international movement of students, researchers and academic professionals (Martinez-Fernandez et al., 2006; Martinez-Fernandez & Sharpe, 2007).

2.4.3 High creativity and cultural vibrancy

This study views creative and cultural aspects similarly (Hansen et al., 2005), given their equal significance in the new economy as sub-sets of knowledge-intense or knowledge-based industries (Garnham, 2005; Wu, 2005).

Florida (2002b) argued creativity and talent to be fundamental to regional economic growth and competitiveness. Despite his strong urban research focus, statistical generalisations and narrow definitions of creative occupations generate measurement discrepancies restricting the application and robustness of his work (Ley, 2003; Luciani, 2006). Nevertheless, many argue that creativity is critical for sustainable new economy development, innovation and regional prosperity (Lee & Choi, 2008; Wojan et al., 2007). Notwithstanding these difficulties with inconsistent data and analysis (Kelly & O'Hagan, 2007), many agree that firstly, social connections and then, city amenities (eg, aesthetic quality and natural

environment) - both contributing to cultural and creative elements - are more important than either occupation or industry (Hansen & Niedomysl, 2008; Marlet & van Woerkens, 2005; Wenting et al., 2008).

Planning amenities and infrastructure to leverage creative and cultural aspects can promote sustainable and organic urban vibrancy and human interaction. Markusen and King (2003) argued that the sense of vibrancy introduced with the attraction of creative persons to the daily urban environment has a multiplier effect on regional incomes. Government policy enhancing creative soft (creative occupations) and hard (local art, music venues, cafes, entertainment complexes, etc) infrastructure will intensify human interaction, potentially strengthening social capital and, in turn, regional innovation capacity.

2.4.4 Strong industry and business networks

Competitive advantage theory of industrial clustering (Marshall, 1890) continues to underpin modern research despite structural economic changes over the last one hundred years (Baldwin et al., 2007; Ciccone, 2006). Maskell & Malmberg (1999) observed that the proximity and institutional aspects of clustering strengthened a firm's learning and knowledge creation capability. Thus, industry and business networks are facilitated and supported by hard infrastructure as the framework of the co-location and physical connectivity of business (eg, science parks, concentrated commercial services in the central city), as well as soft infrastructure elements as the foundation for infinite permutations of formal and informal business interactions (eg, conferences, networking, lobbying, daily trade).

As the reasons for clustering shift from proximity to material inputs to that of high-quality labour pools, associated network drivers and mechanisms of innovation are only loosely understood. The positive externalities of localised clustering widely associated with Porter (APEC, 2004; Porter, 2000) are under scholarly review. Some contend that economic benefits are in the form of a *local* specialised creative workforce (ie, informal local knowledge spillovers and social networks) (Isaksen, 2004; Lobo & Strumsky, 2008; Neff, 2005) and *local* R&D inputs (eg, human capital) and competitive markets (Bettencourt *et al.*, 2007). While others advocate *national/global* linkages and networks (Maskell et al., 2006; McDonald et al., 2007; Simmie, 2004; Wolfe & Gertler, 2004) and a *national/global* mobile labour force (ie, network of social and professional ideas, knowledge and skills) (Power & Lundmark, 2004; Wenting et al., 2008). Despite subtle differences, all acknowledge the considerable influence industrial and business networks have over innovation, economic development and regional prosperity. City and infrastructure planning which augments business and industrial networks and flows will better leverage soft infrastructure elements

(eg, human capital, business networks). Such urban environments will be more adept in facilitating the conversion of new business opportunities and networks to a regional competitive advantage.

2.4.5 Diversity

Diversity is also an asset of the innovative city. Indeed, where previously the „brain drain“ was viewed as a zero-sum overall gain with no externalities as highly-qualified workers moved from low to high income regions. More recent views treat the movement of such workers as a method of *brain exchange* or *brain circulation* between regions enabling the cross-pollination of knowledge in the context of globalisation. The knowledge-trade generated by attracting highly-qualified workers creates a multiplier effect on knowledge levels both for the region and globally (APEC 2004).

This thesis presumes that diversity is found both in the knowledge base, skill level and character qualities of human capital (soft infrastructure) and in the range of socio-economic functions of urban form (hard infrastructure). For instance, diversity in natural and constructed amenities (hard infrastructure) has strong linkages with economic competitiveness (Ren, 2004) given its positive role in facilitating networking opportunities (Marlet & van Woerkens, 2005) and that different population groups are drawn to different amenities (Clark, 2004). Similarly, the attraction of skilled migrants (soft infrastructure) is a source of natural competitive advantage, as it assists both the global exchange of talent and energising regional knowledge pools (APEC, 2004; Duranton & Puga, 2001; Saint-Paul, 2004). Adamson et al. (2004) argued that policies targeting high-capital workers by improving amenities enhanced cultural diversity and quality-of-life, benefiting competitive advantage more than those using tax breaks and subsidies to firms.

For example, Saxenian (2002) observed that the skilled migrants to Silicon Valley were high-value assets having established hundreds of technology companies central to regional economic robustness. Studies have demonstrated that the lower social barriers and a tolerance for new ideas of culturally diverse environments are highly correlated with: (1) innovation levels and university-graduated immigrants (Hunt & Gauthier-Loiselle, 2009); (2) diverse amenity levels and high growth regions (Glaeser et al., 2001); and, (3) cultural diversity and various measures of income, creativity and economic development (Boschma & Fritsch, 2007; Florida et al., 2008; Thomas & Darnton, 2006).

Unfortunately, the advantages of cultural diversity are often spread disproportionately with a wage premium for the skilled (Ottaviano & Peri, 2006) and wage reduction for the low-skilled (Borjas, 2003; Card, 2001). The socio-economic disparities between the skilled and unskilled create persistent structural issues for cities focused on knowledge development and

innovation. Urban physical form and function can be used to address this by creating more socially-inclusive public spaces. Optimising the diversity of amenities within and of human capital attracted to local spaces appears to support this. Such urban developments will be most successful in tackling social exclusion and providing vibrant and stimulating environments appropriate for innovation.

2.5 Conclusion

Innovation and knowledge development are increasingly part of national productivity and economic development agendas. They are a product of a highly complex process embedded in human knowledge, experience and space, leading many to argue that the key to future economic efficiency and sustainability lies in urban spaces which leverage human qualities. As a result, the capacity of regions and cities to optimise knowledge productivity and innovation has become of strategic national importance. Discussions of knowledge-based developments often revolve around soft infrastructure requirements with a growing awareness of the importance of local factors, such as amenities and infrastructure. This chapter examined the on-going debate whether density and infrastructure is the greatest driver of regional and national economic growth. It found that empirical evidence and economic production theory support the positive contribution of density to urban vibrancy and human connectivity, but that it is constrained by a city's infrastructure and amenity levels. This suggested an optimal density point or city size, *ceteris paribus*, after which point higher density and continued economic growth require the support of higher levels of infrastructure and amenity. This is supported by economic production theory and the Law of Diminishing Marginal Returns.

Economic production efficiency is fundamental to the success of globally competitive markets, regions and nations. This chapter used the production function to gain insights into how human capital's growing role in the production process has linked productivity to a city's mix and levels of infrastructure and amenities. It suggested that policies supportive of population-driven urban development but with inadequate infrastructure provision may risk diminishing and total marginal returns as the negative externalities of density outstrip its benefits. This is economically inefficient at any given level of input, and an undesirable outcome for globally competitive cities.

If the desired output of an economy is knowledge and innovation, economic efficiency will depend on the connectivity, mobility and creativity of quality human capital. Thus, developments attractive to a wide range of human capital irrespective of socio-economic standing are likely to have both a competitive and comparative advantage in the generation

of knowledge and innovation. Logically, such developments will also require less government intervention and human resources to address issues of community participation and social exclusion. This chapter suggested that they foster self-perpetuating and organic environments highly supportive of factors which encourage sustainable innovation and knowledge development. Therefore, improving the efficiency and productivity of local knowledge exchange and innovation systems through urban planning will have accumulative effects at regional and national levels.

This chapter provided the conceptual foundations to identify five key infrastructure types significant to innovation and knowledge development. These are: 1) connectivity; 2) education and skills; 3) creativity and culture; 4) industrial clustering; and, 5) diversity. It contends that the spatial mix and level of these infrastructure types creates a unique socio-economic imprint defining the capacity of a development for innovation. This thesis hypothesises that urban planning for new economy efficiency focuses on harnessing the human energy of urban space. It explores that idea that this is achievable by a better understanding how hard infrastructure influences socio-economic patterns in a city. Urban planning which broadens community foundations for social capital building and knowledge transfer is most likely to enable more 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.

CHAPTER 3: INNOVATIVE CITIES²

3.1 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 gleaming 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 socially disconnected communities, 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

² A version of this chapter was published in the 2010 Knowledge Cities World Summit (Martinus, 2010b) and Journal of International Knowledge-Based Organisations (Martinus, 2012b, forthcoming).

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 Jacobs (1961) 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“ (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. Jacobs writings 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 chapter briefly discusses 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 presents the results of a study of the built form surrounding key infrastructure in cities of innovation. It maps the presence, relative density and distribution of amenities and infrastructure surrounding major train stations in four highly-innovative mid-size cities: Boston, Portland, Stuttgart and Dusseldorf. Section 4 concludes that building cities of innovation and knowledge development requires understanding human flow at all levels of the city: from human-scale pedestrian environments to the complex links of networked cities and regions. It notes that firmer conclusions require additional research of urban form variations between the least innovative and other highly innovative cities.

3.2 Responding to the growing global need to access local knowledge resources

Cities have largely grown in population, wealth and complexity throughout the industrial era. This partly signals 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 where it is structurally embedded in many city and urban planning schemes. The often simple explanation of „we are a car-culture“ ignores

the cars“ relatively recent appearance in the ancient connect between humans and cities. Indeed, some argue 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, controlled growth) have been debating those of bottom-up (self-generating, preserving the living fabric of urban spaces) city planning systems (Salingaros, 2003).

Many cities are challenging the need for strong land-use planning, which 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 worldwide 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 assess the contribution and failure of these.

3.2.1 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, p.1149). 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). 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, 2006; WAPC, 2004b), city-regions (Robson et al., 2006; The World Bank, 2008) and polynuclear (or polycentric) urban regions (Lambregts et al., 2002; Meijers, 2005).

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 challenges 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.

3.2.2 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: 161). The 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, promoting the idea of designing spaces attractive to human capital.

In Western Australia, *Liveable Neighbourhoods* design code was proposed to encourage residential interaction during daily living/working activities within neighbourhood walkable catchments of 400m (WAPC, 1997, 2004a). It responded to demands for more interactive and inclusive communities destroyed by car-based planning, viewing suburbs as a series of 400-metre walkable neighbourhood catchments. Its principles were consistent with The

University of Western Australia's 1995 findings that people are willing to walk 400 metres to facilities and 800 metres to transport (Pikora et al., 2001).

In Japan, *machizukuri* (translation: neighbourhood planning using community engagement) 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 previously overlooked 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.

3.3 Cities fostering innovation

This section adds to discussions of how planning can support a city's movement into the knowledge economy. It recognises the importance of 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 new economy. Mapping the presence, relative density and distribution of the five key soft (human) and hard (built form) infrastructure and amenity types of Chapter 2 (hereafter referred to as INAM), this section examines key pedestrian developments of four successful, globally-competitive, mid-size cities of innovation.

3.3.1 Site selection

Cities with high levels of innovation were selected from two highly innovative countries. Patent statistics were used 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 case study chapters, cities from USA and Germany were selected using Table 4 city selection criteria and indicators.

Table 4 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 4. Table 5 summarises the indicator results and success of each in the transition from an industrial to a knowledge and service economy.

3.3.2 Methodology

This section investigates the INAM³ of cities which appear to have a natural capacity for innovation and knowledge development. Chapter 2 suggests the INAM for innovation and knowledge development can be classified into five types linked to specific urban form. Given the infinite permutations of urban form found in different cities, Table 6 gives examples of urban indicators highly likely to facilitate a knowledge-based economy being derived from five INAM categories.

As argued in Chapter 2, INAM are assumed more important than density. Greater population densities will result in more human reticulation following flow lines which are influenced by a given set of fixed INAM. Observing the existence and spatial distribution of key INAM (rather than exact numbers), as well as major human flow lines (HFLs), gives 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. As such, 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 Table 6 INAM is used to evaluate the innovative capacity of key urban sites within the selected cities.

³ Infrastructure and amenities

Table 4: City selection criteria and indicators

Criteria	Indicator
Significant contributor to the global new economy	<ul style="list-style-type: none"> • Global and regional ranking of creativity or innovation • Dominance of new economy industry, such as high tech, biotech, robotics, etc
Competitive advantage in knowledge development and innovation	<ul style="list-style-type: none"> • Political leadership and vision to facilitate knowledge economy after period of economic struggle and decline • Rapid success in new economy-based activities once switch was made • Highly innovative – as indicated by patent activity
Globally competitive	<ul style="list-style-type: none"> • 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) <ul style="list-style-type: none"> – Beta city being „important world cities that are instrumental in linking their region or state into the world economy“ (GaWC, 2008) – 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)
Relevant to smaller cities/regions competing against more populated cities/regions	<ul style="list-style-type: none"> • Other cities in the wider region or country have greater populations

Table 5: Selected cities and indicator results

Indicators	Boston	Portland	Stuttgart	Dusseldorf
Ranking of: • World innovation (2thinknow, 2009)	• #1 in world	• #55 in world	• #11 in world	• #29 in world
• Regional innovation (2thinknow, 2009)	• #1 in Americas	• #12 in Americas	• #7 in Europe	• #20 in Europe
• Creative industry ranked by arts employees per capita (America for the Arts, 2008)	• #6 in USA	• #9 in USA		
• Patent activity	• #3 in World over 1975-2008 according to USA Patent Office data (Arndt, 2009)	• #9 in World over 1975-2008 according to USA Patent Office data (Arndt, 2009)	• #1 in Germany (Eurostat, 2009; Stuttgart Region Economic Development Corporation, 2002)	• #3 in Germany (Stuttgart Region Economic Development Corporation, 2002)
• Regional economic growth	• #8 most educated city in USA according to 2006 US Census Bureau (Christie, 2006) • #6 leading most innovative and overall green technology city in USA 2008 (SustainLane, 2009)	• #1 leading most innovative and overall green technology city in USA 2008 (SustainLane, 2009)	• #1 in Europe in share of employment in high-tech and medium tech industry (Eurostat, 2009)	• #12 in Europe in Knowledge intensive business services employment (Europeinnova, 2009)

Indicators	Boston	Portland	Stuttgart	Dusseldorf
<ul style="list-style-type: none"> Regional economic growth 	<ul style="list-style-type: none"> #12 GPD at purchasing price parity in world 2008 (PriceWaterhouseCoopers, 2009) 	<ul style="list-style-type: none"> #57 GPD at purchasing price parity in world 2008 (PriceWaterhouseCoopers, 2009) 	<ul style="list-style-type: none"> #9 in Europe (Baker, 2009) 	<ul style="list-style-type: none"> # 34 in Europe (Baker, 2009)
Dominance of new economy industry	<p>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)</p>	<p>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)</p>	<p>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, Healthcare (Haug, 2009; Urban Audit, 2008)</p>	<p>Once 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 bio-technology (Urban Audit, 2008)</p>

Indicators	Boston	Portland	Stuttgart	Dusseldorf
Political leadership and vision to facilitate knowledge economy after period of economic struggle and decline	Sharp decline in manufacturing jobs between 1969-1992, shifting industrial and urban development focus to attracting „new collar“ work and opportunities (Lewis <i>et al.</i> , 1999; O'Brien, 1999)	Large structural shifts from 1980's away from manufacturing (City of Portland, 2006). City has a strong history of urban renewal. 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 <i>et al.</i> , 2005)	1990-1997 saw huge job loss with economic downturn. Shift in governance approach as recognised that Stuttgart had to compete with other German cities and find place in international urban hierarchy (Heeg, 2003)	Shift from traditional manufacturing to knowledge industry (Kaskinen <i>et al.</i> , 2006; Knapp <i>et al.</i> , 2005). Decline in industrial employment occurring around the 1970's due to large portion of old industrial regions (Birch <i>et al.</i> , 2010)
Rapid success in new economy-based activities once switch was made	Since 1990's, grown quickly as a new economy, particularly in its contribution to innovation and knowledge development (Glaeser & Kohlhase, 2003; The Boston Foundation, 2002b)	A growing high-tech industry has earned it the nickname „Silicon Forrest“ (Wollner, 2008), as well as emerging Cleantech industry (City of Portland, 2009)	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)	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)
„The World According to GaWC“ ranking (2008)	Beta	Gamma	Gamma plus	Beta minus

Indicators	Boston	Portland	Stuttgart	Dusseldorf
Population	City – 590,763 (US Census Bureau, 2006)	City – 582,130 (Portland State Population Research Centre, 2009)	City – 600,068 in 2008 (Brinkhoff, 2008)	City – 584,217 in 2008 (Brinkhoff, 2008)
Population of other cities in the wider region or country	New York - 19,490,297; Philadelphia – 1,448,394; Chicago - 2,883,321 (US Census Bureau, 2006)	San Francisco - 744,041; San Jose – 929, 936; Los Angeles - 3,849,378 (US Census Bureau, 2006)	Berlin - 3,431,675; Hamburg - 1,772,100; Munich - 1,326,807; Koln - 995,420; Frankfurt - 664,838 (Brinkhoff, 2008)	

Table 6: INAM and indicator possibilities

Innovation facilitator type	Possible INAM indicators
Connectivity	<ul style="list-style-type: none"> • Transport nodes (including airports, train, bus) • Travel time between International airport and central city area by public transport • Average no. intersections in 400m radius (as measure of walkability) • Community open space/civic space • Wireless hotspot • Hotels, accommodation • Range of entertainment and personal services • Small and large retail • Supermarket (daily grocery)
Education and Skills	<ul style="list-style-type: none"> • Universities and higher education facilities • High schools • Other learning centres • Public library
Creativity and culture	<ul style="list-style-type: none"> • Entertainment • Restaurants, cafés, etc • Cultural, historical tourism, etc • Street art
Business and industrial networks	<ul style="list-style-type: none"> • Transport nodes (including airports, train, bus) • Personal, financial and business services • Entertainment • Restaurants, cafés, etc • Small and large retail • Wireless hotspots • Hotels, accommodation • Sporting facilities
Diversity	<p>Degree of mixed use and diversity in</p> <ul style="list-style-type: none"> • Transport (airport, train, bus, bike, foot, etc) • Shopping (24-hr marts to major retail) • Learning (Universities, schools, learning centres, etc) • Business and personal (services, etc) • Entertainment (clubs, tourism, etc) • Supermarket (daily grocery)

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 the five INAM types.

A search of Table 6 indicators within the selected site was conducted to identify the presence and spatial distribution of INAM using Google maps. The presence of indicators were documented and recorded in Table 7 as either present (✓) with a value of 1 or not (✗) with a value of 0. 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 1km radius of each station. The results are given in Table 7.

3.3.3 Analysis of four cities

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 (Chapter 2). The study site of each city is highly walkable and globally-connected encouraging high human connectivity, pedestrian movement and urban vibrancy facilitating knowledge transfer and creativity.

Table 7 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. Boston, Stuttgart and Dusseldorf average mid-level relative density and distribution across all INAM within the area of study. Portland is the exception; its low average density compensated by a highly-even distribution of INAM. The following outlines the individual findings for each city.

Table 7: Presence, comparative densities and distribution of INAM in a 1km radius of the main train station in each city

Indicator	Boston			Portland			Stuttgart			Dusseldorf		
	Presence	Density	Distribution	Presence	Density	Distribution	Presence	Density	Distribution	Presence	Density	Distribution
Transport options (e.g., train, bus, pedestrian, tram)	✓			✓			✓			✓		
Community open space (e.g., parks, public squares)	✓			✓			✓			✓		
Retail (e.g., small and major)	✓			✓			✓			✓		
Supermarket (daily grocery)	✓			✓			✓			✓		
Personal services (e.g., beauty)	✓			✓			✓			✓		
Business services (e.g., computer, accounting)	✓			✓			✓			✓		
Financial services (e.g., banking, financial advisory)	✓			✓			✓			✓		
Public wireless hotspots (e.g., cafes, hotels)	✓			✓			✓			✓		
Entertainment (various clubs, agencies, theatres)	✓			✓			✓			✓		
Cinema	✓			✓			✓			✓		
Theatres	✓			✓			✓			✓		
Restaurants and cafes	✓			✓			✓			✓		
Accommodation (e.g., hotels, motels, B&B's)	✓			✓			✓			✓		
Sporting services (e.g., gyms, specialist retail)	✓			✓			✓			✓		
History (e.g., museums, tourism)	✓			✓			✓			✓		
Library (public and private)	✓			✓			✓			✓		
University	✓			✓			✓			✓		
Education (e.g., technical colleges, other learning)	✓			✓			✓			✓		
High school	✓			✓			✓			✓		
Average density and distribution of INAM Total presence score (out of 19)	19			19			19			19		

Key

Low density and not evenly distributed	Mid level density and semi-evenly distributed	Dense and well distributed
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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 2). 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 3 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 2). 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 3), 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 2: Map of study area (Boston)

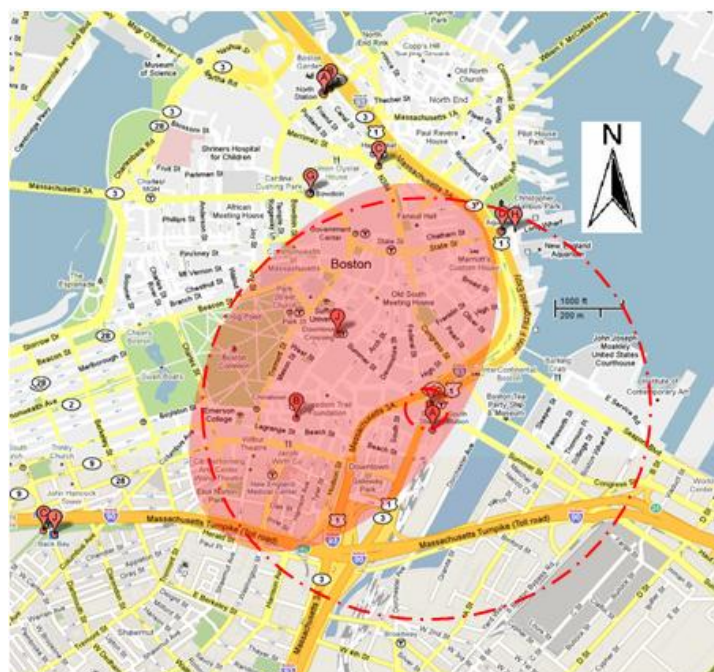
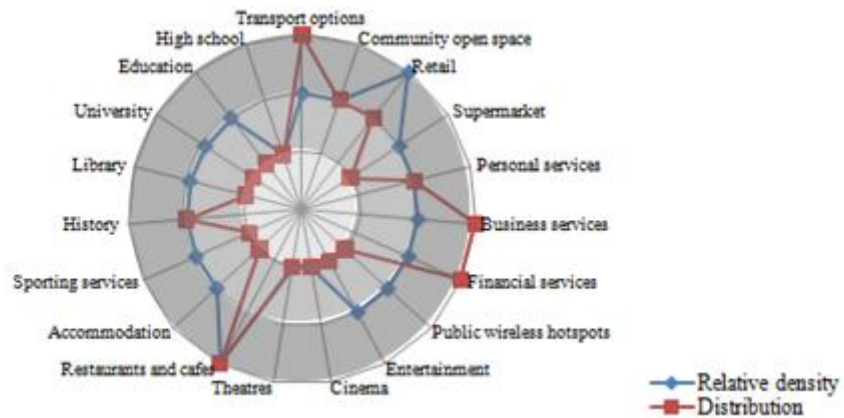


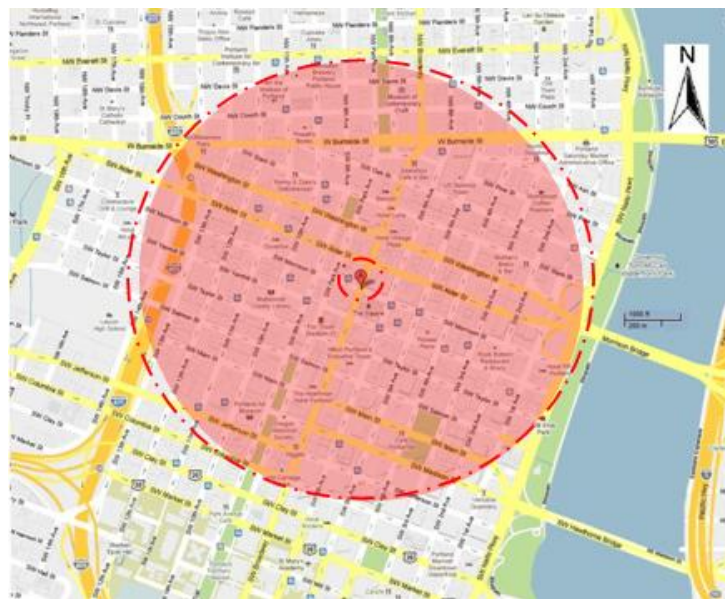
Figure 3: Relative density and distribution by INAM type in 1km radius study area of Boston



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 Forest“ (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 trendy image. This has acted to attract youth even with the lower number of jobs since the Global Financial Crisis (Dougherty, 2009a, 2009b).

Figure 4: Map of study area (Portland)

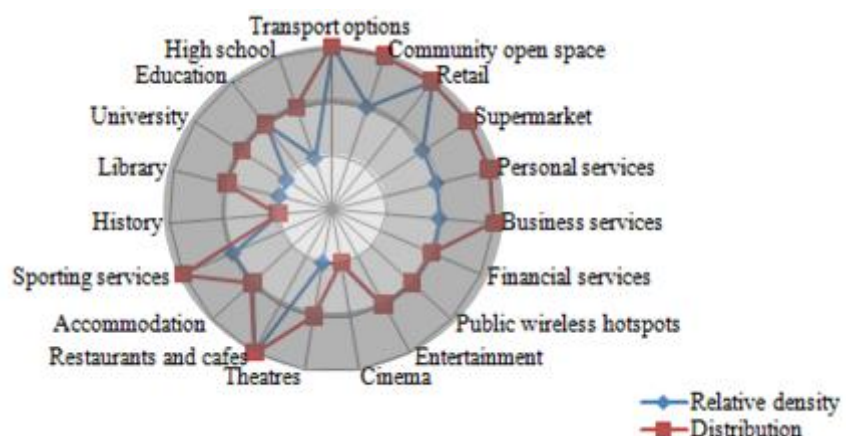


Portland town centre has approximately 34 pedestrian intersections in a 400-metre radius (See Figure 4). Transport modes are well-distributed and relatively dense within the 1km

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 4).

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 many university facilities 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.

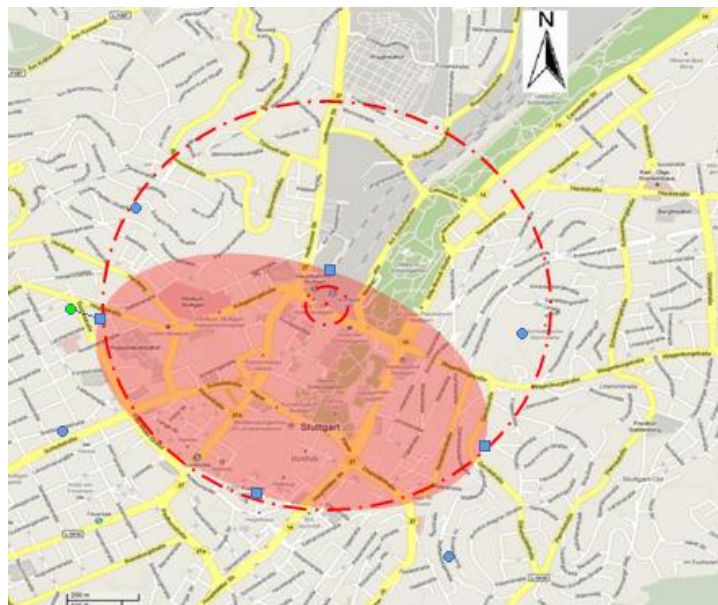
Figure 5: Relative density and distribution by INAM in 1km radius study area of Portland



Stuttgart

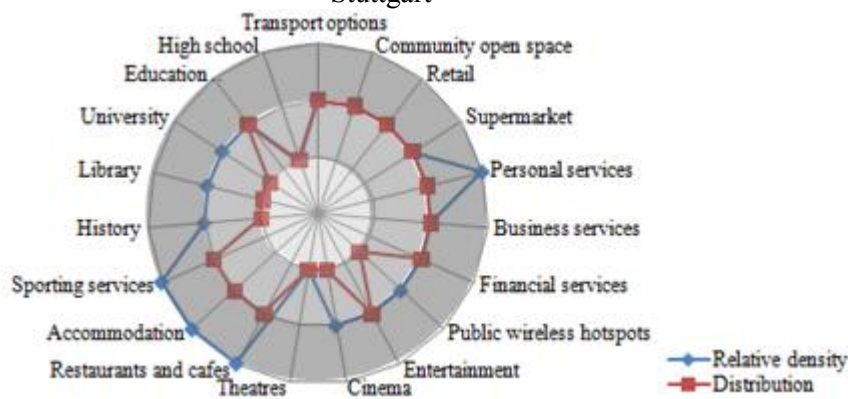
Stuttgart leads the *Cities for Mobility* unit (United Cities and Local Governments, 2009a) with over 500 members from 70 countries targeting the three urban mobility objectives of social inclusivity, environmentally-friendly and economic sustainability. It sees itself as at the forefront in recognising 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).

Figure 6: Map of study area (Stuttgart)



Stuttgart town centre has approximately 150 pedestrian intersections in a 400 metre radius (See Figure 6). Transport modes are relatively well-distributed with mid-level density (mid-grey in Figure 7). 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 focused on improving pedestrian walkability since the 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.

Figure 7: Relative density and distribution by INAM in 1km radius study area of Stuttgart



Though personal services, restaurants/cafes, accommodation and sporting services were highly dense, no INAM types were evenly distributed (dark grey in Figure 7). 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.

Dusseldorf

Ranked by the 2009 Mercer Quality of Life Index as the sixth most livable city in the world and first in Germany (Mercer Consulting, 2009). As in 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).

Dusseldorf town centre has approximately 50 pedestrian intersections in a 400-metre radius (see Figure 8). Transport modes are well-distributed (dark grey in Figure 9) 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 historic neighbourhood of Altstadt to the outlandish futurist Gehry buildings of Media Harbour. Figure 9 describes the relative density and distribution by INAM in the 1km radius. INAM averaged medium level density and distribution.

Transport, supermarkets, restaurants and cafes and sporting services were all evenly distributed, only personal services were relatively dense. High schools were both poorly

distributed and had low density. The majority of INAM exhibited mid-level density and poor distribution, indicating that the majority of services were clustered in one section of the 1km radius study area. This was found to be in the area west of the station.

Figure 8: Map of study area (Dusseldorf)

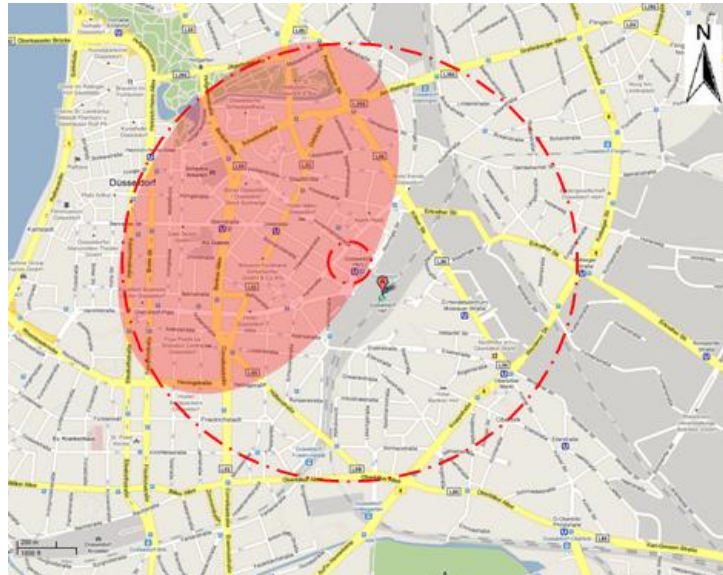
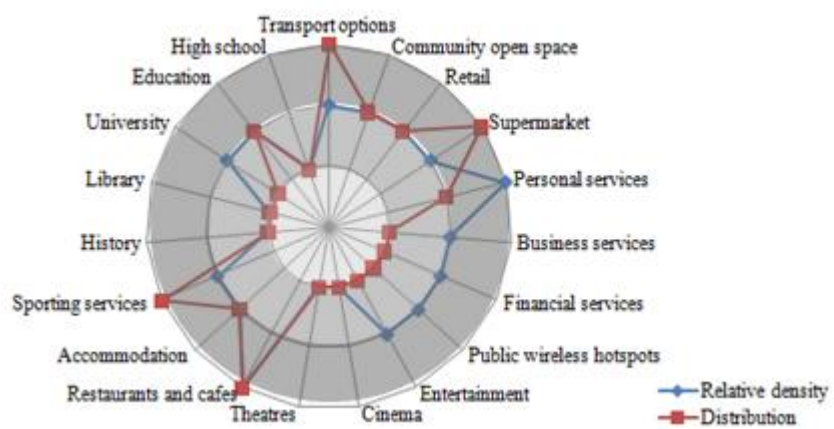
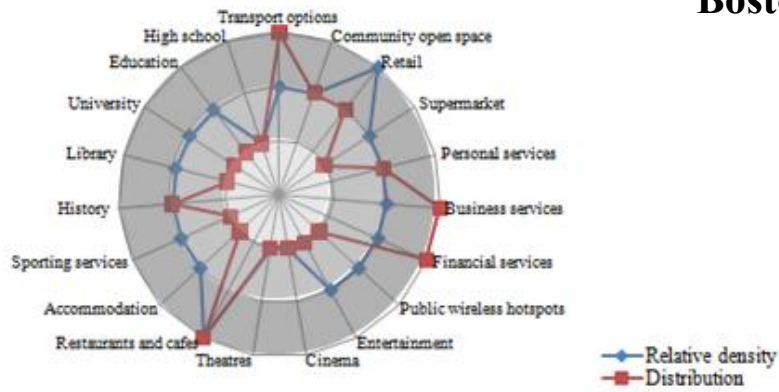


Figure 9: Relative density and distribution by INAM in 1km radius study area of Dusseldorf

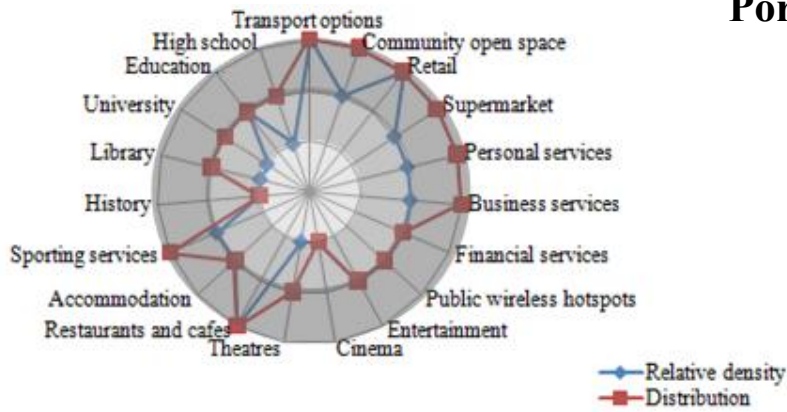


Summary results of four cities as per figures 3, 5, 7 and 9

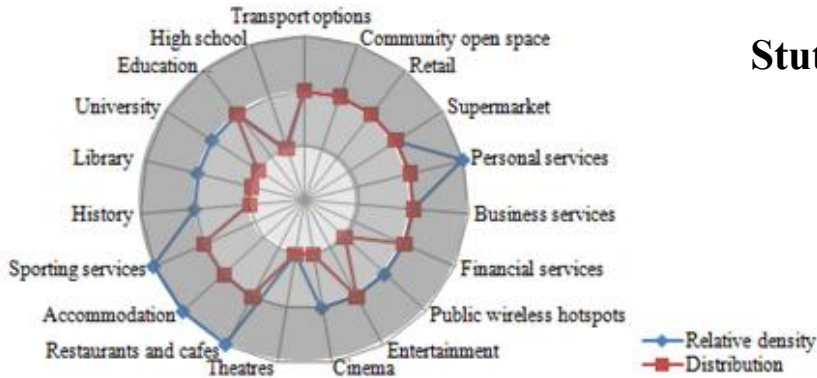
Boston



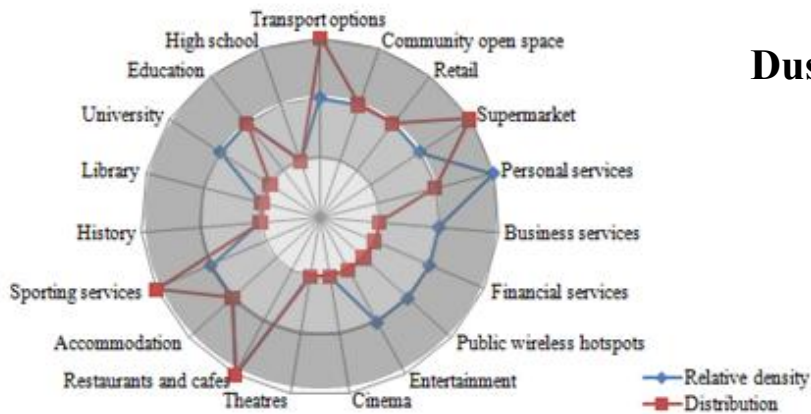
Portland



Stuttgart



Dusseldorf



3.3.4 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 different 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 10: Average relative density/distribution by INAM in 1km study area (4 cities)

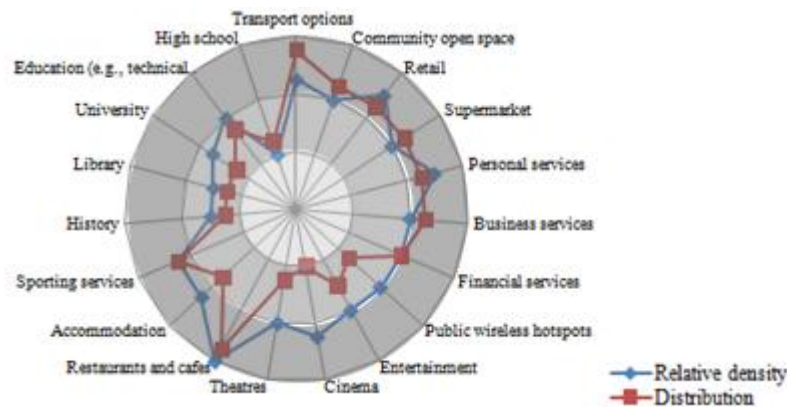


Figure 10 shows similar patterns for relative density and distribution in all INAM, except cinemas and wireless hotspots which had relatively high densities clustered in one area (ie, poor distribution). Density was higher than evenness of distribution for 63% of the INAM, while 26% were more evenly 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 concentrated (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. 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 8: Average relative density/distribution by INAM in 1km study area (4 cities)

Indicator according to relative density and distribution ranking (5 groupings)	Based on 3 levels of density and distribution
Restaurants and cafes	Densest and most well-distributed
Transport options	
Retail	
Sporting services	
Personal services	
Community open space	Mid-level density and semi-evenly distributed
Supermarket	
Business services	
Financial services	
Accommodation	
Education	
Entertainment	
Public wireless hotspots	
University	Very few and not evenly distributed
Library	
History	
Cinema	
Theatres	
High school	

Table 8 gives a breakdown of Figure 10 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.

3.4 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 focused 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. Chapter 2 suggested five infrastructure and amenity (INAM) types specifically relevant for knowledge development and innovation. This chapter 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. It investigated the presence, relative density and distribution of INAM in four highly-innovative mid-size cities: Boston, Portland, Stuttgart and Dusseldorf. Several lessons emerged from the data. 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.

If the hypothesis of Chapter 2 holds true, individual developments contribute to the overall efficiency of a city's regional innovation system, be it at the central city or local neighbourhood level. Therefore, even local or neighbourhood key pedestrian infrastructure will likely require the presence of INAM appropriate for knowledge development and innovation. This chapter attempts to understand how urban form in successful new economy mid-size cities may assist in knowledge development and innovation. A better understanding of how to integrate specific knowledge-related INAM into neighbourhoods and strategic centres is likely to be increasingly important for cities targeting innovation, particularly secondary economic regions.

CHAPTER 4: RESEARCH INQUIRY PARADIGM

4.1 Introduction

This chapter outlines the research approach and paradigm based on the literature reviews and enquiries of previous chapters. The research is comparative and exploratory assuming a constructivist perspective based on an interpretive epistemology. That is, „reality“ or the „knowledge“ in this research is a matter of interpretation. Data collection (interviews) is primarily qualitative and uses a case study approach with document analysis and interviews. There is additional quantitative analysis (surveys) for the Japanese case study. All sampling (for case study sites, participants, etc) is purposeful, and data analysis uses grounded theory to triangulate data encouraging emergent theory and hypotheses.

4.2 Ontology: constructivist

A constructivist approach is the most appropriate for this cross-national research for two reasons. Firstly, the idea that „multiple realities constructed by people“ (Patton, 2002, p.96) affect a participant’s lifestyle and interactions with others. Secondly, the researcher-subject interaction is central to the generation and analysis of data (Charmaz, 2000; Schwandt, 1998). This research acknowledges that constructions of reality by the researcher and case study participants are „are not more or less “true” in any absolute sense, but simply more or less informed and/or sophisticated“ (Guba & Lincoln, 1998, p.206). The researcher played an integral role in understanding the „reality“ of the interviewees and analyzing observations through her considerable knowledge of Japanese and Australian society, culture, language. This assisted the interpretation of complex socio-economic systems in both countries. Table 9 further explains the constructivists’ approach to inquiry.

4.3 Epistemology: interpretivist

Governed by respective cultural settings, both Australian and Japanese socio-economic urban environments will provide meaning and context in the interpretation of case study

urban and economic development systems and policies. Being a cross-national study, multiple realities exist based on the particular cultural, social and economic context of case study participants. Therefore, an interpretive approach is most appropriate as it allows for these multiple realities to exist and for the subjects and their actions to be governed by cultural contexts of language and rules (Flick, 2002; Goulding, 2002; Schwandt, 1998). Berg (2004) suggested this approach allows human activity and social action to be treated as a „collection of symbols expressing layers of meaning“, as data collected from interviews and observation „can be transcribed into written text for analysis“ (p.266). The researcher’s language ability and knowledge of cultural and business systems of the countries being studied will be useful tools in understanding and comparatively analyzing the complex socio-economic urban systems (Gubrium & Holstein, 2000). In contrast, a positivist approach is not appropriate for this study as it assumes only one objective reality irrespective of the perception of individuals (Goulding, 2002).

Table 9: Constructivist paradigm position on selected practical issues

Issue	Constructivism	Meaning to research
Inquiry aim	Understanding; reconstruction	Inquirer in role of participant and facilitator; content and meaning of inquiry is developed over time
Nature of knowledge	Individual reconstructions coalescing around consensus	Multiple realities can exist; constructs are subject to continued revision
Knowledge accumulation	More informed and sophisticated reconstructions; vicarious experience	Through hermeneutical/ dialectical process; transfer of knowledge is facilitated through experiences of others (e.g., case studies)
Goodness or quality criteria	Trustworthiness and authenticity	Trustworthiness criteria: credibility, transferability, dependability, and confirmability Authenticity criteria: fairness, ontological, educative, catalytic and tactical
Values	Included - informative	All informants deserve equal consideration
Ethics	Intrinsic; process tilt toward revelation; special problems	Starts with informants existing constructs and works towards increased understanding
Voice	“Passionate participant” as facilitator of multi-voice reconstruction	Change is facilitated as reconstructions are formed

Issue	Constructivism	Meaning to research
Training	Re-socialisation; qualitative and quantitative; history; values of altruism and empowerment	Must understand social, political, cultural, economic, ethnic, and gender history and structure of inquiries
Accommodation	Incommensurable	As there is either a „real“ reality or there is not – so can’t accommodate positivism/post-positivism stance

Source: Adapted from Guba & Lincoln (1998, pp.210-217)

4.4 Research approach: case study

This research uses case studies in Western Australia and Japan to provide insight into the role of economic development and urban planning in the development of knowledge-based regions in secondary economic centres. The case studies explore the research objectives of investigating policy and strategy which may support knowledge development and innovation priorities and how this may have assisted in new economy growth in secondary economic centres. As such, the case studies „only serve a supportive role, a background against which the actual research interests will play out“ (Berg, 2004, p.256).

The case studies are exploratory and descriptive. This was identified by Yin (2003b) as an appropriate methodology for policy, city and regional planning research. Eisenhardt and Graebner (2007, p.26) argued that this type of phenomenon-driven research should broadly scope the research question to allow flexibility due to the „phenomenon“’s importance, and the lack of viable theory and empirical evidence“. Table 10 identifies the types of research questions most appropriate for the exploratory and explanatory purposes of this study.

Case studies are useful in building theory as they contain descriptions of a phenomenon from a variety of data sources (Dooley, 2002). Theory emerges as „it is situated in and developed by recognizing patterns of relationships among constructs within and across cases *and* their underlying logical arguments“(Eisenhardt & Graebner, 2007, p.25). This research begins with a comprehensive review of pertinent literature. This establishes the in-depth context upon which to base subsequent case study research and to develop relevant hypothesis and propositions.

There are two case studies: 1) Perth’s Northwest Corridor (PNWC) in Western Australia; and, 2) Kansai Region, Japan. The resultant cross-case analysis provides a strong foundation for emergent theory. Case study sites are selected as those which most adeptly demonstrate and document the wider phenomenon of the study (Stake, 1995), as well as those strongly

„contribut(ing) to theory development within the set of cases“ (Eisenhardt & Graebner, 2007, p.27). A heuristic approach during the case studies initial period to review and improve techniques and methods (Janesick, 1998).

Table 10: Appropriate research question for exploratory and explanatory study

Purpose of the study	General research questions
<p>Exploratory</p> <ul style="list-style-type: none"> ✓ To investigate a little-understood phenomena ✓ To identify or discover important categories of meaning ✓ To generate hypotheses for further research 	<ul style="list-style-type: none"> ✓ What is happening in the urban socio-economic environment? ✓ What are the salient themes, patterns, or categories of meaning for participation? ✓ How are these patterns linked with one another?
<p>Explanatory</p> <ul style="list-style-type: none"> ✓ To explain the patterns related to the phenomenon in question ✓ To identify plausible relationships shaping the phenomenon 	<ul style="list-style-type: none"> ✓ What events, beliefs, attitudes, or policies shape this phenomenon? ✓ How do these forces interact to result in the phenomenon?

Source: Adapted from Marshall & Rossman (2006, p.34)

The case studies adhere to the following five criteria (Byman, 2004; Guba & Lincoln, 1998; Marshall & Rossman, 2006) to ensure reliability and validity:

1. *Credibility* (internal validity): by being carried out in accordance with good research practices and seeking confirmation from participants that the researcher has correctly interpreted interviews and observations;
2. *Transferability* (external validity): by providing a database of contextual thick descriptions allowing others to make judgments transferable to another environment;
3. *Dependability* (reliability): recording and storing of all data gathered during research process;
4. *Confirmability* (objectivity): act as objective as possible by submitting data to auditing to ensure researcher has acted in „good faith“; and,
5. *Authenticity*: by promoting fairness and better understanding of phenomenon under examination.

Data collection and analysis were conducted on each respective case study, and results and findings were cross-analysed to encourage emergent theory and develop hypotheses (Dooley, 2002). Many have suggested that this research strategy is most applicable to the exploratory and descriptive nature of cross-national research (Gray, 2004; Yin, 2003b). The following sub-sections describe the various elements of the case study process.

4.4.1 Literature review

A comprehensive literature review developed the conceptual framework for the case studies, and substantiated the study by providing a platform for further study and discussion (Bell, 2005; Creswell, 2009; Dooley, 2002; Marshall & Rossman, 2006; Yin, 2003b). It primarily investigated contemporary empirical data and theory underpinning the links between new economy development (including increased productivity) and urban development. The core hypothesis emerging from the review is detailed in Chapter 2, with related supporting processes given in Chapters 3 and 5.

4.4.2 Sampling

The issue of sampling arose several times during the 4-year research process (see Table 11).

Table 11: Sampling decisions in the research process

Stage in research	Sampling methods
While collecting data	Case sampling (which locations) Sampling groups of cases (which informants from locations)
While interpreting data	Material sampling (which interviews need further analysis) Sampling within the material (which text of interviews need further analysis)
While presenting the findings	Presentational sampling (which parts of text best represent findings)

Source: Adapted from Flick (2002, p.62)

Mason (2002) suggested basing case selection on the possible richness of information rather than random sampling when documenting a specific phenomenon. Critical cases were therefore selected according to their strategic importance to the research question. These selected cases also represented a range of contexts to enable comparison (Mason, 2002). Flyvbjerg (2006) noted that strategically selecting cases can increase the „generalisability of case studies“ (p.229). Thus, case study sites were purposely selected as those sites which

displayed *certain attributes* consistent with those emergent from the literature. This also aligns with those that believe sites should best enrich the understanding of the problem and answer research questions (Berg, 2004; Bradshaw & Stratford, 2005; Creswell, 2009). The selection criteria for case study sites are outlined in Chapter 6 and for interview participants in Chapter 7. The criteria for each sampling stage is summarised in Table 12.

Table 12: Summary of criteria for purposeful sampling for case study

Sampling stage	Selection criteria
Case study site in each region	Strong knowledge-based industry focus
Interviewees	For their role in urban planning and economic development, and able to provide insight to the research question
Material for further analysis	Generated from interviews and documents which require further analysis and generate the most interesting findings for the research
Presentation of text	Text from document analysis and interviews which provide the greatest insights into the research and best represent the findings

4.4.3 Data collection methods within the case studies

Fieldwork, surveys, document analysis and semi-structured interviews were employed to investigate the research question. A process of category saturation for each method enabled triangulation and verification of data (Dooley, 2002; Goulding, 2002). The following explains each data collection method.

Document analysis

Case studies included a review of all relevant documentation (e.g., policies, strategies, newspaper and other articles) and archival records (such as maps, economic and social statistics) (Goulding, 2002; Bryman, 2004). Documents were analysed through a hermeneutic approach with „emphasis on the location of interpretation within a specific social and historical context...(and) represent(ing) an invitation to ensure that the analyst of text is fully conversant with the context“ (Bryman, 2004, p.394). This enabled the researcher to draw linkages between the authors meaning and relevant wider social, economic, political and historical contexts.

As per Yin (2003a), evidence collected from sources identified in the preliminary fieldwork provided detailed documentation of events/names over time periods. This supported evidence from other sources, forming part of the data analysis triangulation process. All

document sources were carefully and appropriately employed within the case study to minimise the likelihood of misleading or incorrect use.

Interviews

Semi-structured, in-depth interviews enriched the data from other sources, enabling a deeper understanding of the research questions through the experiences and views of key informants. These informants provided a range of subjective perspectives, facilitating and encouraging revisions or reinterpretations of data analysis and emerging theory (Bradshaw & Stratford, 2004; Dunn, 2005; Eisenhardt & Graebner, 2007; Mason, 2002).

All interviewees were asked the same questions (informed by the literature review) with high levels of flexibility allowed in how they answered. Interviews were structured to ensure cross-case comparability during data analysis, with interviewee general or specific information contextualising answers (Bryman, 2004). Interview questions were:

Broad and general so that the participants can construct the meaning of a situation...The more open-ended the questioning, the better, as the researcher listens carefully to what people say or do in their life settings. Often these subjective meanings are negotiated socially and historically. They are not simply imprinted on individuals but are formed through interaction with others (hence social constructivism) and through historical and cultural norms that operate in individuals' lives. Thus, constructivist researchers often address the process of interaction among individuals. They also focus on specific contexts in which people live and work, in order to understand the historical and cultural settings of participants. Researchers recognise that their own backgrounds shape their interpretation, and they position themselves in the research to acknowledge how their interpretation flows from their personal cultural, and historical experiences. The researcher's intent is to make sense of (or interpret) the meanings others have about the world. Rather than starting with theory, inquirers generate or inductively develop a theory or pattern of meaning (Creswell, 2009, p.8).

Face-to-face interviews were conducted with key stakeholders from local and state government and private enterprise in both countries. Seven interview questions were generated from the literature review and initial document analysis as informed by the research questions (Warren, 2001). Interview questions were asked in the respondents own language to avoid misinterpretation and ensure validity and reliability of transcripts (Mangen, 2007).

Interview sampling was purposeful. Participants were selected as those best able to answer interview questions (Bradshaw & Stratford, 2005; Bryman, 2004; Morse, 2007) given their

role in the economic and urban development processes of the study regions and their potential contribution to other data. These key stakeholders (or elite interviewees) were critical in obtaining valuable, but publically unavailable, information and informed opinion regarding levels of regional knowledge and leadership (Marshall & Rossman, 2006). As per MacDougall and Fudge (2001), the sampling was „flexible and evolve(d) as the study develop(ed), informed by analysis of data and guided by developing understanding“ (p.120).

All interviews were tape recorded and transcribed by the researcher to increase the trustworthiness and authenticity of the data. Recording interviews increased the reliability of data by allowing public access and the researcher to review what was said (Perakyla, 1998). It also permitted the researcher to concentrate on what is being said, rather than the accuracy of notes (Bryman, 2004; Dunn, 2005).

Transcription issues arose as interviews were conducted in two different languages (Japanese and English). Subtle differences in language and culture meant that Japanese words did not always have corresponding English meaning. In such cases, the researcher did her best to interpret meanings. Some have noted that this may decrease the reliability and accuracy of interview data (Mangen, 2007; Marshall & Rossman, 2006). However, as noted but Marshall and Rossman (2006), having the researcher also conduct the translation avoids:

1. „More issues of meaning and interpretation aris(ing) when someone other than the researcher translates spoken or written words“; and,
2. Questions regarding validity of conclusions „since translation entails the construction of meaning...(and)...analysis (by the translator) is happening whether or not it is acknowledged or not“ (p.112).

All transcripts were written in the source language by either the researcher or Japanese native speaker, and then reviewed by the researcher. Japanese transcripts were translated into English by the researcher, who is a licensed Interpreter through the National Australian Accreditation for Translators and Interpreters (NAATI).

Survey

A survey of train station users was conducted to determine the capacity of a public space outside a central station to support knowledge development and innovation. The researcher was granted permission to ask survey questions at the site by local police. In accordance with Japanese expectations, business attire best facilitated good field relations by putting participants at ease. There were no special ethical considerations for this type of data collection. Survey results are documented in Chapter 5. The same survey was also intended for a Western Australian train station, but did not eventuate for two reasons:

1. The Perth Transport Authority (PTA), who controls all Perth stations, refused to permission to carry out the survey. Their reason being that train stations are not designed to „attract“ people, so there should be no users outside of stations other than those waiting for the next mode of transport (i.e., bus, car); and,
2. Researcher observations outside of the station found limited human activity other than users waiting for other modes of transport. Given that this activity fell outside of participant selection criteria (see Chapter 5), there were not enough users at the station to complete the target 80 respondents.

Given that both regions are dealing with similar but different knowledge economy objectives, the survey outside of the Kansai train station was used to provide insights into how urban form around a train station might support aspects of human interaction, connectivity and mobility as facilitators of knowledge development and innovation.

The survey, itself, was formulated to extract a small amount of highly-specific information from a large number of users (Marshall & Rossman, 2006; McGuirk & O’Neill, 2005). As suggested in McGuirk and O’Neill (2005), the questions were designed to establish respondent attributes (demography, occupation type), behavior (how they use case study site) and attitudes (feeling towards case study site). Fink (2006, 2003) suggested that multiple-choice increased the efficiency and reliability, as well as be non-threatening and allow multiple answers. He also noted that it was able to generate data most able to measure complex behaviour and objectively scored. Survey questions were general and impersonal, using unbiased Standard English or Japanese with a single thought to avoid participant confusion. Questions were logically ordered, with relatively easy, objective questions proceeding more difficult subjective ones. (Fink, 2006, 2003). The survey was pilot-tested to make sure it was easily understood and readable (Fink, 2006, 2003; McGuirk & O’Neill, 2005).

Population samples were selected to avoid bias (Fink, 2006, 2003; Kitchin & Tate, 2000) and to allow data to represent a larger population within known limits of error (Marshall & Rossman, 2006). Survey participants were selected systematically using the random number table of Kitchin and Tate (2000). This is represented in Table 13.

The first number selected was the first „1“ of „71118“. This dictated the user interval between surveys, where every 1-5 users were sampled according to Table 13. Five was selected as the upper limit. An interval of more than 5 users was inefficient given the lower use during some periods of the day. That is, users were selected at a random interval as indicated in Table 14. There are no intervals of 7, 8 or 9 users before a survey is conducted as each exceeds the upper limit of 5. If a chosen user refused to participate, the researcher asked each

consecutive user until consent was given. The researcher then returned to selecting users based on the random table. This same user selection method was repeated at different times of the day.

Table 13: Random numbers allowing systematic participant selection

Random numbers									
71118	41798	34541	76432	40522	51521	74382	06305	11956	30611
53253	23100	03743	48999	37736	92186	19108	69017	21661	17175
12206	24205	37372	46438	67981	53226	24943	68659	91924	69555

Source: Kitchin & Tate (2000, p.56), taken from Silk (1979) and Neave (1976).

Table 14: User interval between surveys as per Table 13

1	1	1	8	4	1	7
✓	✓	✓	✗	✓	✓	✗
9	8	3	4	5	4	1
✗	✗	✓	✓	✓	✓	✓

Table 15: Sample sizes needed to estimate population values with given levels of confidence assuming a variability of 50%, and a very large population.

Confidence limit (±% of mean)	Confidence level	
	99%	95%
7	339	196
8	259	150
9	205	119
10	166	96
15	74	43
20	41	24

Source: Adapted from Kitchin & Tate (2000, p.59)

Given that the survey is a one of several data sources, sample sizes were small at 20 users for four different times of the week. These were: 1) weekday peak; 2) weekday off-peak; 3) weekend peak; and, 4) weekend off-peak. 20 participants was the recommended sample size

by Kitchin and Tate (2000), being the „minimum sample size to conform to a normal distribution“ (p.58). Surveys were distributed face-to-face at the case study location (outside the Sannomiya train station). This encouraged greater participant response and engagement, as well as enriched data obtained through observation field notes (McGuirk & O’Neill, 2005). There were a total of 80-90 users surveyed for each location. Table 15 estimates the confidence level for the reliability and accuracy of the data representing the movements and attitudes of a larger population.

Observations (field notes)

Marshall and Rossman (2006) suggested that detailed non-judgmental observations of how study sites are used should be recorded using both check lists and holistic descriptions. These were used to establish patterns of behavior for later analysis. As described by Kearn (2005), observations were both controlled focusing on particular elements of the urban environment and uncontrolled to capture data not restricted to particular elements. Observations were conducted for the purposes of counting, complementing (other forms of data collection) and contextualizing the data (Kearns, 2005).

Controlled observations focused on pedestrian counts, mapping of activity nodes and destination analysis. Uncontrolled observations followed three forms as suggested by Gold in 1958 (Flick, 2002; Kearns, 2005):

1. *Observer-as-participant* - the researcher travelled to Japan and observed case study sites;
2. *Participant-as-observer* - the researcher observed and interpreted own locality; and,
3. *Complete participation* - having lived/worked in both regions and being fluent in both languages, the researcher was able to develop an in-depth understanding of daily human capital flows and interaction with urban form in both regions. A systematic observation process sought to understand and compliment data gathered from more controlled sources where participants could give constructed answers.

Adapted from Kearns“ (2005) description of the observation process, the research adopted the following as appropriate. Both controlled and uncontrolled observations complimented survey results as detailed in Table 16. Observations were conducted at four different times of the week (peak weekday, off-peak weekday, peak weekend and peak weekend) at each location. Results are detailed in Chapter 5. There were no special ethical considerations for this type of data collection.

Observations were systematically recorded as field notes. These were later codified for analysis (Berg, 2004; Kearns, 2005), and contributed to the final analysis on the capacity of each region to support innovative activity and knowledge productivity.

Table 16: Controlled and uncontrolled observations of study

Type of observation	Method
Controlled observations: Recorded as frequency tables and on maps	
Pedestrian counts	Estimate number pedestrians travelling through and hanging around community open space (meeting place) outside case study location (as key infrastructure)
Activity nodes	Record types of activities or amenities surrounding case study location, e.g., restaurants, cafes, fast food, high schools, universities, learning centres, wireless hot spots, car parks, library, grocery/24-hour store
Destination analysis	Record major pedestrian-oriented destinations surrounding case study location (e.g., tourism, university, science park, shopping precinct)
Uncontrolled Observations: Recorded as field notes (brief notes during observation period will be expanded at the end of each day)	
Observer-as-participant and Participant-as-observer	Observe human movements and flows to destinations, activities and around case study site, including types of individuals (ie, businessmen, families)
Participant observer	Leverage researchers' knowledge and experience from living/working in both case study region. for more in-depth analysis and interpret data.

4.4.4 Data analysis

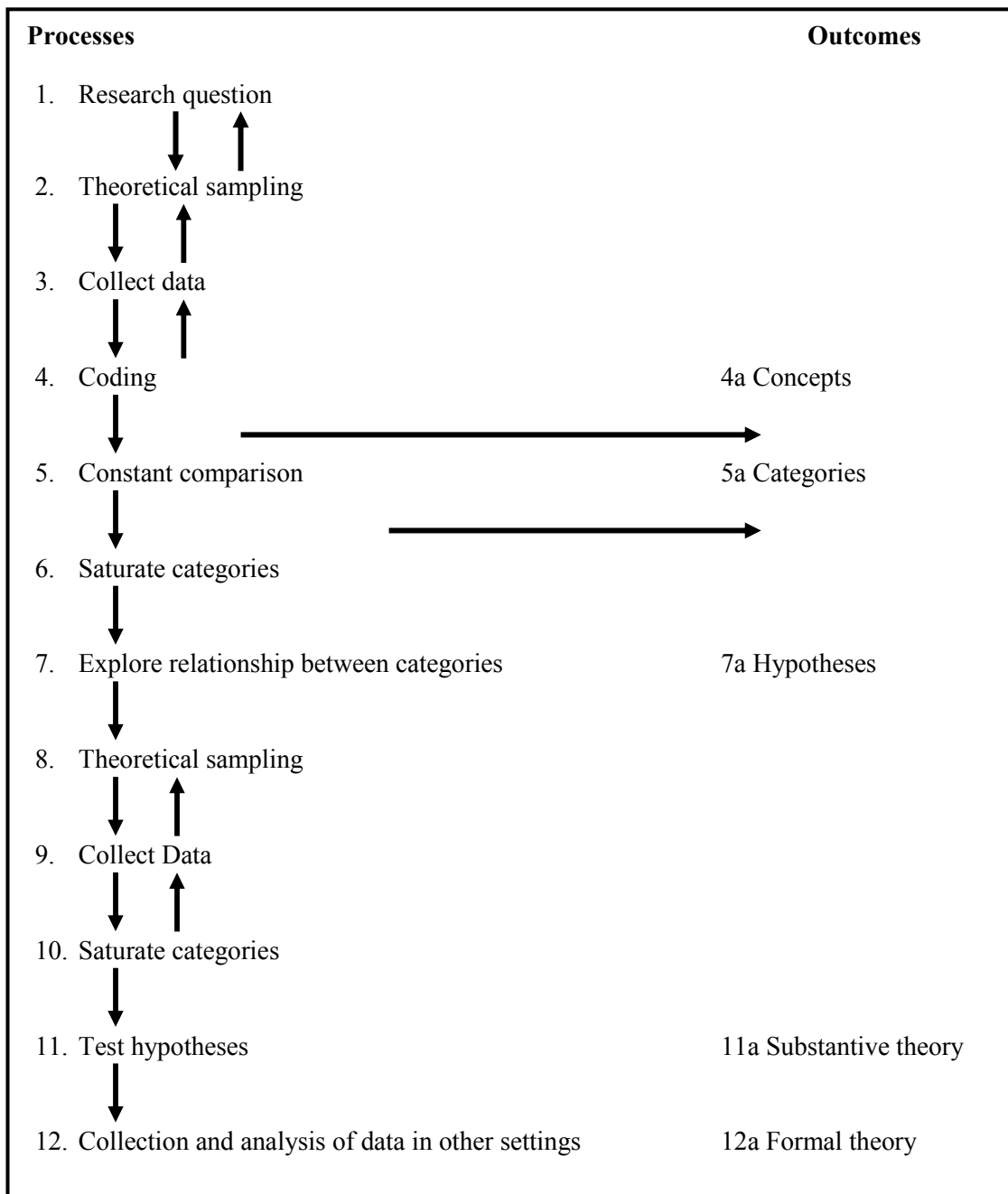
This study employed grounded theory as the analytical framework being „concerned with the development of theory out of the data and...that data collection and analysis proceed in tandem, repeatedly referring to each other“ (Bryman, 2004, p.401).

This method is designed to encourage researchers' persistent interaction with their data, while remaining constantly involved with their emerging analysis. Data collection and analysis proceed simultaneously and each informs and streamlines the other. The (grounded theory method) builds empirical checks into the analytic process and leads researchers to examine all possible theoretical explanations for

their empirical findings. The iterative process of moving back and forth between empirical data and emerging analysis makes the collected data progressively more focused and the analysis successively more theoretical (Bryant & Charmaz, 2007, p.1).

The grounded theory process is summarized in Figure 11.

Figure 11: Processes and outcomes in grounded theory



Source: Bryman (2004, p.404)

Initially, each case was individually analysed via a coding process using themes derived from the conceptual framework based on a comprehensive literature review, the research question set, hypotheses, key issues and variables. Coding categories were determined using inductive and deductive reasoning to ensure analysis was grounded in the data and theory (as per Berg, 2004; Kitchin & Tate, 2000). Some researchers have advocated analysing interviews using the *themes* and *concepts* emerge from the data (Berg, 2004; Marshall & Rossman, 2006). Others suggest placing each case into a matrix table so the researcher can observe similarities and differences between the cases. Such approaches allow the researcher to return to stakeholders to collect missing data and draw cross-case conclusions (Huberman & Miles, 1994; Yin, 2003a). Similarly, Cope (2005) recommended developing a coding structure of emerging categories, relationships and patterns.

These techniques critically challenge ideas during the analysis process, allowing alternative explanations to arise. Some have noted that this adds rigour and validity to the final hypotheses and conclusions (Marshall & Rossman, 2006; Bradshaw & Stratford, 2005; Creswell, 2009). NVivo computer software is also a useful tool in supporting this.

This study approached final interview analysis with the full intention of employing these recommended strategies, including the use of NVivo software tool. Despite this, practical application found that NVivo was not appropriate for this study. The reasons for this lay in the cross-national nature of the study having large differences in:

1. Terminology and concepts:

- For example, Japanese had no understanding of the term *mixed-use planning*; the closest explanation being *compact city*. This gave a linguist advantage to Perth participants in Question 6, evident in their more fluid and targeted responses.

2. Intentions and outcomes of urban planning approaches:

- For example, the 400-metre walkable catchments of Western Australian *Liveable Neighbourhoods* strategy bear little similarity to the citizen participation element of the Japanese *machizukuri* process. A matrix comparing these processes would outcomes relevant to the study.

3. Socio-economic issues and targets:

- For example, challenges presented by and solutions to the aging population of Japanese new towns were different to the challenges of the lower socio-economic groups in Perth's outer metropolitan regions.

This made comparisons in *similarity* and *differences* difficult because underlying drivers and shapers were not the same. Therefore, rather than give a definitive answer to the hypothesis, the study sought to paint a picture of each region which could be related to documented policy approaches. As suggested by Bryman (2004), data analysis began with initial data collection which then continuously informed and shaped the data collection process. It dealt with the broad pattern of responses rather than absolute response percentage to avoid „subtleties of language or social rules“ (Jorm et al., 2005). NVivo, which assigns value to words or phrases, was not appropriate for the ambiguous and often-intertwined concepts being dealt with in this study.

Instead, the researcher used the participants own words to describe a regional „story“, „perspective“ or „reality“. Italicised „phases and key words from the original language from time to time in (the) final narrative“ were used to avoid issues in the quoting of translated text, this helped remind „the reader that the interviews were originally conducted in a language other than English“ (Marshall & Rossman 2006, p.112).

Multiple data sources for each case (documentation, interviews, field research) allowed triangulation of the cases, cross-case analysis and depth of inquiry (Patton, 2002; Silverman, 2006; Yin, 2003b). Combining several data collection methods allowed multiple lines of sight to emerge forming a *triangle of error*. This was defined by Berg (2004) as „the best estimate of the true location of the new point or object is the centre of the triangle, assuming that the three lines are about equal in error“ (p.5). Triangulation of the data allowed a more substantive story to emerge as one data source imposed its own perspective on reality, the use of several data sources minimised the error contributed by a single source of data (Berg, 2004; Creswell, 2009).

4.4.5 Ethical issues

There are primarily four considerations for research regarding ethics (Bryman, 2004; Dowling, 2005):

- 1) Harm to participants;
- 2) Lack of informed consent;
- 3) Confidentiality and invasion of privacy; and,
- 4) Deception.

Informed consent is the only ethical requirement needing further consideration within this study. Information letters in the language of the target interviewee (either Japanese or English) requesting participation in voluntary interviews for the study were prepared and sent by the researcher to the individual community and stakeholder participants. Letters sent

to participants explained that names/companies may be used within the data analysis and discussions due to the nature of the interview questions and information being sought. Pseudonyms were offered to be assigned to the names and companies of those who do not wish to be identified. In adherence to university policy, the interview tapes and transcribed information are being kept in a locked cabinet for five years, before being destroyed.

The researcher made application to the University's HREC (ethics council) as required by DGSC. There was no additional ethics approval processes required to conduct this research overseas in Japan. The knowledge and experience of the researcher in the Japanese culture and language ensured that all local values be acknowledged within the research design framework. All participants were afforded the respect and protection as established by the *Australian National Statement on Conduct Ethical in Human Research*.

In addition, this research recognises the unique ethical considerations arising from cross-national comparative case studies. That is, given this study employs a primarily qualitative research approach it „generates words – the primary symbol system through which meaning is conveyed and constructed“ (Marshall & Rossman, 2006, p.113). The special considerations arising from this are detailed in the various relevant sections of this chapter.

4.4.6 Data storage and retention

All data are stored and retained according to the *Joint NHMRC / AVCC Statement and Guidelines on Research Practice*. All interviews were recorded onto micro-cassette and later transcribed for analysis. Data collected was recorded in both hard and soft forms, all subsequent analysis was recorded onto compact disc and retained at the Department of Urban and Regional Planning, Curtin University of Technology. It will be held for a period of at least five years after the thesis is completed.

4.5 Limitations and strategies to address limitations

This research is subject to the usual criticisms that qualitative studies are too subjective, difficult to replicate, as well as having issues with generalisation and lacking transparency (Bryman, 2004). Table 17 illustrates how the research dealt with limitations.

Comparative studies between societies with different language, cultural and political environments present various methodological and ethical complications, particularly if the researcher is also acting as the interpreter (Goulding, 2002; Shklarov, 2007). As an Australian nationally accredited Japanese-English Interpreter, the researcher oversaw all interview transcripts and document translations. Some believe that this heightens the

reliability and consistency in data collection from both countries (Goulding, 2002; Marshall & Rossman, 2006).

Barrett and Cason (1997) noted that taping interviews conducted in a foreign language is particularly helpful as it circumvents the need to „interrupt the flow of the interview to ask for clarification about a word or a phase“ (p.100). The researcher’s intimate knowledge in both Japanese and Australian social, business and cultural spheres and with her fluent written and spoken English and Japanese ability facilitated the specific context of language interpretations (Mangen, 2007). Shklarov (2007) noted that the dual interpreter/researcher role allowed the „ability to perceive and consider the ambiguity of various linguistic, cultural, and ethical contexts“ and could generate „ethically sound research outcomes“ (p.537).

Table 17: Strategies to deal with limitations

Limitation	How arisen	Strategies to address limitations
Too subjective	Researcher has strong affiliations and long history with various elements of Japanese cultural, business, people, language, etc.	Use the literature to inform survey questions. Use consistent coding for both case studies in data analysis. Continual critical reflexivity to encourage awareness of „nature of (researchers) involvement“ (Dowling, 2005, p.25; Creswell, 2009)
Difficult to replicate	Researcher has depth of knowledge, language, personal experience and understanding in both case studies which will be difficult to replicate in another researcher. Interpretation of data is subject to the unique interpretation of the researcher based on her subjectivity.	Keep good record of interviews, observations and other documentation gathered during data collecting process (Bryman, 2004). Keep good record of methodologies used and why these were chosen (Bryman, 2004).
Issues with generalisation	Using single case study regions in Western Australia and Japan, can the data be used to make generalizations of other cities?	Use the data to infer moderate generalisations of the data rather than absolute or statistical generalisations (Bryman, 2004).
Lacking transparency	Failure to keep accurate record of methodology or sampling procedure (i.e., why a specific key informant was chosen). Confusion as to how the researcher arrived at a particular conclusion.	Keep an accurate record of methodology and sampling procedures (Bryman, 2004). Meticulously document process through which particular conclusion has arisen (Bryman, 2004).

There is little research on the complexities of the insider/outsider relationship in cross-national studies. Carmel (2007) advocated „access to a combination of insider and outsider understandings of the subject and the countries may produce the most useful insights into data“ (p.55). The researchers“ deep understanding of the language and culture of both regions allowed her to act as an insider in both case studies. Dowling (2005) suggested the information and interpretations of an insider „are more valid than those of an outsider“ (p.26), and that people were more likely to open up and speak if they are comfortable with the researchers“ ability to understand their position or environment.

Zulaf (2007) observed additional difficulties facing researchers of cross-national studies in gaining access to interviewees, such as unwillingness to participate, low response rate to introductory and follow-up letters, time and expense. This is in part because the researcher does not develop a personal rapport with gatekeepers and interviewees as the majority of communications are through email and phone, not face-to-face meetings. To overcome this, the researcher established an academic contact with a University in the Kansai region. This facilitated the opening of doors for interviews and provided assistance in locating local academic resources (libraries, newspaper article, etc) (as per Barrett & Cason 1997).

CHAPTER 5: URBAN INNOVATION SYSTEM⁴

5.1 Introduction

Success in innovative cities appears associated with a pool of talented human capital and the creation of intimate urban space. 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 (2000) 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 (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.

⁴ A version of this chapter was published in the 2010 Knowledge cities World Summit (Martinus, 2010c) and in the book titled „Building prosperous knowledge cities: policies, plans and metrics“ (Martinus, 2012a).

This chapter asserts that civic 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 in Chapter 2 as urban form capable of enhancing the knowledge productivity of local inputs. Section 2 of this chapter 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 civic 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.

5.2 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 and 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. 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 (p.1029).

Civic 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 (2002) 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“ (p.69).

Understanding how civic 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 below.

5.2.1 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 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 to innovation. 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 complementary 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 and creates urban spaces of improved life quality and diverse interaction. Such environments are also 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. This is supported by Chapter 2, which argues that inadequate hard infrastructure (including hard networks) act as a constraint on soft infrastructure (and networks). It suggests that 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, p.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. In an effort to encapsulate this, the five hard and soft infrastructure types suggested in Chapter 2 appear 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 civic space can strengthen local social capital (Hanna et al., 2009) suggests that it can be used as a tool for government policy targeting innovation and knowledge development.

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 space. 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.

5.2.2 The contribution of local space

Beriatos and 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“ (p.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 central city. Gospodini suggested that they were „sifting/expanding the spatial core and altering the city’s spatial organisation and structure“ (p.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 (2002) 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“ (p.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 (2002) 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“ (p.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 central city. Applying these concepts to local civic space can contribute to the local milieu's capacity to support regional new economy objectives and global competitiveness.

Franck and Stevens (2007) contended that spaces 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 study views „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. 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 (1961) 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 civic space a key economic infrastructure for regions focusing on knowledge development and innovation. It advocates better understanding 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, p.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 partly rests on levels of human interaction, stimulation and creativity. 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 civic space as a key regional platform for this encapsulating both time and space.

The idea that *space is compressed* is strongly influenced by global events. 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 (ie, 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 (e.g., next-generation of internet and communications technologies) only adding to feelings of lack time (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 (2006, p.316) noted that „*multi-tasking* itself can be considered as characteristic of the human interactions that underpins new media production activities“. This chapter contends that civic space can play a time-saving role by integrating uses, better reflecting and supporting new economy workers, and therefore, the innovation process itself.

In their analysis of learning and knowledge generation, Amin and Roberts (2008, p.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. They thought that 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 thesis contends that the function of some spaces makes them more appropriate than others. More specifically, civic space adjacent to key public infrastructure is a prime location to concentrate a region's vitality. For example, concentrating other infrastructure, amenities and services around train stations (as key public infrastructure) can leverage its transport function to provide a convenient hub of daily business and living activities. This facilitates an organic and self-perpetuating local environment critical for activities in the new economy.

As a potential local, regional and global entry point, not doing so around a train station represents a wasted opportunity to concentrate knowledge resources (urban vibrancy, human connectivity and interaction, etc) for regions targeting innovation and knowledge development. Therefore, train stations fulfilling only the basic transport function will likely be economically inefficient in knowledge production, whilst those optimising human movement, vibrancy and interaction will be better equipped. 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.

5.3 Train station survey

This thesis asserts 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 civic 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. Attracting a large number of pedestrians, the transport function of train stations make them prime locations to leverage human interaction, connectivity and movement.

This section examines the natural pedestrian pull of train stations to understand why some civic spaces outside of train stations attracted people more than others. It 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.

This section tested whether the longer and more frequently people visited the space the more likely they were to have unplanned meetings with friends. This assumes that, as inputs of knowledge creation and innovation, the deepening of social capital networks and attraction and retention of human capital are underlying functions of civic space in cities of innovation. Based on the literature review of Chapter 2, 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.

5.3.1 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 in Chapter 3 for innovative cities.

As argued in Chapter 6, Japan views innovation as a driver of industrial change and critical for future sustainable economic growth. 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 Region (in the middle of Japan) is the third most highly innovative region of the world after Kanto Prefecture (in Japan, containing the capital city of Tokyo) and California, USA (Table 18) (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. Case study region and city selection is detailed in Chapter 7.

Figure 12: Train station entrances around Sannomiya station



Sannomiya station sits at the heart of Kobe’s over 1.5 million people (City of Kobe, 2009b) 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 12).

Given the importance of attracting and retaining human capital in facilitating human interaction, connectivity and movement, 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 civic space outside Hankyu Sannomiya (Figure 13). 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*).

Figure 13: Hankyu station and survey site (at green dot)



The study area is paved in grey cobble stones, with metal benches and random scattered stone seats (Figure 14). 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 14: Survey site taken from various angles



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.

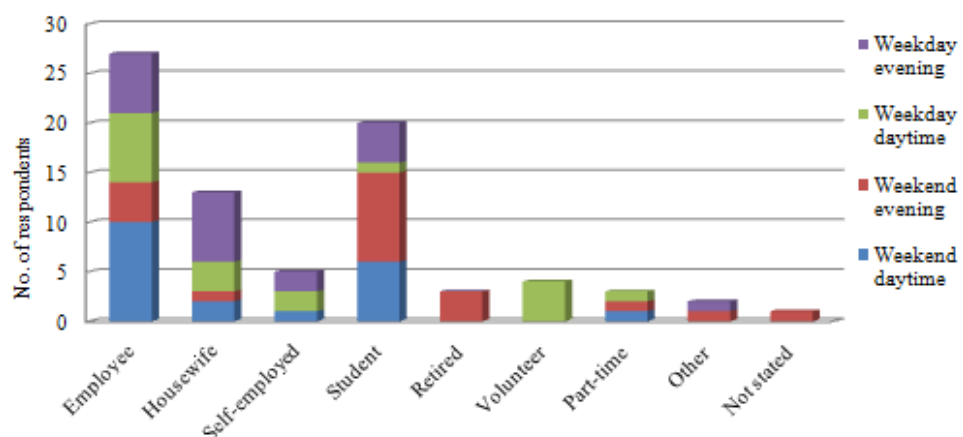
5.3.2 Observations and survey results

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 city centre 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 15). In general, the different types of people and occupation found in the survey site added to the interest and vibrancy of the site.

Figure 15: 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 16 and 17). 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.

Figure 16: Survey response to „How did you get here?“

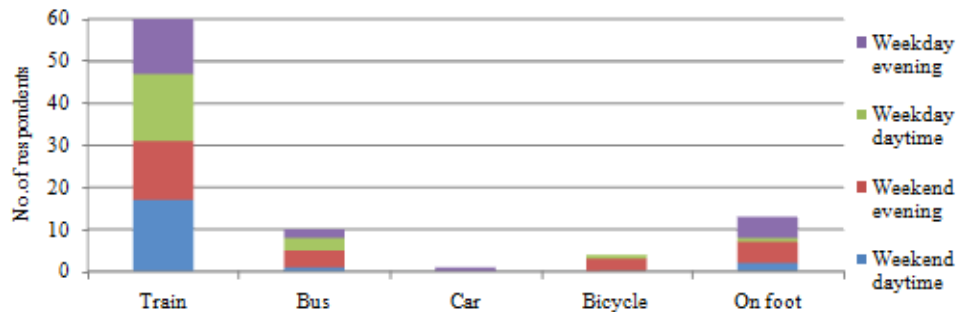
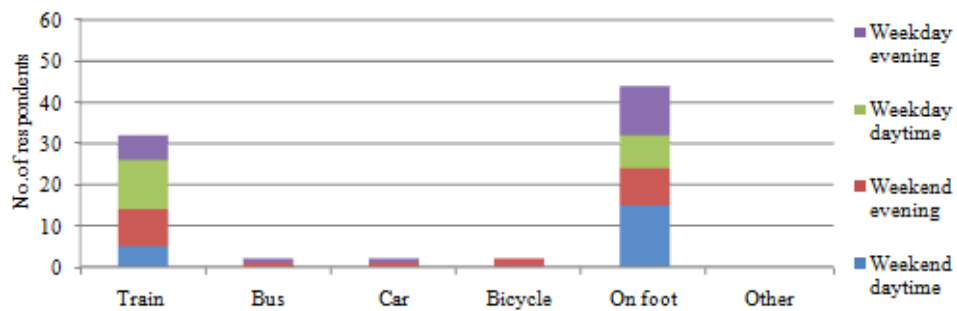


Figure 17: Survey response to „How will you travel to your next activity?“



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 18). 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 19). 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 20), 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 21 provides a breakdown of intended destinations in Figure 20. 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.

Figure 18: Survey response to „Where did you come from?“

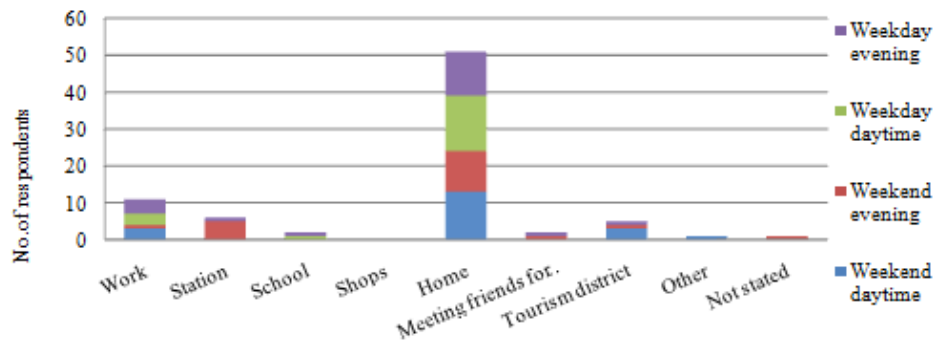


Figure 19: Survey response to „Why did you come here?“

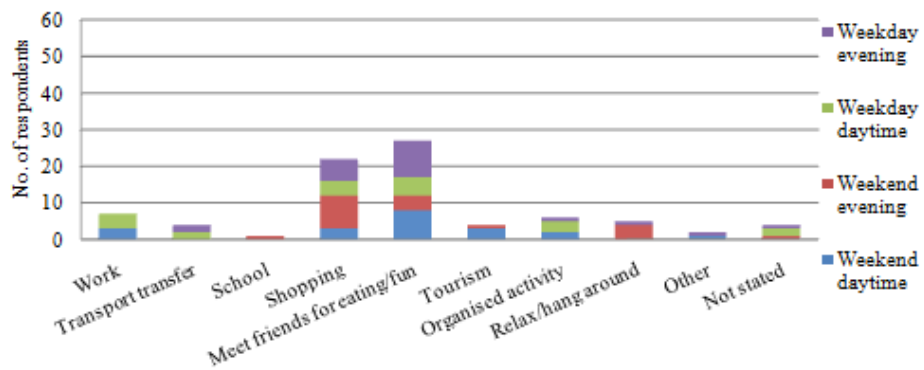


Figure 20: Survey response to „Where are you going immediately after this?“

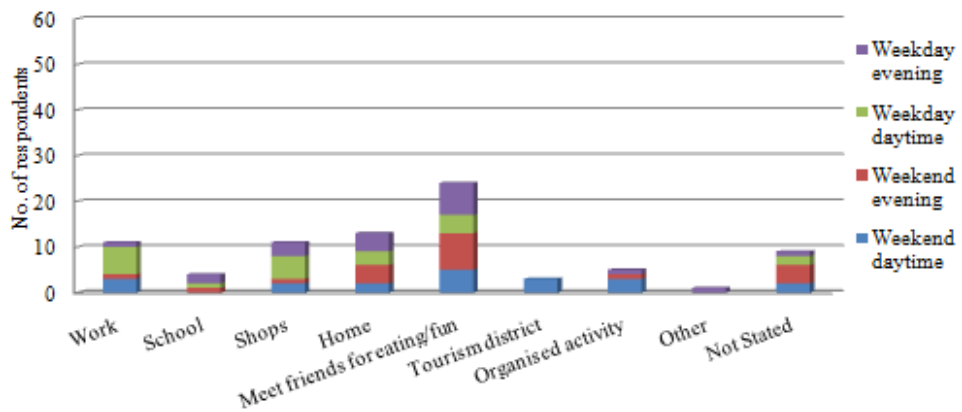
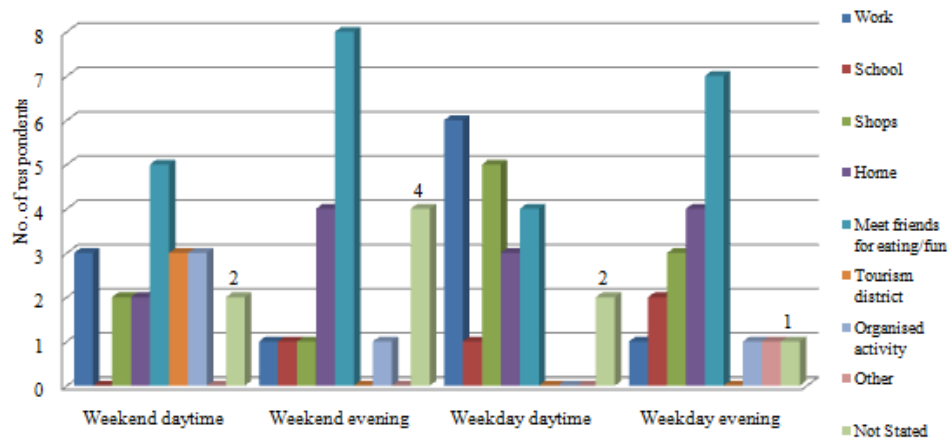
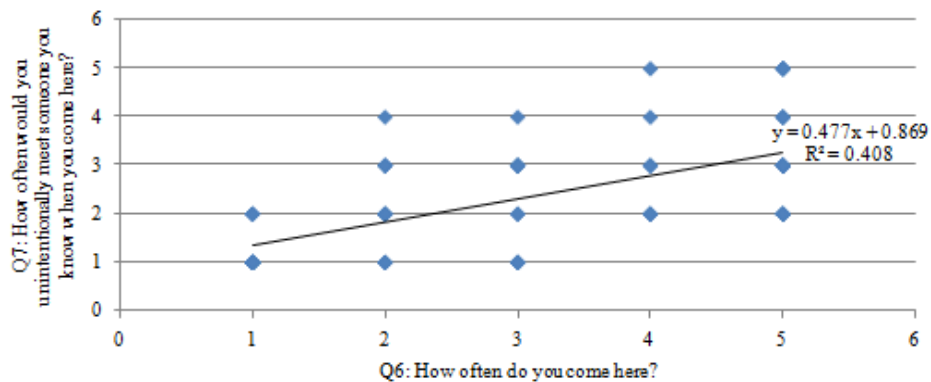


Figure 21: Survey response to „Where are you going immediately after this?“



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 22). 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.

Figure 22: Correlation between Q6 „How often do you come here?“ and Q7 „How often do you meet someone you know?“



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.

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 23). 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 anti-social 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 11), it is reasonable to conclude that the benefits of the space outweighed negative feelings or criticisms.

Survey participants were asked to specifically comment on the strengths and weaknesses of the space. This is detailed in Figures 24 and 25. 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.

Figure 23: Survey response to „What sort of atmosphere do you think this place has?“

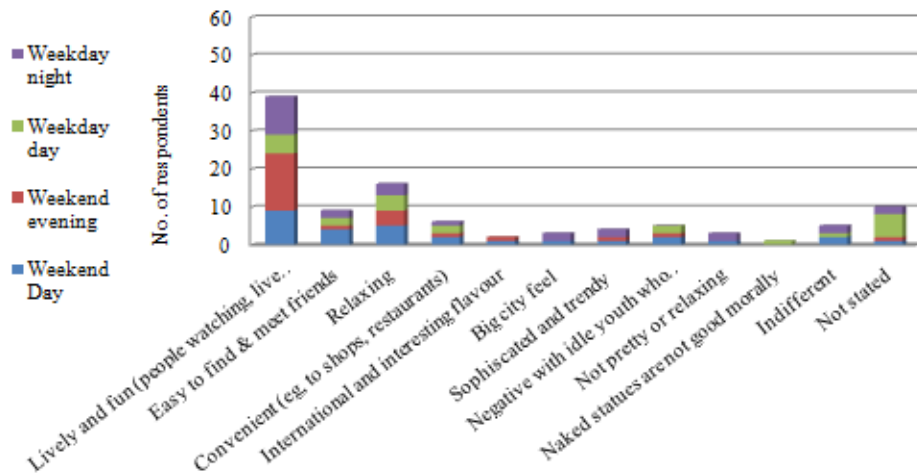


Figure 24: Survey response to „What are the strengths of this place?“

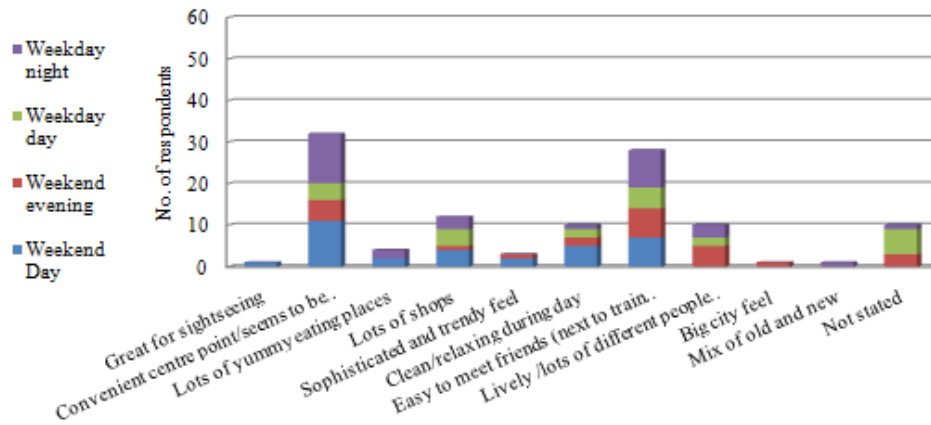
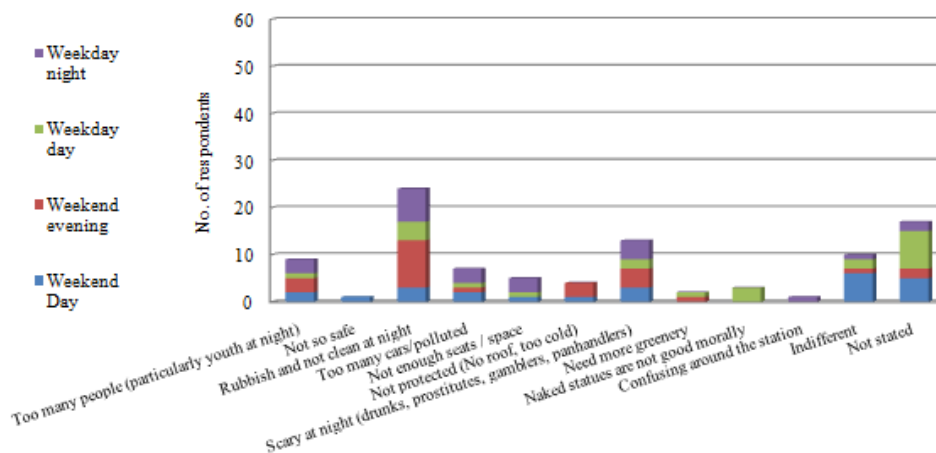


Figure 25: Survey response to „What are the weaknesses of this place?“



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“*. These results highlighted the capacity of the space to both attract and retain people, and therefore, its potential to strengthen social capital. This is a key priority for cities targeting innovation and knowledge development.

Most of the negative feedback regarding the space related to the nightly 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 touting 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.

5.4 Conclusion

Chapter 2 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 environment 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.

A link between global competitiveness and the urban environment suggests that certain elements of civic 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 chapter proposed 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 the regional innovation system. Successful interactive, vibrant and connected spaces accumulated on national or regional levels are likely to consolidate national innovation systems and increase knowledge productivity.

This chapter described the preliminary findings of a space providing an environment of interaction and connection. It presented 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 to the city centre 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 (low barrier to entry) and potential to facilitate a regional flow of human capital, knowledge and information (capacity to attract and retain people strengthens social capital). It is possible 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. Further research is required to support this hypothesis.

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 central city area, 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 which enrich 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 chapter concludes that it is possible the space itself forms part of the Kobe regional innovation system. Dispersing such spaces throughout a city can facilitate 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.

CHAPTER 6: NATIONAL CONTEXT OF CASE STUDIES⁵

6.1 Introduction: Countries of focus

Both Japan and Australia view innovation as a driver of industrial change and critical for future sustainable economic growth (Commonwealth of Australia, 2004, 2007; Japan Ministry of Education Culture Sports Science and Technology, 2002). OECD (2009) measures of 2005-07 patent numbers ranked Japan second only to USA as the most globally innovative, and Australia as fourteenth. WIPO (2008) statistics found Japan to be number one in 2000 and 2006, while Australia moved from fourteenth to thirteenth. The OECD (2009) noted that R&D intensity in Japan was relatively stable (ranked alongside Finland, Korea and Sweden), whilst Australia and Portugal were identified as the only countries with significant positive R&D growth during 2007-2009.

Language, cultural and governance differences have meant only limited Western study of Japan's dense and often outwardly unappealing developments (Jacobs, 2002). Australia most frequently looked to America for new innovative urban planning strategies (Gwyther, 2003). This thesis holds that, despite differences, a study of Japan's urban and economic development environment may produce interesting planning insights and lessons for Australia. There should be no more difficulties in learning from Japanese experiences than those from other countries, particularly as Japanese management and business systems have already been adopted successfully (Jacobs, 2002).

Australia and Japan are also both highly urbanised countries with the majority of their populations living in cities (Forster, 2006; Jacobs, 2002). Japanese city planning is closely controlled by the Federal Government (Sorensen, 2004) while that of Australian cities is managed largely by individual State governments (Hamnett & Freestone, 2000). Thus, comparing Japanese National-level and Western Australian (WA) State-level urban planning strategies is relevant and appropriate.

⁵ Part of this chapter was published in 2011 World Schools Planning Congress (Martinus, 2011b).

The following section describes the major policies and strategies influencing the economic development and urban planning in the study regions, particularly those relating to the development of the new economy.

6.2 Australia

Analysis of various policies and strategies relating to urban planning and new economy development found only limited cross-referencing between respective documents. Some acknowledged the importance of urban factors to various facets of economic performance in the new economy, such as creativity and connectivity. The ambiguous links between urban planning and new economy development appeared to make discussion and implementation difficult, and they were largely treated as separate issues. The major policies and strategies pertinent to this study are summarised below.

6.2.1 Innovation and knowledge-based directions

Driven by WA's current resource boom, pleasant lifestyle, increased migration, globalisation and the need to remain internationally competitive, the State Government has been looking at strengthening and diversifying current globally competitive and knowledge-based industries (Delaney, 2005). It has funded publications exploring issues, such as criticisms of Perth's lack of creativity and urban vibrancy, and how to attract more *bohemia* or *creative* industry (Centre for International Economics, 2009; FORM, 2007; Gibson et al., 2002; Landry, 2002). It has introduced policies targeting investments in science, innovation and education, such as InnovateWA (WA Department of Commerce, 2009), and encouraged discussions of global connectivity and telecommunications infrastructure (WA Information and Communications Technology Industry Development Forum, 2006). In general, the WA Government views innovation, creativity and knowledge development as increasingly critical for sustainable economic development and international competitiveness. It identifies both as important to cities and regions as they are to industry (Morris, 2002).

Such discussions are consistent with Federal Government findings that the five most significant drivers of change to Australian industry were globalisation, innovation, demographic change, human capital and sustainability (Commonwealth of Australia, 2007). Innovation was seen as „fundamental to economic growth“ as „it is by the generation of new ideas, products and processes that firms grow and become more efficient“ (p.19). These priorities manifested in a National movement to enhance the Australian innovation system, defined as the „open network of organisations interacting to produce and use new knowledge and technology to create social and economic value“ (Australian Department of Innovation,

Science, Industry and Research, 2010, p.1). The Federal Government stated that development required a „multi-pronged approach“ with innovation:

...underpinned by (Australia’s) research capacity and skill base. Research in the public and private sectors creates new ideas which fuel innovation, while skilled workers drive innovation by turning ideas into new products, services and products for the benefit of economy and society (Australian Department of Innovation, Science, Industry and Research, 2010, p.2).

Both Federal Government innovation documents, *Background paper 4: Drivers of change in Australian industry* and *Australian innovation system report 2010*, focus primarily on firms. Stressing formal links and collaborations between industry and the research community, its „multi-pronged approach“ appears to include little discussion on the contribution of human capital at all levels (not just skilled) or the capacity of the local environment to contribute to innovation or the national innovation system. This is contrary to evidence presented in previous chapters which suggested the urban environment should be included in national innovation dialogues.

Though Western Australian state policy and strategic documents call for the integration of urban planning and economic development, there is still little reference as to *how* urban planning can support the new economy. For example, a WA Government commissioned report on creativity observed that Perth must have „the necessary preconditions in terms of „hard“ and „soft“ infrastructure to generate a flow of ideas and inventions“ (Landry, 2002, p.49). It defined „hard“ infrastructure as buildings, institutions and supporting services such as transport, and „soft“ as social networks and human interactions through face-to-face contact or information technology. The document failed to adequately discuss the strategic relationship between soft and hard infrastructure in facilitating efficient and competitive knowledge development and innovation. Concepts such as „innovation“, „creativity“, „knowledge centres“ and „learning cities“ are employed in a context somewhat isolated from the local urban fabric in which they should be deeply embedded.

Limited integration between new economy objectives and urban planning is also observed at the Perth Metropolitan and local government level. For example, the emerging dominance of knowledge economy-associated industry sectors (such as recreation, business services, professionals, mining and ICT) were noted in a study of 1990-2001 economic changes in Perth City centre (Praxis Solutions, 2004). With its specific objective „to inform policy and planning decisions by identifying significant patterns and processes within the city and recognising emergent trends“ (p.ix), the study highlighted strengthening global connections to enhance Perth’s knowledge economy. Despite concluding that Perth has an emergent

knowledge economy, there were no recommendations as to how this impacts or „inform(s) policy and planning decisions“ in this or other documents.

The findings of a growing „knowledge-based economy“ were similarly reflected in a 2007 document examining Perth’s land use (primarily floor space) and industries of employment (City of Perth & WA Department of Planning, 2007, p.43). It is unclear why the four activities of small business, creative activities, ground floor and night-time economy were chosen to represent evolving activities in Perth. Claims that they „reflect the development of the area as a vibrant and modern city“ (p.35) were not supported by research (data or references) and, therefore, highly subjective. Perhaps they were chosen because they represent a mix of popular urban indicators associated with both traditional and new economic activity. If this is true, then the choice of „creative activities“ and „night-time economy“ suggests the influence of Florida (2002, 2002a, 2002b, 2004) and Landry (2002), who advocated that the capacity of a city to generate sustainable economic wealth lies in its ability to be vibrant and attract people (talent, skills, education, tourism, etc).

The report suffered from the general definitional and statistical discrepancies associated with Florida’s work (Ley, 2003; Luciani, 2006). It defined „creative industries“ as „activities focused on creating and exploiting intellectual property products“, being the „umbrella term for a number of different creative segments, inclusive of music and performing arts; film, television and radio; advertising and marketing; writing and publishing; and software and multimedia development“ (City of Perth & WA Department of Planning, 2007, p.36). Its subsequent analysis of Perth’s creative sector contained a broader range of activities, including „engineering services“, „computing services“, „other professional services“, „other business services“ and „Internet-related“. There is no explanation as to how the „creative element“ of these activities was measured or why they were included.

Other Perth reports similarly review the „creative class“ or „creative industries“, such as *Perth’s creative industries: An analysis* (Telesis Consulting et al., 2007) and *Future Perth: Can Perth be more creative?* (Landry, 2002). These reports also advocated fostering creative elements of the city. The former defined creative industries as „businesses that turn creative ideas into commercial outcomes“, which are increasingly „essential elements of an advanced thriving regional economy. ... (It is) vital in determining the image of a region, retaining talent to that region and providing positive, sustainable benefits to other industry sectors“ (Telesis Consulting et al., 2007, p.4). As in the above State Government report, recommendations centred on enhancing business-related creativity and not on the capacity of urban form or human capital to attract „creative industries“.

There is little doubt that increased interest in „creativity“ is likely influenced by Perth’s emerging new or knowledge economy (focused on attracting human capital) and movement away from a traditional manufacturing or industrial economy (concerned with the efficient movement and storage of goods). Gibson et al. (2002) noted that the Australian creative economy is:

...in part an aggregate of activities across certain sectors, but it is ultimately also linked to local social cultural trends, patterns of migration, lifestyle choices and patterns of urban living. ...While employment and business location data indicate important spatial patterns and give some sense of the immediate economic importance of „culture“, they do not explain of themselves the dynamics of social-economic interactions as they are embedded in particular urban contexts. ...the cultural economy is a process of dynamic urban-regional change rather than simply an aggregate of particular forms of production... (pp.187-188).

If this is true, then fostering a competitive and innovative economy in Australia is more than just the attraction and retention of „creative industry“ or the formalised links between firms and R&D facilities. It is perhaps the efficacy of society, as a whole, to consolidate and unite various socio-economic faculties.

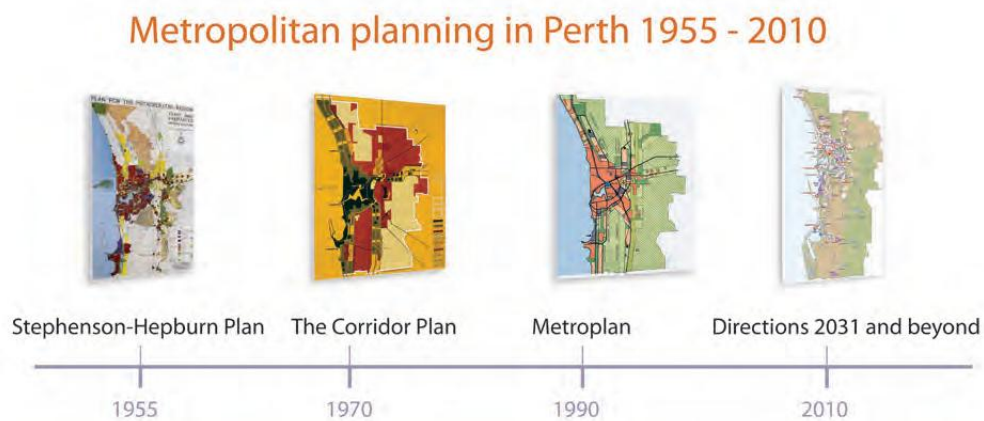
6.2.2 Urban planning

Perth (including its local authorities) is the only capital city in Australia to be governed by a metropolitan level statutory planning scheme, the *Metropolitan Region Scheme* (see Figure 26). It has been regularly reviewed and updated since its inception in the 1955 Stephenson-Hepburn Plan (Alexander et al., 2010). The 1955 version of the plan envisioned a relatively compact single-centred city and offered a „comprehensive analysis of the city cover(ing) its problems, prospects and potential for positive change and improvement to its fabric, setting and lifestyle“ (Hedgcock & Yiftachel, 1992, p.304). Its good intentions were undermined by several unpredicted factors burdening proposed infrastructure and growth patterns: 1) car ownership increases; and, 2) residential property shortages associated with the resources boom (Hedgcock & Yiftachel, 1992).

Its successor, the *Corridor Plan*, proposed four employment centres at the end of transport corridors to alleviate growing congestion in Perth Capital central area (Curtis, 2006; Hedgcock & Yiftachel, 1992). This plan clearly pictured „indefinite corridor expansion of low dense suburbs, serviced by a comprehensive road network which emerged as the most efficient urban form option from the Perth’s Region Transport Study published in 1970“ (Hedgcock & Yiftachel, 1992, p.307). It envisioned that closely located employment and residential land would create „self-contained communities“ at the end of corridors. However,

these „communities“ struggled as employment largely remained in Perth City and the social welfare function of rail took a back seat to the development of roads. Private vehicles became the preferred mode of mobility, particularly in accessing activities. Public transport was available for those who could not afford a car, with the well-developed road system making buses rather than rail a logical and more cost-efficient choice for government. Car-based planning dominated Perth’s urban form, giving the car unprecedented and undeniable access to its urban fabric (Curtis, 2006; Curtis & Perkins, 2006; Khan, 2010). This was consistent with other cities of the era where governments were „investing in big infrastructure projects and emphasis(ing) an industrial park concept needing good road accessibility for effective mass production and consumption“ (Tiwari & Curtis, 2010, p.294)

Figure 26: Planning timeline in Perth



Source: WA Department of Planning, 2010, p. 26

The 1990’s Metroplan sought to address the resultant urban sprawl by locating economic activities in the vicinity of transport nodes (Curtis & Perkins, 2006). A growing concern of more sustainable and energy-efficient urban design, social equity and economic efficiency had arisen from the dispersed centres of employment and sprawled living (Forster, 2006). It was a time for change; developers were asked to meet a range of infrastructure, environment and amenity requirements previously the responsibility of government (Hedgcock, 1994). Existing conventional road design also came under scrutiny with calls for greater connectivity, legibility, safety and social inclusion (Tiwari & Curtis, 2010).

As a result, *Liveable Neighbourhoods* (WAPC, 1997) was introduced as a design guide to create suburbs encouraging residential interaction in 400m walkable catchments of concentrated living/working activities (WAPC, 2004a). Its fundamental principles challenged previous car-based planning and emphasised community building by creating pleasant urban villages. However, its capacity to incorporate a diverse and complex range of individual work/life travel itineraries was limited (Curtis, 2006).

In practice, misinterpretations of the *Liveable Neighbourhoods* strategy did not generate the pedestrian-friendly environments they were designed for. Suburbs in Perth's Northwest Corridor were particularly characterised by poor public transport connectivity (Miller, 2008). The *Liveable Neighbourhoods*' 400m radial walkable catchment was much shorter in reality. Complex (non-linear) road patterns hampered pedestrian movement and local amenities were constructed with disproportionate areas of car parking. Instead, it appeared to validate Perth's car culture.

In 2003, *Dialogue with the City* introduced public participatory decision-making by engaging community stakeholders to visualise a more integrated future form of Perth (Hopkins, 2010; Tiwari & Curtis, 2010). The resulting 2004 *Network City* draft strategy addressed urban mobility through a comprehensive land-use transport integration strategy (WAPC, 2004c). It was a whole-of-government approach of high accessibility through a logically-connected network hierarchy (regional, district and neighbourhood) of activity corridors, transport corridors and activity centres (Hamnett & Kellett, 2007; WAPC, 2004c, 2006). Its „multiple nodes of concentrated activities“ connected „both physically and by communications“ incorporated cutting-edge approaches in sustainable transport-oriented planning (Curtis, 2006, p.6). It advocated decentralised services and employment to resolve increasing traffic and divergent socio-economic levels and opportunities between Perth Capital central area and outer suburbs, such as Perth's Northwest Corridor. Overtly, *Network City* supported human interactions, greater urban vibrancy and better local-global connections. However, its „poor land use-transport integration“, particularly in outer metro areas, continued to disadvantage non-car owners (Curtis, 2006, p. 6) or those unable afford soaring petrol prices.

Therefore, within a historical urban expansion framework often ignoring policy guidelines, Perth has become one of the world's most sprawled cities (Adams, 2007, 2010; Alexander & Grieve, 2010) and car-dominant (in 2003, 81% of the trips were by car). Given that the primary usage of the 723 cars per 1000 Perth people is for single occupant trips, it is not surprising that the bulk of transport expenditure is allocated to road networks at the expense of the public transport system (Curtis & Perkins, 2006; Newman, 2001). Perth's persistently high car usage and low car occupancy rates present a scenario of community isolation and elitism as suburbs have varying access levels to quality amenities and global networks (Curtis, 2006).

Perth is not the only Australian city battling historically car-dependent urban landscapes (Hensher, 1998). Indeed, studies of housing and employment locations in other capital cities have suggested a tendency towards car-based structures in outer suburbs where journey-to-

work is longer and more dispersed than for those living/working in the adjacent central city (Forster, 2006; O'Connor & Healy, 2004; O'Connor & Rapson, 2002).

Forster (2006, p.177) argued that since the 1990's there has been significant economic and social polarisation between the inner and outer metropolitan areas of all Australian cities with „an increasing concentration of professional, managerial and administrative employment in the inner city and adjacent areas“. O'Connor & Healy (2004) attributed this to an over-emphasis of housing within urban policy and limited understanding of the complex links between housing choice and employment location. Advancing technologies, globalisation and the knowledge economy will only further compound income disparities and wealth issues in Perth between low amenity and socio-economic outer metro areas and adjacent high amenity and socio-economic city core. This creates two distinct economies as evident in studies of other Australian cities (Nygaard et al., 2005; O'Connor & Healy, 2004). Therefore, for a broad range of socio-economic reasons (those for a knowledge economy are outlined in previous chapters), accessibility to transport and amenities has become a key issue.

This has generated increased interest in how transport nodes, retail strips and activity centres can create more socially inclusive, vibrant and accessible spaces. Nevertheless, planning in Perth remains conflicted. On one side, there is a strong movement to be more walkable and community-oriented, and on the other is the reality of a highly car-dependent city. This is particularly true in Perth's newer outer suburbs which have primarily low density, land-use segregation and hierarchical street network connectivity. Despite being guided by the principles of *Liveable Neighbourhoods*, many outer suburbs have more car trips and less walking than their inner city counterparts guided by earlier planning strategies (Curtis, 2010). Curtis (2010) observed:

On the whole planning strategies have seen the creation of middle suburbs and outer suburbs characterised by low density and mono-land use. Getting to activities, jobs and entertainment is difficult, especially without a car. Streets have been widened to accommodate the car, with parking bays, additional traffic lanes, right and left turning lanes to keep the traffic moving. The design approach delivers high speed arterial roads at the perimeter of residential cells with internal neighbourhood centres designed for car-based travel. The layout is difficult to serve by bus and the environment is not conducive to walking (p.262).

Even rail stations in Perth, positioned every 2-3 kilometres, are surrounded by extensive car parking and planned according to what is most efficient for car-based travel. This is very different to cities planned in the 1890's before the car-era, when stations could be placed less

than 800m apart (Curtis, 2010). Integrated transport models are an attempt to address the imbalance between car usage and other modes of transport. However, despite the good intentions of such models, their effective implementation is hampered by the enduring nature of previous highly segregated planning strategies (Curtis, 2010). The suburban shopping centre is a good example of this, and will be discussed in the following section.

A new „connected city“ metropolitan plan has emerged from the draft *Network Cities* document and rapid changes in Perth’s economy, population and sustainability agenda (WA Department of Planning, 2010). Named *Directions 2031 and Beyond*, its vision of „a world-class liveable city: green, vibrant, more compact and accessible with a unique sense of place“ (p.2) is supported by five strategic objectives: liveability, prosperity, accessibility, sustainability and responsibility.

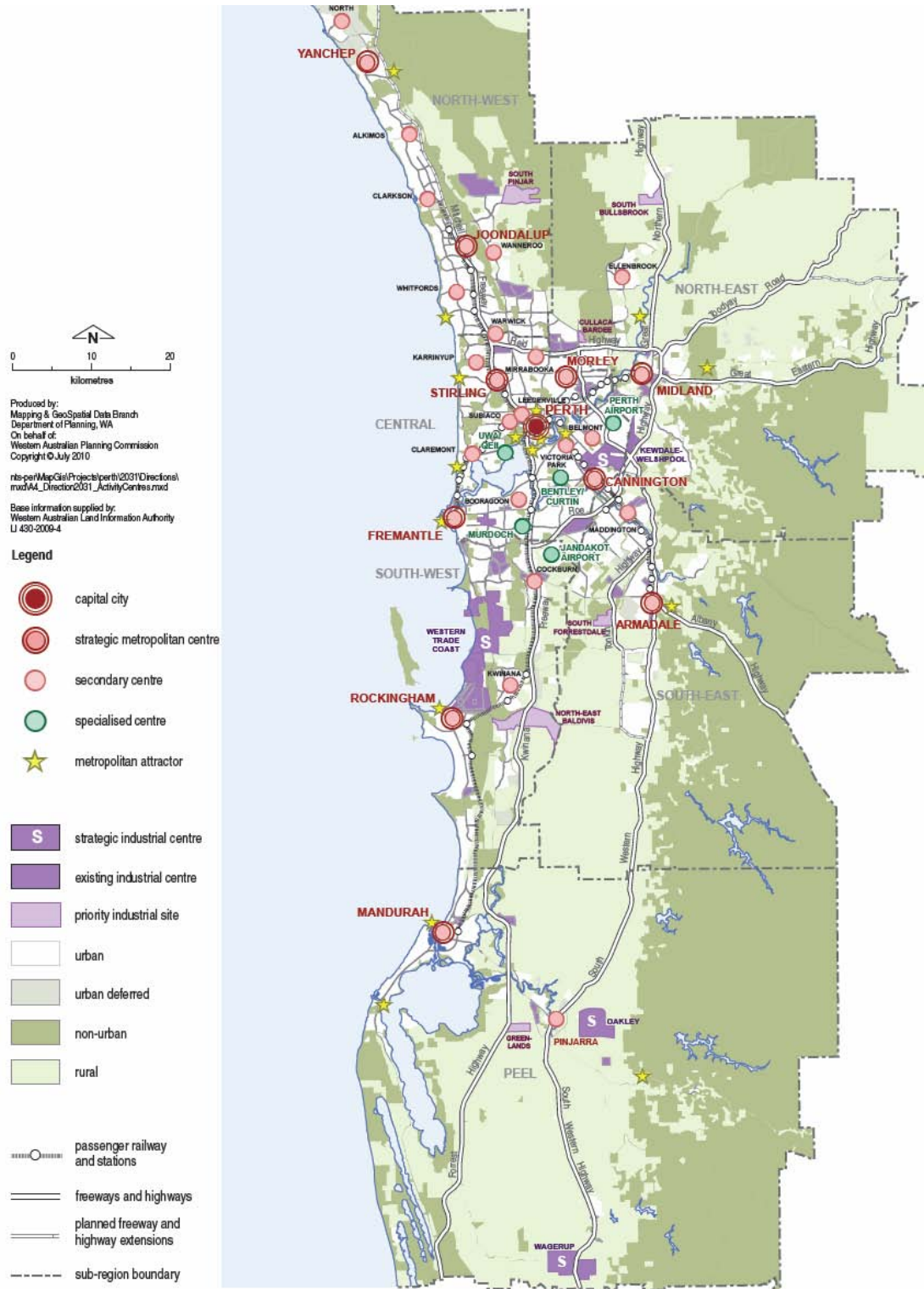
Directions 2031 differs from earlier plans in the way it visualises the role of activity centres as having a diverse range of services, activities and amenities rather than just a retail function. It establishes a hierarchy of activity centres based on level of diversity and economic concentration: capital city, primary centres, strategic metropolitan centres, secondary centres, district centres and neighbourhood centres and local centres (see Figure 27). With no primary centres identified, it established competition amongst the 10 nominated strategic metropolitan centres vying for the position.

Its spatial framework rests on integrating activity centre networks, movement networks and green networks. This strong network and connectivity approach appears better equipped than its predecessors to deliver knowledge economy priorities, such as knowledge development and innovation. Its „prosperous city“ section outlines economic development priorities of employment growth and distribution (to encourage self-sufficiency), business diversity and decentralisation, as well as a more integrated public transport system. These are important for all economy types, including the new economy.

In addition, *Directions 2031* recommends an economic development strategy to address issues of „productivity“ and „global competitiveness“ to foster elements of the new economy (such as innovation, entrepreneurship, collaboration, business growth) (WA Department of Planning, 2010, p.94). Discussed in the section below, it notes the strategic significance of specialised areas (UWA/QEII, Curtin/Bentley, Murdoch and Perth Airport) associated with higher education, R&D, global movement and emerging industry (e.g., medical). Nonetheless, *Directions 2031* and its associated document „*Planning activity centres for communities and economic growth*“ (WAPC & DPI, 2009) do not discuss the fundamental importance of connectivity and movement of people (including elements of urban vibrancy

and human interaction). This may indicate a limited understanding of urban planning's role in facilitating productivity and economic wealth in new economy target areas.

Figure 27: Directions 2031- activity centres



Source: WA Department of Planning (2010, p.34)

6.2.3 Issues and urban form of particular relevance to this research

This thesis examines the capacity of the built environment to optimise human movement and generate factors supportive of innovation and knowledge development such as urban vibrancy, human interaction and connectivity. It suggests that some developments are better at this than others.

Perth's planning approaches can be viewed as products of paradigms associated with prevailing metropolitan strategies. The following describes shopping centres, transit-oriented development (TOD) and the proposed „Knowledge Ring“ as popular past, present and future elements of Perth's urban landscape capable of influencing movement and interaction patterns. Each represents a snapshot of integrated land use from the era they were implemented, with past and present paradigms becoming enduring features of the future city.

Perth's retail market is largely dominated by highly attractive suburban shopping centres whose largely car-oriented design reinforces the car-based planning of surrounding suburbs. Primarily operated and maintained by multi-national retail companies employing the same formula worldwide, the competitive and uniform mix of shopping, entertainment and food in these highly-controlled centres represents a global approach to mass consumption. They typically have the same recognisable brands across Australia and the same general look and feel around the world (Kueh & Grieves, 2010). Kueh and Grieves (2010) observed:

...national and international chain stores (which) follow a strongly prescribed and identical image and design ethos that is immediately associated with the brand. Typically these stores line the corridors and galleries of the mall. The food court filled galleries are heavily signposted and advertised. Outside, there are expansive areas for car parking surrounding the shopping centres, and sometimes above and below (p.328).

The failure of shopping centres to represent their surrounding local environments puts them in fundamental opposition to arguments presented in previous chapters. Goodman and Coote (2007) questioned the local economic contribution of shopping centres:

...they ought to provide economic opportunity for the community which they serve. This can mean employment opportunities and also the chance to start up new businesses. ...The tenancies in corporate shopping malls are tightly controlled and the particular mix of retail functions are prescribed by a formula considered the lowest risk for the investor. Thus unusual, quirky or particular niche shops are not usually found within corporate shopping malls. ...This can be viewed as a cultural issue as well as one of economic opportunity, with corporate shopping malls

arguably providing bland representations of a monoculture, and adding very little to the diversity or individual sense of place (p.42).

In many cases, the success of shopping centres to attract people has „challenged the retail primacy of the central city... (and) the commercial viability of many local shopping centres“ (Kueh & Grieves, 2010, p.327). In Perth, the ubiquitous shopping centre was facilitated by the fact that it aligned with Perth’s strong car-based planning ethos. This differed to the shopping centre controls exercised by other countries, such as in Europe, where they are more protective of traditional shopping strips, pedestrian-oriented urban form and public transport accessibility (Goodman, 2005; Goodman & Coote, 2007). In a study of Melbourne’s sustainable urban form, it was noted that accessibility to retail centres must focus on „means other than the private car...as a fundamental environmental and social goal“ (Goodman, 2005, p.1). From evidence presented in previous chapters, this is also a basic economic goal supporting innovation and knowledge development.

In recent documents, higher-density residential and commercial TOD’s are presented as environmentally and socio-economically sustainable alternatives to shopping centres. Khan (2010) noted links between the integrated transport planning emphasis of Network Cities, the creation of walkable communities in *Liveable Neighbourhoods* and underlying principles of TOD’s. Indeed, *Directions 2031 and Beyond* identified TOD’s as a key strategy to better integrate land use and transit facilities (WA Department of Planning, 2010). This is particularly valuable for outer metro areas prone to higher rates of socio-economic disadvantage. TOD’s are defined as „mixed-use communit(ies) with a central node of activity, located within an average 800 meters walking distance of a transit stop“ (DPI, 2005). They aim to „increase ridership in public transport, efficiently integrate land use and transport, and create liveable communities“ (Khan, 2010, p.251) by injecting new commercial and residential development into station-based areas losing businesses to „nearby car-oriented retail centres and residential development“ (Holling & Haslam McKenzie, 2010, p.274).

However, with Perth public transport ridership at approximately 6% of total metropolitan trips (Curtis, 2006), rail has been unable to compete with the convenience of the car or shake off its „public-transport-is-for-the-poor“ image. Studies of Perth TOD’s confirmed this, finding that housing affordability was a more frequent reason to move to a TOD than either proximity to public transport or shops and services which ranked second and third respectively (Holling & Haslam McKenzie, 2010; Holling et al., 2007).

Indeed, Perth’s essentially car-based planning approach has led to a tradition of underestimating the environmental and socio-economic contribution of public transport. Cars

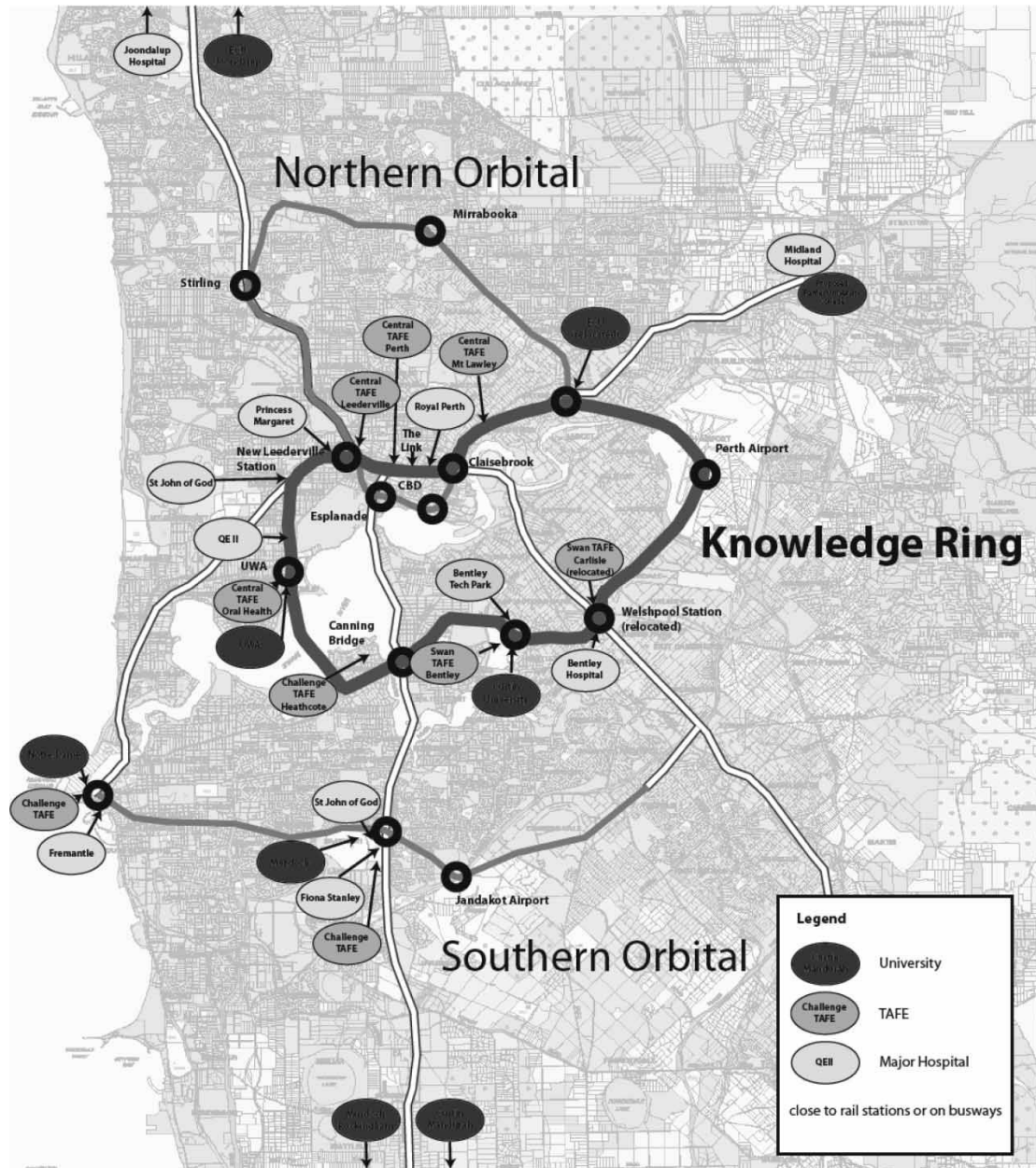
have ample and conveniently-located parking and wide roads for good city access. In contrast, rail runs primarily along the fringe of less advantaged communities and/or down the middle of the freeway, and train stations facilitate car/bus convenience often at the expense of pedestrian accessibility.

Currently, there are no WA statutory land-use requirements around train stations or in poorly-served transit areas to ensure the most economically sustainable outcomes (Curtis & Perkins, 2006; Renne, 2005). Economic development is assumed to be a natural result of the regulated approval of allocated commercial and retail space. One WA Government-commissioned document noted that a retail strategy at each potential TOD is an „analytical framework for assessing the scope and scale of development potential of activity nodes“ (Pracsys, 2007). There was little discussion of the economic significance of activity nodes in facilitating human flows or their socio-economic importance beyond a transport function.

With research revealing that many innovative cities are also highly transit-oriented (Scheurer et al., 2005) and pressures to increase the productivity of Australian cities through better infrastructure provision, the meaning of land use and public transport integration is broadening to include facilitation of emerging new economy industry. This is evident in the proposed *Knowledge Ring* (see Figure 28). Seeking to network „major knowledge-based mixed use centres...along both the orbital and radial rail intersection corridors“ (Kane, 2010, p.80), this future light rail aims to link Perth’s premier higher education and R&D facilities (University of Western Australia, Curtin and Murdoch), skill providers (of various technical and skills), key emerging economy industries (various health campus“ and tech parks) and Perth Airport.

To what extent and in what timeframe this proposal will be implemented is unclear. However, the recommendations demonstrate an ideological shift towards recognising public transport’s role in facilitating the new economy, and its importance for Perth’s economic sustainability. On the surface, the Knowledge Ring provides a solid platform for diversity in human interaction, movement and connection as recommended in this research. However, its proposal to further consolidate Perth’s already industrially stronger and wealthier middle and core suburbs without a strategy to connect outer metropolitan regions (or secondary economic centres) may exacerbate wealth disparities.

Figure 28: Proposed knowledge ring of Perth



Source: Kane, 2010, p.76

6.3 Japan

With innovation and knowledge development a key output and human capital a key resource, Japan is a good example of a knowledge economy. Coupled with its high population, urbanisation and transit-orientation (Lin, 2007a; Sorensen, 2004), national economic wealth revolves on the capacity of its cities to mobilise human capital. This is reflected in both business practice and government policy. Urban planning policy plays a dual role in creating better communities and facilitating national industrial and economic strategies under the belief that national priorities are the responsibility of the Japanese Government. This has

arisen from a general fear that private developers are motivated by profits and local governments by tax revenues (Jacobs, 2002).

This section follows a similar format to the Western Australian section for consistency and comparison. However, unlike Western Australia, Japan does not appear to clearly distinguish between industrial and urban planning policy.

6.3.1 Innovation and knowledge-based directions

Japan's post World War II rapid economic growth is a well-documented (Fujita & Tabuchi, 1997; Gilman, 2001; Sorensen, 2004). Real per capita income tripled in the 1960's and averaged 3-5% growth in the 1970's. Population movements mirrored industrial changes from primarily heavy industry post-war to large-scale manufacturing with mass migration to metropolitan production centres (Fujita & Tabuchi, 1997; Gilman, 2001). This phenomenal growth was partly due to a three-prong economic development/urban planning/technology policy approach expanding industrial infrastructure in strategic regions to attract and concentrate enterprise (Sorensen, 2004). In addition, Japan engaged in extensive post-war reconstruction of its public and private transportation and communications infrastructure system. These actions originated from the „belief that the development of infrastructure was the basis for economic growth“ (United Nations, 2001).

Japan's lack of natural resources other than human capital means its labour force has played a central role in generating national economic wealth (Fujita & Tabuchi, 1997; Gilman, 2001) through two major economic shifts. Firstly, the 1950-1970 transition from light to heavy industry creating the *Pacific Industrial Belt*. Secondly, the mid-1970 to present shift from heavy to high-tech and service industries (i.e., knowledge-intensive) which caused the Tokyo monopolar regional system (i.e., Tokyo being the dominant Japanese city) where population and business central management migration to Tokyo occurred at the expense of other cities (Fujita & Tabuchi, 1997).

As such, Tokyo represented a major threat to the future economic competitiveness of cities in the Kansai study area (e.g., Osaka, Kyoto and Kobe). By the 1990's, it had a significant economic lead over its next biggest competitor, Osaka, attracting over 50% of all new service sector jobs and head offices and 85% of foreign offices (Sorensen, 2004). As Fujita and Tabuchi (1997) noted:

Surrounding this core agglomeration of central management functions, knowledge-intensive activities such as R&D laboratories, universities and advanced business services locate in the central business area or suburbs of Tokyo. These knowledge-intensive or information-oriented activities locate relatively closely due partly to the

convenience of face-to-face communications and more generally to enjoy the agglomeration economies which are generated by the accumulation as well as the newly created knowledge and information in Tokyo. Given that major domestic and international transportation and communication networks of Japan are primarily based in Tokyo, the strategic value of Tokyo as the centre of knowledge based or information-based activities is enhanced even more (p.660).

The Japanese Ministry of International Trade and Industry (MITI) introduced its *Technopolis Program* in 1970 partly to address these regional imbalances („Japan’s chip-makers head for the good life“, 1983; Sorensen, 2004). MITI proposed 26 locations adjacent to major cities (see Figure 29) for high-tech communities modeled on Silicon Valley in California (Sorensen, 2004). Initially highly imaginative and innovative, each technopolis was to consist of 3 zones „in (the) pleasant natural setting“ of: 1) core industries – electronics, biotech, robotics, etc; 2) academic – laboratories, information processing facilities; and, 3) residential - 50,000 homes powered by solar with „experimental social facilities, such as cable TV“ („Japan’s chip-makers head for the good life“, 1983). The Japanese Government identified appropriate land to develop the specific technologies for Japan’s economic success (Marinova, 1999). The success of this originally controversial government investment made Japan realise that „high-quality residential environments were worth investing in, even if only for the key high-tech workers who would lead the country in its competition with Silicon Valley“ (Sorensen, 2004, p. 264).

The *Technopolis Program* was the most sophisticated attempt of its era by an advanced industrial nation to plan for nation-wide high-tech industrial development (Glasmeier, 1988). It is not surprising, therefore, that Japan’s post war growth gave Freeman (1988) the opportunity to first apply the concept of an *innovation system* to a real setting (Archibugi et. al, 1998), noting that success was facilitated by a combination of government, firm, social and education factors (Freeman, 1988).

Japan’s bubble burst in the 1990’s. A stagnant economy forced the national government to push new economic growth strategies (METI, 2010a, 2010b), and its innovation systems took on a slightly different emphasis. The remainder of this section reviews three policies (still current) most relevant to this research: Japan’s innovation policy (Innovation 25) and two national cluster policies of the Ministry of Economy Trade and Industry (METI) and Ministry of Education, Culture, Sports, Science and Technology (MEXT).

Figure 29: Technopolis locations



Source: Sorensen, 2004, p.263

Based on the Technopolis Project, METI (formally MITI) launched its 2001 *Industrial Cluster Plan* focusing on 17 projects (see Figure 30) (Colovic-Lamotte & Tayanagi, 2003; Hattori, 2009; Kodama, 2007). With a vision „to strengthen the global competitiveness of Japanese industry and to invigorate Japan’s local economies“ (METI, 2004), it had three key objectives: „support the development of new businesses, induce technological innovation, and give rise to university-generated venture businesses“ (METI-Kanto, 2010).

In connection with METI’s cluster policy, MEXT announced its *Knowledge Cluster Plan* (also known as *Intellectual Clusters*; see Figure 31) in 2002 (Kodama, 2007; MEXT, 2006) defining clusters as:

...a regional system of technological innovations in which public research organisation uses its R&D potential and other unique abilities to lead companies within and around a particular region. More specifically, by utilising a human resource network and systematic collaborative researches, the system fosters interaction between the original technology seeds of the public research

organisation and the business needs of regional companies to create a chain of technological innovations and new industries (Hattori, 2009, p.89).

Six clusters were added to an initial twelve sites, but only eleven remained by 2007. Hattori (2009) observed that Japan was the first (and only at the time of his writing) to establish policy specifically „taking into consideration that knowledge can be clustered“ (p.87).

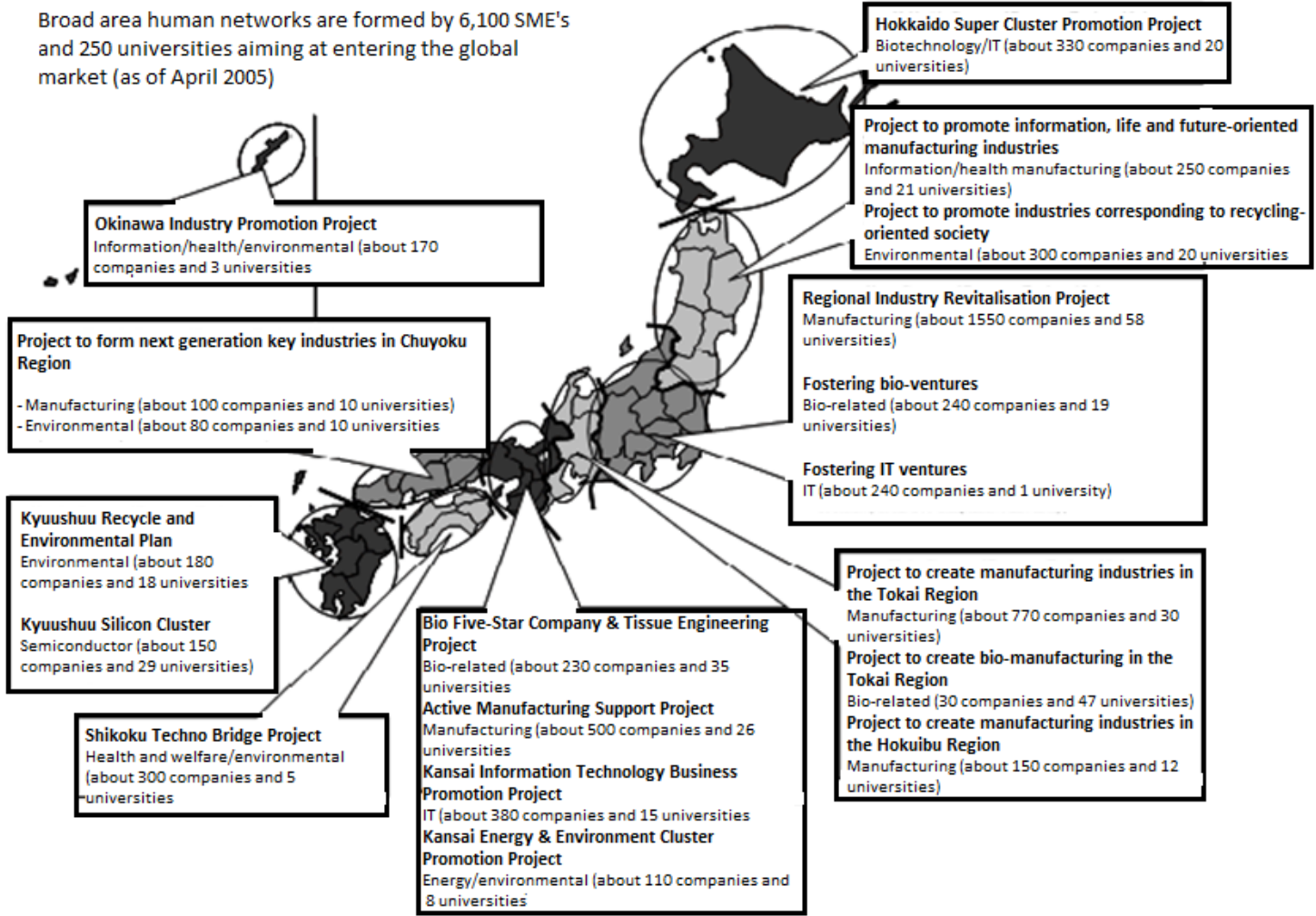
From 2007, Japan implemented its *Innovation 25* policy, an innovation strategy targeting long term sustainable economic growth (Government of Japan, 2008). The interim policy report presented „image of the innovation society for which Japan should aim by 2025“ (Innovation 25 Strategy Council, 2007, p.4), summarising the last hundred years of world progress with:

... at the beginning of the 20th century, predictions...were posted in a Japanese newspaper. It included the invention of air conditioners and fax machines. ...The first flight by man was in 1903, only eight years after a famous scientist said, “Objects that are heavier than air cannot fly.” When computers were first invented, people did not anticipate the need for the high performance we get from today’s personal computers. However, small and high-capacity memories were made available due to the rapid progress of semiconductor technologies, and small personal computers perform better than the old large computers (Government of Japan, 2008, p.18).

It argued the need for innovation.

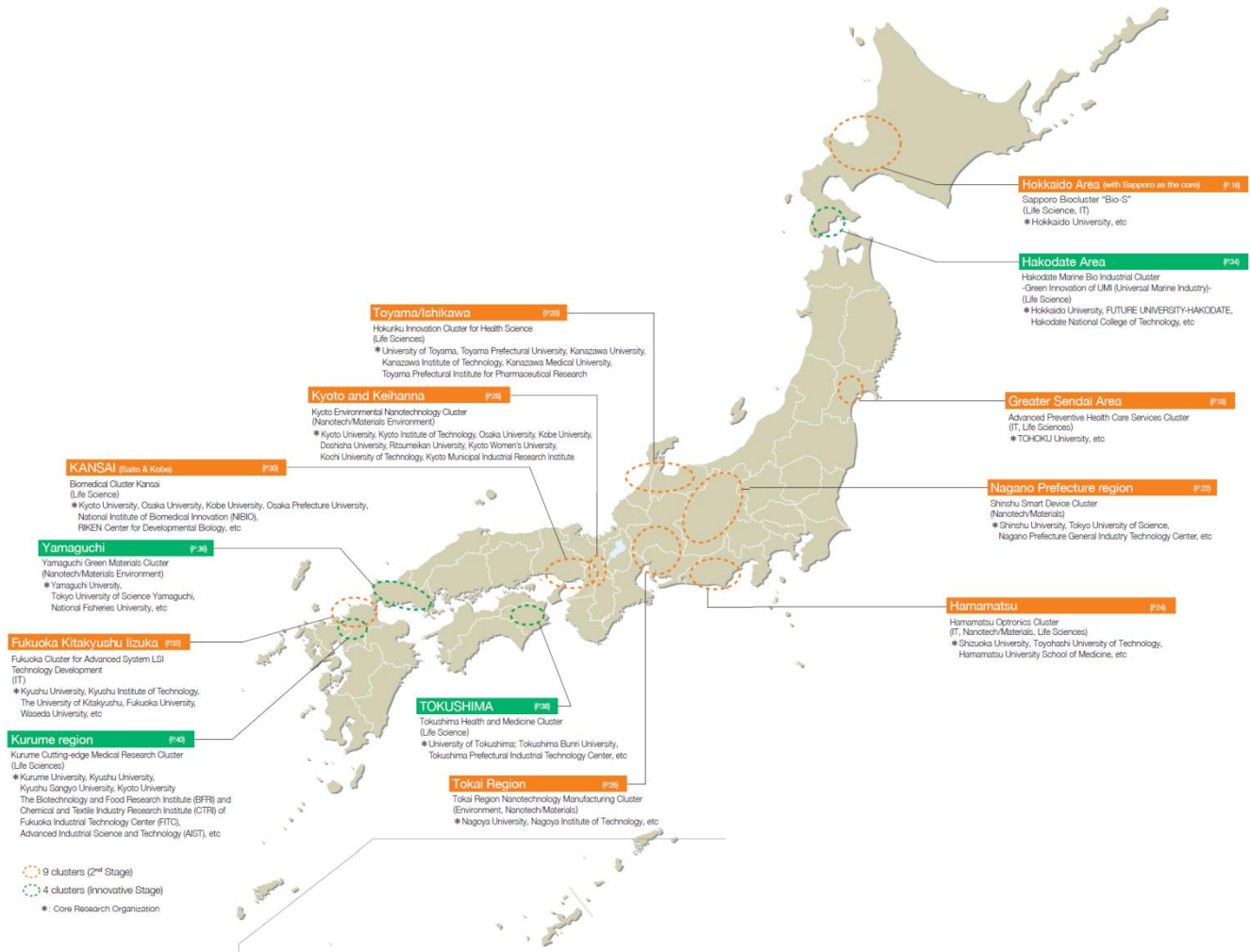
“Speed” at an international level is quite essential in this process, reflecting the Globalized era. “Innovation”... is not merely a word or a magic solution. Perhaps the reason that this word has suddenly stepped out into the limelight in the past 5–10 years is that a country might make the wrong policy decisions, universities might take up the wrong missions and companies might make the wrong management strategies if they are not aware of “innovation”. In the era of global competition, “innovation” requires a panoramic point of view that looks at the entire world at every step, and the speed of the decision is a crucial element (pp. 20-21).

Figure 30: MITI Industrial Clusters



Source: Adapted from MEXT, 2006

Figure 31: MEXT Knowledge Clusters



Source: Adapted from MEXT, 2010

The report appeared highly supportive of this study's hypothesis that the daily urban environment also contributes to innovation, stating:

It is necessary to *build an environment where "uniqueness" is not suppressed* [author's emphasis], and one that offers opportunities for various unique talents to meet (p. 24).

...now the question is *how quickly the results of research (are) brought to society* [author's emphasis] and how to explore the needs of the people (p. 24).

Despite references to a better networked local urban environment, *Innovation 25* strategies specifically targeting a society equipped for the high-speed delivery and diffusion of innovation focused on the consolidation of factors primarily relating to university and company resources. There is little mention of how the local environment can be leveraged for innovation and national competitive advantage.

In 2009, METI released a new phase of its industrial cluster plan, the *New Growth Strategy* as defined in its *Industrial Structure Vision 2010* (METI, 2010b). It aimed to „promote the creation of next-generation businesses through „open innovation“, or the flow of technology and expertise beyond the boundaries of existing organisational structures“ (Innovation Network Corporation of Japan, 2010). Indeed, the 2010 New Growth Strategy (METI, 2010a) for industry focused equally on strengthening social and cultural factors as it did on achieving industrial prowess. There are several components of this new policy of interest to this research. Firstly, the emphasis placed on strengthening local regions:

...we will implement intense investment projects with environment, health and tourism as the main pillars, making use of a comprehensive policy package...the first step toward the transformation to a sustainable socio-economic structure originating from self-supporting local regions (p.22).

Secondly, the importance of the health and vitality of Japanese cities:

...to strategically proceed with priority investment in major-city airports, ports, roads, and other truly necessary, high-impact infrastructure that provide a foothold for growth, as well as to maintain hubs to enhance their attractiveness, and to strive to make other major cities *hubs for interaction of people* [author's emphasis] and exchanges of goods from all over Asia and the rest of the world (p. 32).

This suggests some acknowledgement of the connection between the economy and the local environment. However, the capacity of the local environment to support greater economic efficiency and growth in a knowledge economy (as identified in Chapter 2) was not mentioned in the *Science-and-technology and IT-oriented nation strategy* as a the „platform

to support growth“ (METI, 2010a, p.36). Therefore, as in the Western Australian case, there appears to be limited understanding of how to leverage mechanisms linking the economy and local urban environment.

The following section explores the level of economic development integration in urban planning policies to facilitate nation-led innovation and knowledge development objectives.

6.3.2 Urban planning

Japanese urban planning and development strategies have evolved to reflect a structural economic and social transition from the industrial to the information age. They rely on the development of strategic corridors rather than hierarchical regional centres as in Western Australia. A review of Japanese urban planning policy shows a history of integrating economic development and urban planning, shifting from primarily targeting national industrial prowess to one which values local economies. This is evident in Figure 32 which compares the background, objectives and development method of each successive national urban plan. The major points of each are outlined below.

Linked to legislation aimed at doubling income (1960 National Income-Doubling Plan) as well as *Pacific Belt* concept, the Japanese Government introduced its *First Comprehensive National Development Plan (CNDP)* in 1962. This plan responded to regional disparities between Japanese cities from its rapid post-war development. It targeted the development of growth hubs by nationally redistributing industry, nominating certain cities as „New Industrial Cities“ and „Special Areas for Urban Consolidation“ (Edgington, 1994; MLIT, 2010; Takafusa, 2004). A Japan network of industry based on regional development was identified, which:

...classifie(d) areas other than Tokyo, Osaka, Nagoya and their surrounding areas according to their stage of development, and establishes large-scale development bases in them which are connected to the existing large-scale concentrations. In addition, the method locates small- and medium-scale development bases, establishes organic connections between them through superior communications and transportation facilities to enable mutual interaction, and at the same time has a favourable effect on the surrounding agricultural and forest industries, developing them in a chain reaction (Takafusa, 2004, p.3).

Figure 32: Overview of Japanese Government past plans

	Comprehensive National development Plan	New Comprehensive National development Plan	3rd Comprehensive National development Plan	4th Comprehensive National development Plan	Grand Design for the 21st Century
Year	1962	1969	1977	1987	1998
Background	<ol style="list-style-type: none"> 1. Transition to high growth economy. 2. Overpopulation and disparity in income. 3. National income-doubling plan (Pacific-Belt Zone Project). 	<ol style="list-style-type: none"> 1. High growth economy. 2. Concentration of population and industry in metropolitan areas. 3. Advancement of information technology and technical renovation. 	<ol style="list-style-type: none"> 1. Stable economic growth. 2. Signs of decentralisation of population and industry. 3. Response to realisation of limited national resources and energy 	<ol style="list-style-type: none"> 1. Concentration of population and various functions in Tokyo. 2. Employment issues in non-metropolitan areas are more serious for reasons such as drastic structural changes in industry. 3. Advancement of full-scale globalisation. 	<ol style="list-style-type: none"> 1. Global age (Global environmental issues, mega-competition and exchanges with Asian nations. 2. Decreasing population and aging society. 3. Information-oriented society.
Target year	1970	1985	About 1987	About 2000	2010-2015
Basic objectives	Well-balanced development between regions	Creation of a rich environment	Improvement of the general living environment	Formation of a multi-polar country	Prepare the basics for a multi-axial structure
Development method	<u>Development of regional hubs</u> Decentralisation of industry is needed to achieve plan objectives.	<u>Large scale project development</u> Promote large-scale projects by developing transportation networks	<u>Stable settlement concept</u> Promote development of non-metropolitan areas while controlling the	<u>Interactive network concept</u> Establish a multi-polar pattern territory through: 1. Promote a	<u>Participation and cooperation</u> Participation of diverse entities and cooperation between regional as the

	Comprehensive National development Plan	New Comprehensive National development Plan	3rd Comprehensive National development Plan	4th Comprehensive National development Plan	Grand Design for the 21st Century
Development method (cont'd)	Efforts made to develop regional hubs, by organically relating them to and promoting the existing interaction with the production mass in Tokyo and other metropolitan areas, with a new transport and communication network. Development by maintaining characteristics of peripheral areas and achieving a chain reaction to promote regionally balanced development.	(e.g., Shinkansen and expressways) to mitigate the uneven use of land to solve problems such as over-population, de-population and regional disparities.	concentration of population and industry in metro areas. Attempt of achieve well-balnced use of the national territory while responding to issues of over-population and de-population, with the aim of creating a better living environment for citizens.	creative/innovative improvement of each area of national territory by maximising regional characteristics. 2. Develop national backbone transportation information and communications networks in accordance with national program and initiatives. 3. Establish various interaction opportunities through a joint effort between national government, each region and private institutions.	basis for national and regional development: Four strategies: 1. Build nature-rich residential areas(small cities, agricultural and fishing areas, hilly and mountainous areas). 2. Renovate metropolitan areas (renovation, renewal and effective use of sphere in cities). 3. Form regional cooperation corridors (regional partnerships taking form of axis). 4. Form large scale international spheres of interaction.

Source: Adapted from MLIT, 2006

The huge economic growth which followed forced a policy review, and Japan implemented its second CNDP in 1969. This next plan aimed to create a rich environment, consolidating the importance of key Japanese economic and administrative cities. To do so, it announced large-scale project development including a nation-wide high-speed communications and transport systems (e.g., expressways and shinkansen) (Edgington, 1994; MLIT, 2010; Takafusa, 2004; Yamaguchi, 1986). This plan had four fundamental development objectives (Takafusa, 2004, pp.4-5):

1. „Ensure long-term harmony between humans and the environment and permanent protection and conservation of the environment“;
2. „Expand the possibility of development across the entire country by establishing basic conditions for development, thus promoting balanced national development“;
3. „Promote reorganization and higher efficiency in the use of national land by employing development and construction methods in tune with the specific characteristics of each region“; and,
4. „Create and maintain a safe and comfortable cultural environment in both urban and rural areas“.

The grand concepts of the plan fell out of favour and a new plan was introduced in 1977, the 3rd CNDP. Japan’s overwhelming focus on industrial development had left it with extraordinary economic growth but little social development (Yamaguchi, 1986). The issue of limited resources was a growing concern (MLIT, 2010; Takafusa, 2004; Yamaguchi, 1986), such that 3rd CNDP goals stated that „given a situation of limited resources, (it would) make full use of the characteristics of each region in creating an overall environment rooted in the history and culture of that region in which citizens are able to enjoy a stable, healthy and culturally-rich existence in harmony with nature“ (Takafusa, 2004, p.7). Japan had recognised the need to plan for better quality and more liveable neighbourhoods. The 3rd CNDP sought to stabilise settlement by creating better quality „planned living areas“ (Ortuzar, 1988) consisting of:

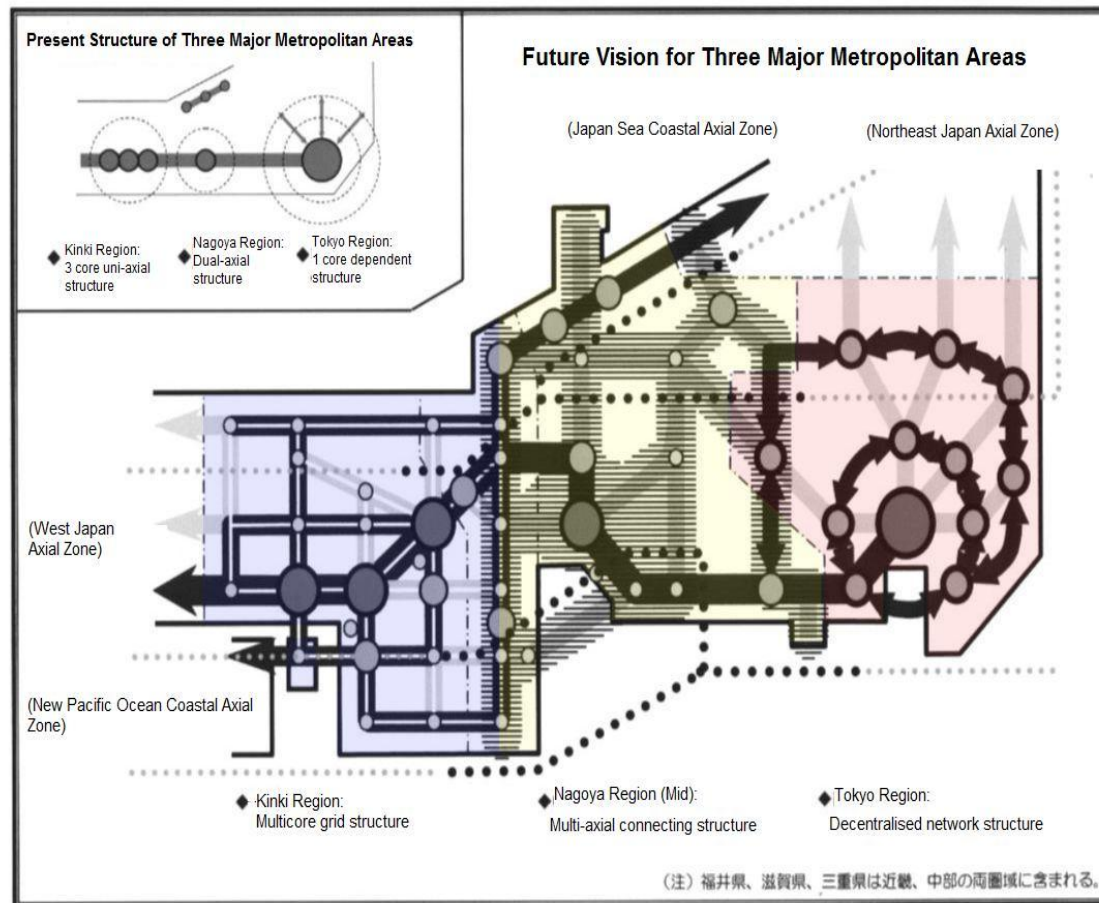
...a close knit community of 50-100 households where residents live and conduct their daily activities: these can either be small villages in the countryside or neighbourhoods in an urban area. The grouping of two or three of them constitutes a nucleus for supporting certain basic facilities such as a primary school. These larger units, of which 200-300 have been identified in Japan, are called *Teijyu-ken*.

The planning and management of each one requires that residents and authorities (usually local government) work together, thus making possible the implementation of the integrated residential policy (p. 337).

The fourth CNDP (1987) focussed on decentralisation as a tool to readdress population imbalances between Tokyo and the rest of Japan and create a multi-polar nation of strong interactive networks (MLIT, 2010; Takafusa, 2004). The fifth CNDP, or *The Grand Design for the 21st Century*, was adopted by the Prime Minister in 1998 (MLIT, 2010). Though previous policies had successfully shifted population from Tokyo to cities along the Pacific Belt, regions outside the Belt were suffering the brunt of Japan's accelerating population decline and aging. Therefore, the 5th CNDP concentrated on revitalisation of these areas, along with addressing increased globalisation and movement towards an information society.

A new approach to decentralisation was adopted. Japan's land structure was altered by the creation of four *national axis zones* (see Figure 33). Each zone was encouraged to establish: 1) direct cooperate links with the others independent of Tokyo (MLIT, 1998b; Takafusa, 2004); and, 2) exchanges with specific Asian zones outside of Japan (MLIT, 2010). Where previous plans had „place(d) Tokyo at the top of the chain... (creating) a vertical relationship between the “cores” (with) regional cities depending on the cores”, the 5th CNDP stressed the importance of „a horizontal and parallel network structures” based on mutual and complementary city relationships (Takafusa, 2004, p.11). Ten multi-prefecture regions spanned the four zones, with each expected to „adopt their own development laws and policy plans that were vertically consistent with the goals and objectives set forth in the Comprehensive National Plan” (Jacobs, 2002, p.182). These prefecture plans guided urban planning policy in smaller municipalities, which in turn directed even smaller local governments (Jacobs, 2002). Not only did this allow respective local governments and regions to be responsible for their own development plans, but it formed an interlocking planning system where local governments become instruments for the delivery of wider National industrial and infrastructure policy.

Figure 33: Three of the four national axis zones of the fifth CNDP



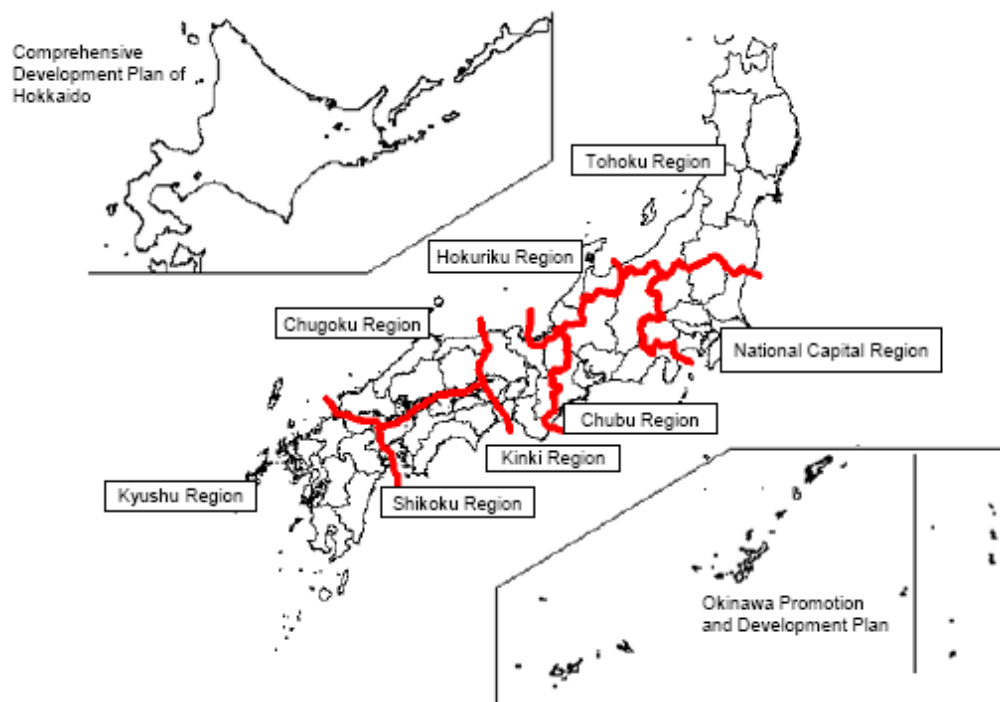
Source: MLIT, 1998a (Translation)

Following a review of Japan's 1950's Planning Act as one of the priorities of the fifth CNDP, the National Spatial Planning Act was enacted in 2005 (Murakami, 2007). Subsequently, fundamental changes to the CNDP approach were recommended through a proposed *The New National Land Sustainability Plan* „to ensure national and regional planning systems that will adequately meet the needs of the new era“ (MLIT, 2006, p.1). This document envisioned creating a *mature-type society* based on greater cooperation between national and local governments, as well as a qualitative rather than quantitative approach to land development (MLIT, 2006). The final plan, *National Spatial Plan*, was adopted by Cabinet in 2008, with *Regional Spatial Plans* still under review (MLIT, 2010). As per previous strategies, it advocated increased cooperation between the Japanese national and local governments.

This latest plan also tried to counteract persistent and excessive reliance on the Tokyo Metropolitan Region to encourage more sustainable and well-balanced growth (Ono, 2008). Ten „active and independent regional blocks“ were identified (see Figure 34) and required to formulate strategies to:

1. „Effectively mobilise local resources such as culture and traditions, tourist attractions and historical relationships with Asian neighbours“; and,
2. Find its „own way of communicating, interchanging and cooperating with adjacent regions including neighbouring Asian cities“ (Ono, 2008, p. 513).

Figure 34: National and regional spatial areas



Source: Taketoshi, 2009, p.11

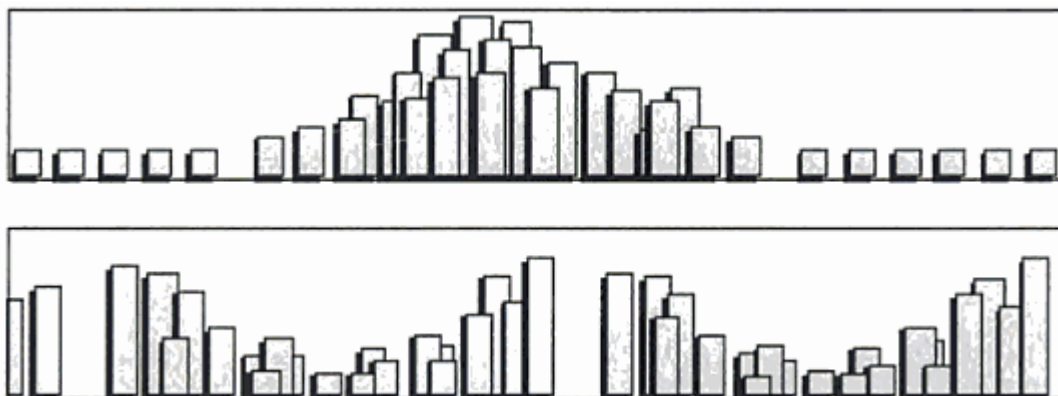
As aspects of these Regional Spatial Strategies relevant to the Kinki (and Kansai region) are further examined in Chapter 7, the remainder of this section reviews Japan's general approach to the construction of neighbourhoods.

Japanese neighbourhoods are strikingly mixed and diverse despite having zoning policies since 1919 (one year earlier than USA) (Eggers, 2006; Sorenson, 2004). Indeed, Japan's zoning has been characterized by very loose restrictions (Eggers, 2006) „never intend(ing) to promote the rigid separation of land uses that is commonly associated with zoning today“ (Sorenson, 2004, p. 115). The permissive nature of its highly *inclusive* zoning specifications has generated issues of conflicting land use (Sorenson, 2004). This has generated dense haphazard housing and vibrant commercial districts easily dismissed as a by-product of dense living. Sorenson (2004) thought Japanese neighbourhoods“ best embodied Jane Jacobs“ vibrant neighbourhoods and „eyes on the street“ descriptions:

Even in the largest Japanese metropolitan areas such as Tokyo and Osaka, a few steps away from the busy main streets, are found quiet residential neighbourhoods with a variety of small shops flanking narrow streets. The human scale of these districts, their efficient use of space, the ubiquitous potted plants on the curb in front of the houses, and the effective restraints on car traffic on extremely narrow roads all contribute to some of the most positive aspects of Japanese urbanisation: the very widespread existence of healthy charming neighbourhoods, even in the largest cities (p.4).

Shelton (1999) graphically compared Japanese neighbourhoods with those in Western cities (see Figure 35). He contended that in Japanese cities „lower buildings and relatively quieter streets commonly lie between high buildings and busy thoroughfares over a wide area“ and in Western cities „the built skyline has tended to peak around a dominant centre“ (p.11).

Figure 35: Representation of Western (top) and Japanese (below) city landscapes



Source: Shelton (1999, p.11)

Despite the positive elements of Japanese neighbourhoods, the 1960's and 70's was a period of increased dissatisfaction amongst citizens living in worsening conditions (Evans, 2001). As outlined above, various top-down national policies were implemented to address regional social differences during the 1970's and 80's. The 1990's bursting of Japan's bubble compounded issues associated with its aging and declining population, increasing the need for better neighbourhoods (Sorenson, 2004). In addition, quality and aesthetically-pleasing living environments were seen as a way to attract and retain knowledge and other skilled workers critical for Japan's future national economic prosperity.

As a result, government decentralisation and community development were intensified (Eggers, 2006; Jacobs, 2002; Sorensen, 2003, 2004). A new neighbourhood planning process, *machizukuri* (translated as *neighbourhood creation*) was being discussed. It targeted a mixture of hard infrastructure-related activities (e.g., constructed urban environment) and soft infrastructure-related activities (e.g., regeneration of historic areas and strengthening of human networks) (Issarathumnoon, 2005). It was hoped that the stakeholder consensus building and decision making of *machizukuri* would encourage greater citizen involvement and enhance local life quality (Evans, 2001; Murayama, 2007; Sorensen & Funck, 2007).

The 1995 Great Hanshin Earthquake presented a perfect opportunity to trial the new process (Sorensen, 2004). In 2000, local governments were given legal jurisdiction over local planning authorities, effectively ending top-down planning (Nishimura, 2005). By 2005, *machizukuri* had „emerged as one of the key players for decision-making, implementation, collaboration and management issues in planning“ (Nishimura, 2005, p. 5). Some felt it was „a form of urban design exercised by the inhabitants that concerns the continuous creation of a neighbourhood in a social as well as physical sense, and one that fills out the framework given by government urban planning“ (Hein, 2001).

Although urban planning in Japan has increasingly focused on the importance of the local environment, there is no specific mention of how it might support innovation and knowledge development priorities in policy or strategic documents. Despite this, Japanese land use is highly integrated and characterized by human patterns identified in previous chapters as supportive of the new economy. The following section briefly describes such urban form and associated Japanese urban planning philosophies significant to this research.

6.3.3 Issues and urban form of particular relevance to this research

Lin (2007a, p.87) found three distinct and connecting themes in Japanese 1960-1980 developments:

1. Considerable investment in advanced communications to connect respective communities „to each other and the world“ as it was believed that the „futuristic look“ of advanced technology would provide global international competitiveness;
2. High integration of „infrastructure, architecture and public spaces“ transpiring into a „three-dimensional generative framework organized around infrastructure“; and,
3. Combined architecture and urban form „to become models of „ideal places“ or „perfect cities“ in their respective eras“.

Tokyo represents a powerful part of the Japanese urban landscape. Therefore, it is logical that those thinking of how to accommodate its future growth may have also influenced the development of smaller Japanese cities and regions. Indeed, it was in the midst of rethinking in the 1960“s that visionary architect Kenzo Tange presented *A Plan for Tokyo, 1960: Toward a Structural Reorganization* at the Tokyo World Design Conference. Though his plan proved to be a utopian ideal, it represented a valid and innovative philosophical shift in approaches to urban development. Those aspiring to his ideals, *Metabolists*, „rejected the modernist notion of the city as a mechanical object, and viewed it instead as an organic process“ (Lin, 2007b, p.110).

Tange predicted Tokyo would become a major city in the world economy. He stated that its present urban physical form would be unable to contend with its growth and the economic power shift from primary and secondary to tertiary sectors. He saw urban mobility as critical for successful city economic development (Lin, 2007a, 2007b), being „the arterial system which preserves the life and human drive of the city, the nervous system which moves its brain... (And) determines the structure of the city“ (Lin, 2007a, p.77). His ideas were based on the belief that „the role of information in our society“ meant that „urban and architectural space“ was not „created by the separation of physical objects“ but „a truly active and binding force“ holding objects together (Tange, 1985).

(I was) strongly aware of the role of information in our society...urban and architectural space, formerly open and unconfined...(and) which I had previously interpreted as being created by the separation of physical objects, actually exercised a force which held these objects together. Space as a truly active and

binding force...caused a basic change in my way of thinking about architecture and city planning (Tange, 1985).

Tange believed that the automobile had permanently changed the social (human) and physical (urban architecture) interface, and that in the post-industrial era a linear model best symbolized „openness“ and the city as an evolving social/economic organism. He proposed re-engineering the „closed“ radial transport structures of Tokyo into an „open“ linear form (in particular the highway) (Lin, 2007a). This was radically different than city concepts emerging from London at the time, „advocat(ing) a centripetal pattern of development through a greenbelt and a series of satellite cities“ (p.79).

The vitality of a city in the post industrial age is no longer based on primary or secondary economic activities, but on its tertiary sector. As a result, the city should be treated not as a composition of separate functional zones...but as an open complex linked together by a communication network. Tange argued that the organic life of Tokyo lay exactly in the flowing movement of its ten million people, who engaged in the communication of various functions and created the total function (p.112).

Tange was perhaps ahead of his time, but his ideas took on meaning in the 1980's - the beginning of the information age. Increased virtual and physical global mobility as well as opportunities for socio-economic interaction became important factors in urban environments. Urban development in Japan responded with higher integration between „infrastructure, architecture and public space“ producing a „three-dimensional generative framework organized around infrastructure“ (Lin 2007a, p.87). Linear human flows centred on train stations were directed through entertainment, open spaces, commercial districts and tourist destinations, creating cities for:

...human habitat and place of communication in which housing, commercial and cultural activities were the central focus. These uses were mixed throughout the whole area, and combined with aesthetically laid-out streets, lively outdoor spaces and parks. Pedestrian areas and broad shorelines were expanded to embrace a network of green spaces (p.88).

Bertolini and Dijst (2003) noted that, in a country with one of the highest public transport uses in the world, Japanese train stations emerged as „anchoring places of consumption“ (p.34) central to everyday community and business life. Indeed, there is a considerable gap between the public transport usage of Japanese major cities and those of other major world centres: 56.7% of Tokyo's population uses public transport, Osaka 59.5% (in Kinki Region),

Paris 24.1%, London 17.1%, Sydney 13.6% and New York 9% (Wendell Cox Consultancy, 2003).

The dense residential, leisure and business mix of Japanese train stations exactly fit the TOD definition Western Australian train stations have been aspiring to. Japanese cities appear to have had a fully integrated land-use and transport planning decades before Calthorpe popularised the term „TOD“ in the US. After Japanese rail privatisation in 1987 (Nakamura, 1996), train stations were often owned and developed by intensely competitive large private multinational conglomerates with a vested interest in creating economic and social vibrancy to attract users (Peek *et al.*, 2006). Both Japanese case study stations of Chapter 7 Section 5 are such sites.

The extraordinary capacity of train stations to be a central part of daily Japanese life has made the surrounding area highly vibrant and socially inclusive, generating deep intra- and inter- urban multiplier effects in local economies (Sorensen, 2004). It is highly possible that Japanese train stations are able to create a local environment supportive of knowledge economy priorities such as high human interaction, vibrancy and connectivity as outlined in Chapter 2. This is explored further in the Chapter 7 and 8.

6.4 Conclusion

This Chapter explored national and state-level policy and strategies influencing economic development and urban planning in the case study regions of Kansai, Japan, and Perth’s Northwest Corridor, Western Australia. The following Chapter 7 examines this at a regional level.

This thesis proposes that urban form can act as a congruent for formal and informal human interaction. By opening new linkages and stimulating new ideas, it can enhance the innovative system and the efficiency of firm (and other formal connections) allowing better access to and use of knowledge and information. This does not appear a consideration in documents relating to WA planning nor its innovation and knowledge-based directions.

Fuelled by its resource boom, increased migration, globalisation and pressures to remain internationally competitive, Western Australia has been examining how to leverage competitive advantages in creative and knowledge-based industries. State-commissioned reports largely advocate the attraction of creative people and better research/industry links, with limited reference to the role of urban planning in generating a local environment supportive of knowledge productivity and innovation priorities. Similarly, urban planning documents have increasingly focussed on economic development and neighbourhood liveability and connectivity, but outlined only vaguely how this might affect productivity,

development and innovation in new economy industries. It was concluded that urban planning and economic development (outside of retail) are largely dealt with separately in WA.

This Chapter briefly examined whether this also held true for shopping centres and transit-oriented developments, tools frequently used to better integrate land use in Perth. It found that they too had limited success in generating the necessary conditions supportive of new economy priorities. Recent proposals to consolidate Perth's knowledge infrastructure using the „*Knowledge Ring*“ demonstrated an ideological shift in urban planning's role for national, state and regional sustainable new economy development. However, despite providing a solid platform for diversity in human interaction, movement and connection, this research suggests that consolidation of Perth's already commercially stronger and wealthier middle and core suburbs may further exacerbate wealth disparities with outer metropolitan regions.

Unlike WA, Japan does not appear to clearly distinguish between industrial and urban planning policy. Japan's post World War II phenomenal economic growth was partly due to a three-prong economic development/urban planning/technology policy approach expanding industrial, transportation and communications infrastructure in strategic regions to attract and concentrate enterprise. Human capital has been crucial to its success through two major economic shifts. Its rapid rise during the second shift (from heavy to high-tech, knowledge-intensive and service industries) to become one of the most globally-powerful countries is consistent with Japan having a „*rapid success in new economy-based activities once switch was made*“. This is identified in Chapter 3 as an indicator of „competitive advantage in knowledge development“.

This Chapter found that Japan's 60 years of various planning strategies reflect its evolving ideologies and desire to achieve regional social and economic equity. It has revised its urban planning policies several times to address socio-economic change and facilitate international competitiveness (Jacobs, 2002; Saito & Thornley, 2003; Sorensen, 2003, 2004). Urban areas have been systematically restructured to redistribute wealth and promote sustainable economic development. Through these changes it is clear that urban planning has been a tool for National economic and social objectives. As Sorenson (2003) stated „the priority was economic development, and urban planning was carried out primarily to foster that growth, not to help create or maintain amenities or improve the quality of life in urban areas“ (p.521). As human capital plays an increasingly significant role in economic wealth, neighbourhood planning and community development have emerged on the Japanese urban planning agenda. However, as in WA, policy and other documents to date only vaguely acknowledge how the local environment might support activities associated with innovation and knowledge development, thereby fulfilling national new economy priorities.

This research examines how the built environment might contribute to new economy priorities by providing more meaningful human interaction and influencing human flows to increase new economy competitiveness and productivity. It explores the hypothesis that urban form can act as a facilitator for formal and informal global human interaction, vibrancy and movement. It suggests that urban planning can enhance the efficiency of more formal connections within the innovative system by allowing better access to and use of knowledge and information. Some developments are better at this than others. Though Japanese urban planning and economic development appear more highly integrated and to better target national innovation priorities, this Chapter found that the policy documents of both study regions demonstrated limited understanding of the mechanisms linking new economy factors and constructed urban environment. Evidence presented in previous chapters suggested that urban planning not sensitive to the new economy contribution of local neighbourhoods is likely to place unnecessary barriers into the innovation process. Therefore, the contribution of urban development must be recognised and included in national, state and regional level discussions of innovation and knowledge development. This will be discussed further in the following chapters.

CHAPTER 7: REGIONAL CONTEXT OF CASE STUDIES⁶

7.1 Introduction

This chapter examines the regional context of two case studies, one in Japan and the other in Western Australia. Building on the literature review and findings of previous chapters, it examines the capacity of the respective systems to support innovation and knowledge-based activities. Section 2 outlines reasons for case study site selection, while Sections 3 and 4 provide an in-depth analysis of the urban planning and economic development policy and initiatives relevant to this research.

7.2 Case study selection

Perth City's Northwest Corridor, consisting of the Local Government Areas of Wanneroo and Joondalup (hereafter, „PNWC“), was chosen as a suitable study region for Western Australia, and Kansai Region (or Kinki Region) for Japan. The case study areas are shown in Figures 37 and 38.

Selection of the case study regions was based on three equally important factors. Firstly, policy and other documents indicated a strong push for the development of new economy industries. Both regions have knowledge economy visions, with urban planning viewed as a tool to strengthen knowledge resources and outcomes. In PNWC, urban planning and economic development are linked primarily through a retail strategy; while in Kobe, urban planning is directed by the high-tech and knowledge development ordinance of the national government. Both regions made the new economy shift at similar times, however, evidence suggests that Kansai has adapted more quickly than PNWC (Table 18).

Secondly, the researcher was highly familiar with the urban landscapes of both regions, as well as various business and social aspects of culture and language. This was based on both professional qualifications and personal experience. The researcher was a certified

⁶ Part of this chapter was published in 2011 World Schools Planning Congress (Martinus, 2011b).

Interpreter under the Australian National Accreditation Authority for Translators and Interpreters (NAATI) and had lived and worked in Kansai for 4 years (1992-1996) and in PNWC for 14 years (1996-2010). This regional familiarity allowed her to act as an „insider“ in both regions and to quickly establish trust and rapport with regional survey and interview respondents. This facilitated outcomes of the interview process by increasing participants“ willingness to volunteer information. The results of these interviews are given in Chapter 8.

Figure 37: Perth’s Northwest Corridor (outlined orange) in relation to Perth



Source: Adapted from WA Department of Planning (2010, p.40)

Figure 38: Kansai Region in relation to Japan (Hyogo Prefecture outlined orange)



Source: Adapted from Kankeiren (2010, p.1)

Thirdly, both Kansai and PNWC are similarly placed in the regional hierarchy competing against the larger economic and urban areas of Kanto (containing Tokyo) and Perth respectively. This has required both regions to consider innovative strategies to remain economically competitive. Similarly, this competition exists at and between all levels of the urban hierarchy – cities, towns and suburbs. Thus, urban form in each region representative of planning in mid-size cities or peripheral economies across each nation was selected to

gain insight into the new economy struggles and success stories of smaller areas competing against economically-larger and well-established ones.

In other words, the rapid urban growth predicted in PNWC (see section 7.3) represents the burgeoning future economic growth and urban expansion in all Perth's outer metropolitan regions (see chapter 6 section 6.2). The WA Government has tried to guide this growth with urban policy shaped by the latest in urban thinking (detailed in section 7.3). These guidelines appear to have generated a planning approach consistent throughout Perth, such that the planning found in PNWC is typical of that found in outer metropolitan Perth. Therefore, PNWC was considered a suitable study area, as most urban form identified as relevant to the research can be found within PNWC. Similarly, urban form found within Kansai is representative of Japan's urban planning approach in regions competing with Kanto (containing Tokyo).

Comprised of many cities and towns, the region of Kansai is larger than Perth's Northwest Corridor which is part of metropolitan Perth. However, this comparison is appropriate as Kansai employed several types of urban form relevant to mid-size cities of innovation. This research sought to examine how effective these were in supporting knowledge development and innovation. Several sites emerged during the case study process as representative of Japanese planning: 1) *Sannomiya* and *Rokkomichi* as respective city centre and local pedestrian-oriented train station developments; 2) *Kansai Science Park* as part of the Federal Governments Technopolis and knowledge park project; and, 3) *Port Island*, *Rokko Island* and *Seishinchuo* as Japanese new town projects. These are discussed in the interview analysis of chapter 8. Recognising obvious differences (location, age of cities); section 7.5 compares the physical urban form and human movement surrounding *Sannomiya* and *Rokkomichi* train stations to that of *Joondalup* and *Clarkson* in PNWC.

Table 18 summarises PNWC and Kansai indicator results as per the methodology outlined in chapter 3. Some indicators are different as boundary and measurement discrepancies existed between various data sets. Despite this, domestic comparisons presented in the table indicate both regional innovation and creative potential. Data for Perth Metropolitan Region and other cities in Australia supplements the lack of new economy information at the PNWC level, and data from the smaller area of Hyogo Prefecture (Figure 38) provides greater detail for Kansai (or Kinki). This broad data range also alleviates complications arising from urban cultural differences between Kansai and PNWC.

Table 18: Comparing PNWC and Kansai as per selection criteria identifying cities of innovation

Indicators	Perth's NW Corridor (PNWC)	Kansai Region
Ranking of: World innovation (2thinknow, 2009)	<ul style="list-style-type: none"> • Perth ranked between #201-250 • Melbourne #20 • Sydney #22 	<ul style="list-style-type: none"> • Kobe #37 • Kyoto #26 • Osaka #63 • Tokyo #9
Regional innovation (2thinknow, 2009)	ABS figures showed declining of „novelty“ innovation in Australia since 2002-03 (figures which are relatively low compared to EU). In 2004-05, WA and SA were Australia's most inventive (37%, 40% respectively). Most inventive industries – Accommodation, cafes & restaurants, Mining and Wholesale trade (Pink, 2007).	Using absolute values, the OECD noted that Kinki is 3 rd most highly innovative region in the world after Kanto (Tokyo and surrounds) and California (Usai, 2008).
Creativity	Not ranked	In 2004, joined UNESCO's Creative Cities Network as City of Design (City of Kobe, 2009a; UNESCO, 2010).
Patent activity (OECD, 2008)	<ul style="list-style-type: none"> • New South Wales (#39). • Figures not available for Perth or smaller areas. 	Osaka (#8), Kyoto (#41), Hyogo (Kansai) (#50)- ranked in top 60 patenting regions worldwide.
Mercer quality of life index (Mercer Consulting, 2010)	<ul style="list-style-type: none"> • Perth #21 • Sydney #10 • Melbourne #18 	<ul style="list-style-type: none"> • Kobe #41 • Tokyo #40
Regional economic growth	<ul style="list-style-type: none"> • WA is one of the most globally productive and competitive mineral and petroleum regions. It has grown 4% over last 10 years (national growth sits at 3.5%) even during global financial crisis (WA Department of State Development, 2009). • Joondalup and Wanneroo are 2.7% and 2.2% respectively of WA Gross State Product (City of Joondalup, 2010a; City of Wanneroo, 	<ul style="list-style-type: none"> • GDP for Kansai is 16% of Japan's total GDP (Takeda, 2008) • GDP for Kansai region alone is 10th in the world (behind Canada) (METI-Kansai, 2007). • Osaka-Kobe-Kyoto area ranks 94st in world (2nd highest in Japan) for GDP per capita (Demographia, 2007).

Indicators	Perth's NW Corridor (PNWC)	Kansai Region
	<p>2010a).</p> <ul style="list-style-type: none"> Perth ranks 41st in world (highest in Australia) for GDP per capita (Demographia, 2007) 	
Dominance of new economy industry	<ul style="list-style-type: none"> Key WA industry in: Minerals and petroleum (including large knowledge-based and innovation component), land development (to expand productive capacity, preserve environmental integrity, promote social/heritage) (Ellis, 2009; WA Department of State Development, 2008). Key industry of Joondalup in: retail trade, education, health and community, property and business services (City of Joondalup, 2010a); and, of Wanneroo in manufacturing, retail, construction, education (City of Wanneroo, 2010a). 	<ul style="list-style-type: none"> Key industry in Kansai – manufacturing (eg, batteries), advanced environmental-related technologies (eg, water supply), R&D (eg, next generation robotics, embedded software), Tourism (Kankeiren, 2010) Key industry in Kansai Science Park –R&D (e.g., robotics, eco-technologies, biotech) (Kankeiren, 2010) Kobe – Medical Industry, Super computers (Kankeiren, 2010)
Political leadership and vision to facilitate knowledge economy after period of economic struggle and decline	<ul style="list-style-type: none"> In 1980's, Australia undertook major micro-economic reform to increase competition (Fane, 1994) and improve economic stability (Wilkie & Grant, 2009). WA wealth in mining and resources provided natural competitive advantage (WA Department of State Department, 2009). In 1990's, cities of PNWC identified strategic importance of knowledge-based activities to compete with economically stronger inner-city areas (City of Joondalup, 2007b; City of Wanneroo, 2004a). Introduced initiatives to increase small business and public sector innovation, such as ThinkLearn in 2000's (Hardy, 2007) 	<ul style="list-style-type: none"> Economic difficulties in 1980's and 1990's, including a major earthquake which hit Kobe destroying much of its business and major infrastructure. All levels of government pursued innovation and knowledge-based industry vision. Including creation of strategic science parks as part of regional innovation system (Kankeiren, 2008). After earthquake, Kobe leveraged health industry assets and introduced new IT industry to revitalise economy (Kobe Medical Industry Development Project Study Group, 2008; Kruger, 2002). Government has valued the development of good infrastructure and international connections to be globally competitive (Kankeiren, 2010).

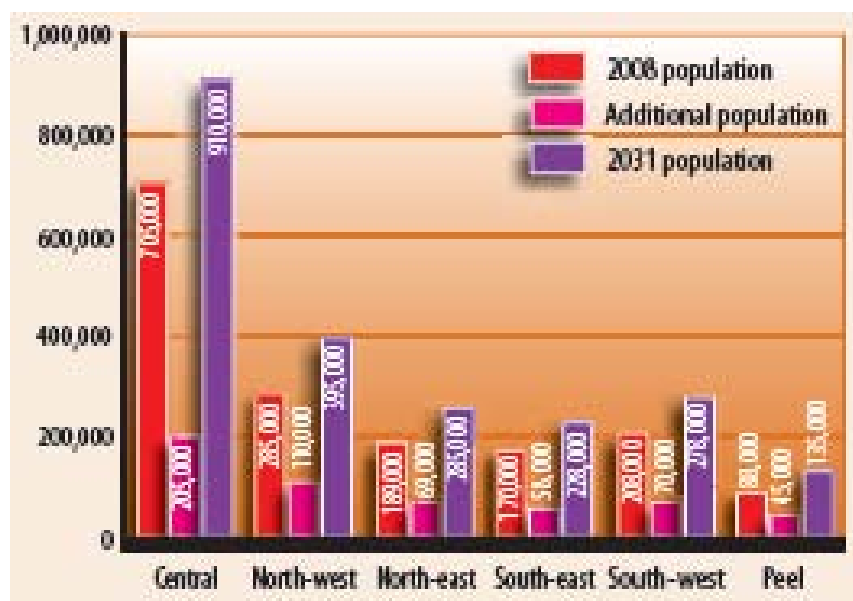
Indicators	Perth's NW Corridor (PNWC)	Kansai Region
Rapid success in new economy-based activities once switch was made	<ul style="list-style-type: none"> • Rapid success of WA economy due to competitive advantage in natural resources rather than policy decision. • PNWC has not demonstrated rapid success in knowledge-based industries, despite its close proximity to economically booming urban areas of inner Perth. 	<ul style="list-style-type: none"> • Since switch to knowledge economy after 1995 earthquake, Kobe has gained global recognition in the new economy areas of health and biotech, (Evans 2002; Kobe Medical Industry Development Project Study Group, 2008) • It is also fast developing in other areas such as the creative design industries (City of Kobe, 2008c, 2010b; UNESCO, 2008)
„The World According to GaWC“ ranking (GaWC, 2008)	Not ranked	Not ranked
Population	<ul style="list-style-type: none"> • PNWC of Joondalup – 162, 195 (City of Joondalup, 2010c); and, of Wanneroo – 134,258 (City of Wanneroo, 2010b) • Population forecast Perth Northwest Corridor: over 395,000 by 2031 (WA Department of Planning, 2010) 	Nada Ward (containing Rokkomichi station) – 129, 589 (City of Kobe, 2009b); Kansai Science Park – 263, 006 (Foundation of Kansai Research Institute, 2009)
Population of other cities in the wider region or country	<ul style="list-style-type: none"> • Metropolitan Perth – 1,659,000 (including PNWC figures) (ABS, 2011) • Population forecast – 3,500,000 by 2035 (WA Department of Planning, 2010) 	Metropolitan Kobe – 1, 533, 034 (City of Kobe, 2009b); Osaka – 2, 653, 552 (City of Osaka, 2010a); Kyoto – 1,466,321 (City of Kyoto, 2004); Tokyo – 12,989,000 (Tokyo Metropolitan Government, 2010); Yokohama - 3,672,789 (City of Yokohama, 2010)

Kansai appeared to have greater competitive advantage in innovation and knowledge development than PNWC, adapting relatively easily once the political shift towards knowledge-based production occurred despite previous struggles as an industrial economy (Table 18). It is unclear whether this transpired in PNWC, despite being similarly in developed nations with access to quality education systems and human capital. The following sections will explore how the economic development and urban planning policies of these regions supported their respective knowledge development objectives.

7.3 Perth’s North-West Corridor (PNWC), Western Australia

The outer metro area of PNWC, comprising the Cities of Joondalup and Wanneroo, is a current and future significant source of urban land release for Greater Metropolitan Perth (Figure 39). With around 17% of the total developed land in Perth (WA Department of Planning, 2010), its predicted population growth and infrastructure needs mean considerable expenditure by the State Government (WA Department of Planning, 2010; WAPC, 2004c).

Figure 39: Population projections in Perth and outer metro regions



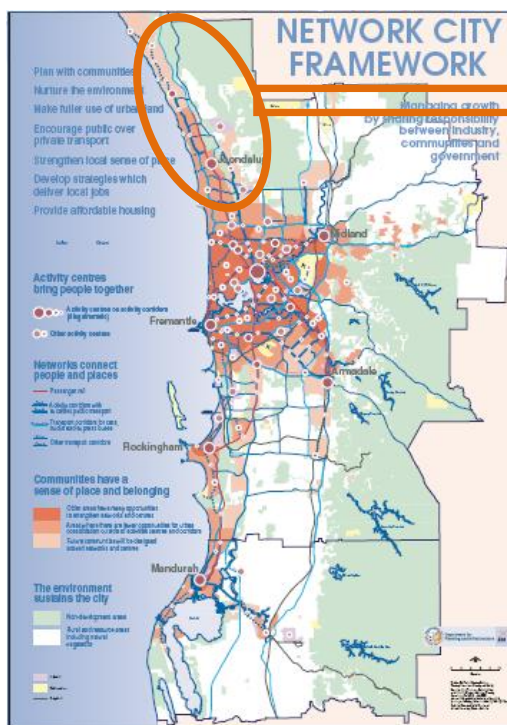
Source: WA Department of Planning, (2010, p.30)

For this purpose, a Northwest Corridor Coordinating Committee was established to „ensure that urban and economic development within the corridor is being coordinated, and that both local governments actively engage the State and Commonwealth governments in dialogue relating to the timely provision of State and Commonwealth infrastructure“ (City of Joondalup, 2006a). Though the committee gained support from the WA Government as it

intended to assist in the development of a PNWC growth strategy consistent with the State’s urban planning policy *Network City* (DPI, 2008), it dissolved a few years after formation. There was no documentation found explaining why it struggled to fulfill objectives, however, several chapter 9 interview participants noted it succumbed to political manipulation (see section 9.3). In the years following its dissolution, there is little evidence of its actual contribution to State urban and economic discussions.

Guidelines for PNWC urban planning are stipulated in the 2004 *Network City* proposed planning framework (WAPC, 2004c), and more recently in the policy document *Directions 2031 and beyond* (WA Department of Planning, 2010). *Network Cities* proposed that Perth and surrounds be planned with an effective land-use transport integration strategy to address urban mobility issues (WAPC, 2004c). PNWC corridor was not specifically detailed in the strategy, though Joondalup was identified as one of six secondary activity centres to Perth. Figure 40 shows the proposed spatial framework.

Figure 40: Network City framework



Source: WAPC (2004, p.13)

Figure 41: Perth’s Northwest Corridor sub-region



Figure 14: North-west sub-region

Source: WA Department of Planning (2010, p.80)

Directions 2031 and beyond recommended a separate sub-regional strategy for Perth’s outer sub-regions, having „a unique set of challenges and must be planned accordingly“ (WA Department of Planning, 2010, p.28). It downgraded previous *Network City* secondary activity centres to third-level activity centres (or strategic metropolitan centres), giving the secondary activity centre title (or primary centre) as an aspirational target. Joondalup and

Yanchep were named as two of the ten strategic metropolitan centres (Figure 41). This represented an urban hierarchy downgrade for Joondalup and upgrade for Yanchep, a move not expected by Joondalup given that its latest Local Structure Plan is based on its second tier status (City of Joondalup, 2009).

Despite considerable investment in the Joondalup central city, the readjustment of urban hierarchies has partly occurred because PNWC is „yet to develop a strong local employment base. As a result, the majority of residents must travel outside of the area for work, placing increasing pressure on transport infrastructure and making the growing population more vulnerable to increases in travel time and associated costs“ (WA Department of Planning, 2010, p.81).

Other than the urban centres and commercial/industrial zones identified in *Directions 2031*, there is no consolidated PNWC economic development plan. The following sections present individual Joondalup and Wanneroo urban and economic development plans and initiatives.

7.3.1 City of Joondalup

Joondalup’s population of 162,195 or 10% of the total Perth population is predicted to rise (see Table 18), with key new economy industries in health, education, research and development (City of Joondalup, 2007a, 2009). This future growth is guided by both economic development and urban planning strategies aiming for a robust and healthy socio-economic community. These strategies appear to have some level of integration with the Joondalup *Local Structure Plan* identifying its *Economic Development Plan 2007-2011* as part of its overall *Strategic Plan 2008-2011* (City of Joondalup, 2009).

The 1977 plan of Joondalup was essentially „a “campus” philosophy with a “pedestrianised” core of buildings surrounded by car parking and roads at the periphery“ (City of Joondalup, 2010c, p.41). An early 1990’s revision included the construction of more roads and pedestrian walkways as well as a „new Northern Suburbs Railway Line and bus/rail interchange, major retail centre, TAFE campus and regional sporting complex“ (p. 41). Though these changes targeted increasing mixed-use in the central city, urban vibrancy and attraction of people remained an issue. In 1995, the central city was reviewed once more to further consolidate its core function and diversify development.

Its 2010 structure plan commented on the gap between development progress and ideological guidelines:

Significant development has occurred since 1995 however the quality and scale of the urban form is not truly representative of the intentions of the Development Plan. As such the review of the Joondalup City Centre Development Plan and Manual

1995 has been initiated to evaluate the opportunities for future development and adopt a planning framework to stimulate the desired outcome and vision for the future (p.42).

Joondalup's urban and economic growth philosophy is partially based on OECD's learning city concept (Poole et al., 2005) aiming to continually enhance lifelong education and learning by strengthening links with government, business, education and industry to become internationally recognised as a „community that values and facilitates lifelong learning“ (City of Joondalup, 2002, pp.7-8). Its success centred on the development of the Joondalup Learning Precinct (JLP) located adjacent to the Joondalup city core and central train station. JLP is marketed as being „just 25 kms north of Perth...(and) the only known educational facility in the world incorporating a university, police academy and technical and further education college“ (City of Joondalup, 2006b; Joondalup Learning Precinct, 2008). JLP partners share an expanding number of services, facilities, teaching and other development opportunities for the mutual purpose of regional capacity building and community engagement (Poole et al., 2005).

Joondalup's *Economic Development Plan 2007-2011* built on the strengths of its learning city strategy by envisioning Joondalup as a „knowledge and service hub for the whole region“ (City of Joondalup, 2007b, p.11) and targeting three key areas:

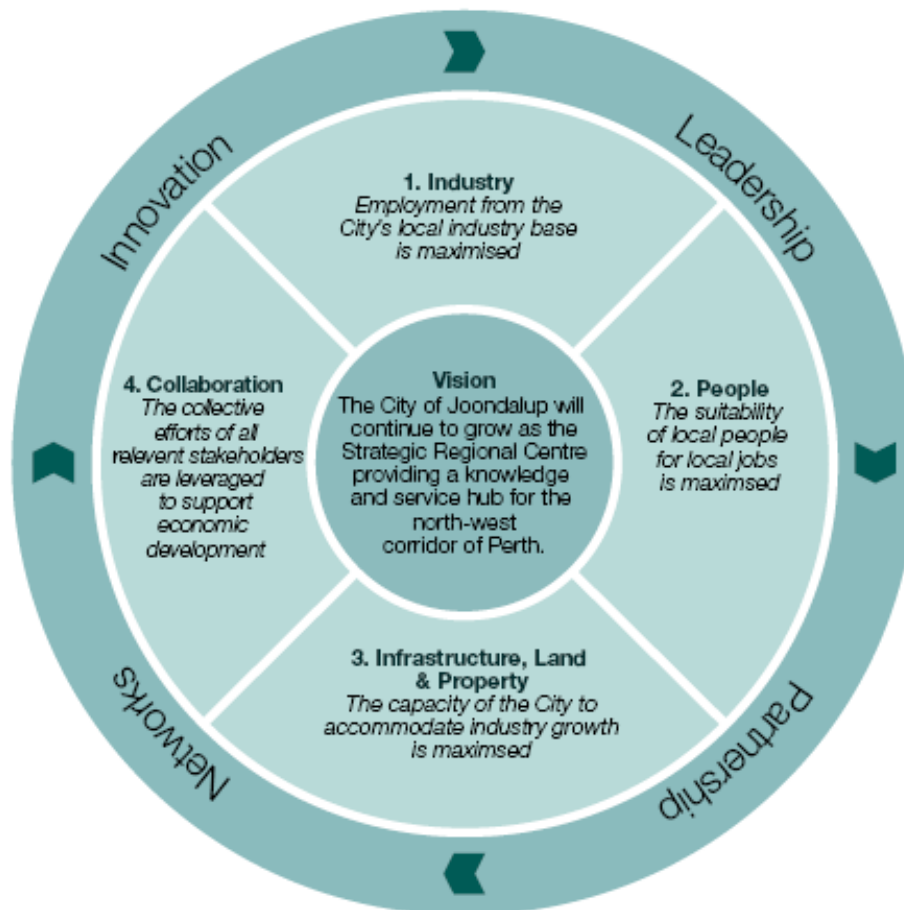
...(1) expansion of current service industry strengths, (2) growth of office-based professional service industries, and (3) smart industries emerging from research outputs of the Joondalup Learning Precinct (p.11).

Its proposed economic development model is summarised in Figure 42. The outer ring contains underlying assumptions underpinning all inner ring strategic priorities and actions (City of Joondalup, 2007b). Despite *innovation* and *networks* being key assumptions relevant to new economy development, this research found only vague or contradictory statements relating to how urban form (influencing the attraction, movement and connection of people) might support Joondalup's overall knowledge economy vision. More specifically:

1. Its key endorsement of community *inward* investment, focusing on *local jobs to local people* to service a growing knowledge economy, did not acknowledge the importance of local-global flows nor specifically target knowledge-based industry. Given that the majority of *local people* are:
 - a. Employed in mid-low skilled clerical, sales and service (79.4%) and only 20.6% in Professionals jobs; and,
 - b. Not university educated (76.3%) with only 23.7% holding Bachelor or higher (City of Joondalup, 2010a).

2. Its „coordinated approach to urban planning policy, precinct management, industry development and property development strategies“ was linked to „the importance the City Centre plays in providing an attractive „vibrant“ environment for knowledge-intensive industries and their workforce“ (City of Joondalup, 2007b, p.33). However, there were no guidelines as to what the link is or how to leverage strategies for greater innovation or economic wealth.
3. It did not extrapolate how the broad strategic priorities and actions relate to State planning policy, such as *Directions 2031 and Beyond*, *Liveable Neighbourhoods* or its own learning cities strategy.

Figure 42: Joondalup Economic Development Plan Model
City of Joondalup: A Vibrant Knowledge & Service Hub for the Region



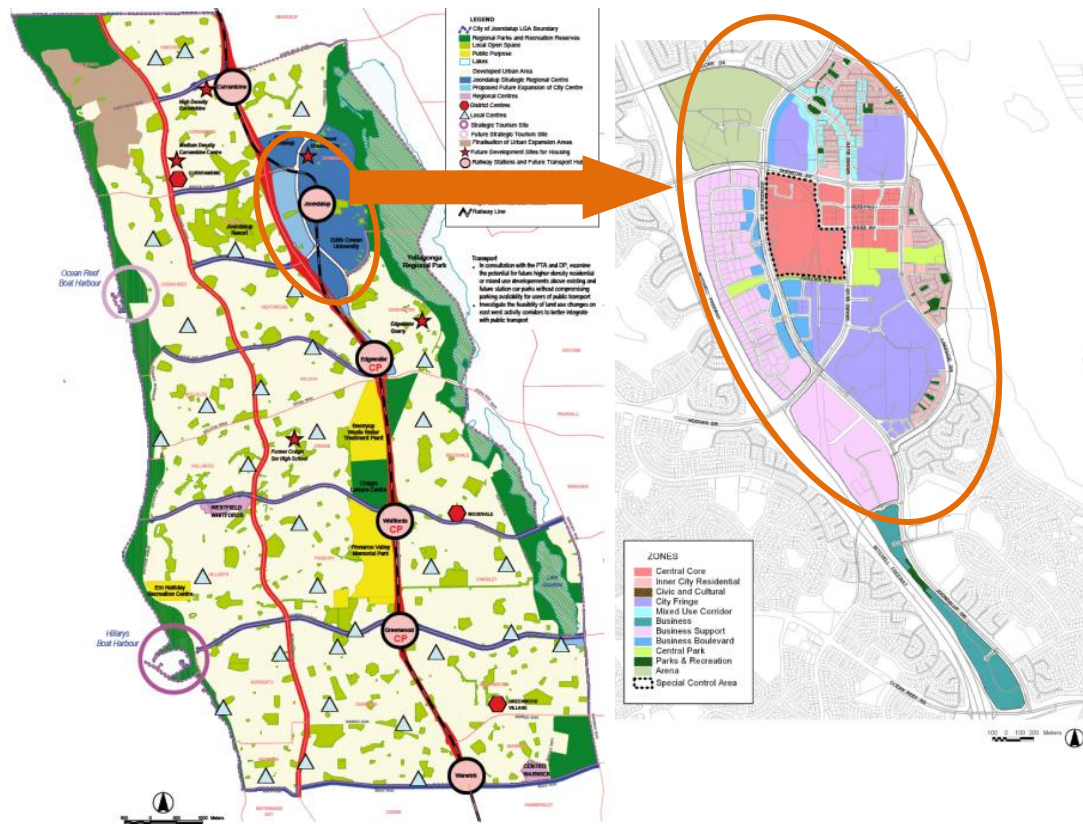
Source: City of Joondalup (2007b, p.15)

Similarly, Joondalup’s *Local Planning Strategy* outlined the link between PNWC economy and Joondalup’s urban environment (City of Joondalup, 2009). However, recent State Government decisions to downgrade Joondalup’s urban hierarchal ranking (WA Department of Planning, 2010) have severely undermined and rendered invalid its underlying assumptions (City of Joondalup, 2009) that:

1. Joondalup is the „Strategic Regional Centre for the north-west region“ (p.25);
2. „The Joondalup City Centre is the best example of a higher order Activity Centre where a full range of activities occur and is positioned as the second City Centre outside of Perth Central Business District“ (p.10); and,
3. „Regional Centres (of Alkimos and Yanchep) are not expected to impact on the growth of the Joondalup City Centre in the short- or medium-term“ (p.28).

Employment was one of the eight key planning themes in Joondalup’s *Local Planning Strategy* (Figure 43). The strategy aimed „to achieve greater employment self-sufficiency“ (City of Joondalup, 2009, p.56) by increasing industry and business floor space, tourism precinct development (such as Ocean Reef Marina) and losing home-base business controls. While all important to growth, it was unclear how local planning might support either the City’s knowledge economy objectives or key strategic priority areas of its economic development plan. If conclusions of previous chapters hold true, then acknowledging this link within strategy and policy documents will be critical for a comprehensible and unified development approach by the City of Joondalup.

Figure 43: City of Joondalup local plan and city centre structure plan



Source: Adapted from City of Joondalup (2009, p.4; 2010b, p.34)

Despite lack of integration between economic and urban plans, the structure plan identifies several elements (City of Joondalup, 2010b) consistent with the facilitators of innovation outlined in Chapter 2.

- Planning for transit use and transit-oriented development with a better mix of residential, commercial and employment.
- An open space network creating better pedestrian links and more activities in public space.
- Better integration and connectivity between different zones of the city centre.
- Improved walkability and bike-ability, including the dispersal of traffic.
- Increased mixed use to provide for a range of opportunities (employment, leisure, education, culture, entertainment, etc)

In conclusion, there appears to be two major constraints on the degree to which Joondalup's urban environment can support knowledge economy development. Firstly, it's highly segregated zones; and secondly, it's car-based planning as:

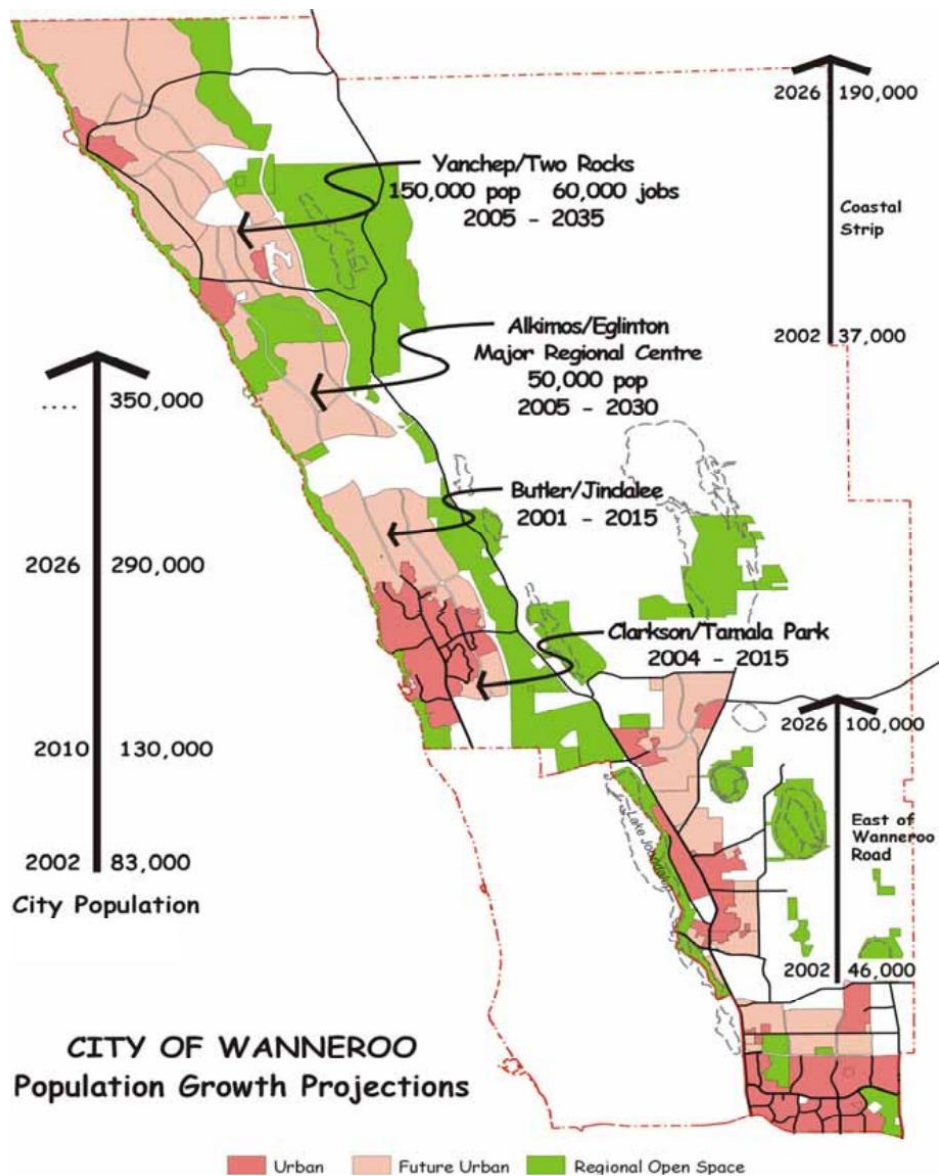
The early planning of the City of Joondalup has established wide road reserves throughout various parts of the Structure Plan Area. Wide roads may cater adequately for on-street parking, pedestrian refuge islands and traffic but do not necessarily provide pedestrians with an appropriate inner city environment whereby wide intersections are timely to cross and the vast street verges and pedestrian paths do not create a sense of enclosure or human scale. In addition, wider roads often allow traffic to travel at a greater speed which can detract from pedestrian safety (City of Joondalup, 2010b, p.52).

7.3.2 City of Wanneroo

With its current 134,258 (8% of Perth) population (see Table 18) predicted to increase to 305,380 (104% rise) by 2031 (City of Wanneroo, 2010b), Wanneroo has planned large tracts of land for future urban development (Figure 44). Government and private developer have identified innovation and knowledge development as critical along with current key industries of agriculture, retail and manufacturing (City of Wanneroo, 2004a; Tokyu Corporation, 2010b). Wanneroo has various planning policies and strategies guiding its expected high growth, including an Economic Development Strategy (City of Wanneroo, 2004a), Employment Policy (City of Wanneroo, 2004b), Smart Growth Local Planning Policy (City of Wanneroo, 2005a) and Centre Planning Policy (City of Wanneroo, 2000).

This section examines their capacity to support future innovation and knowledge development targets.

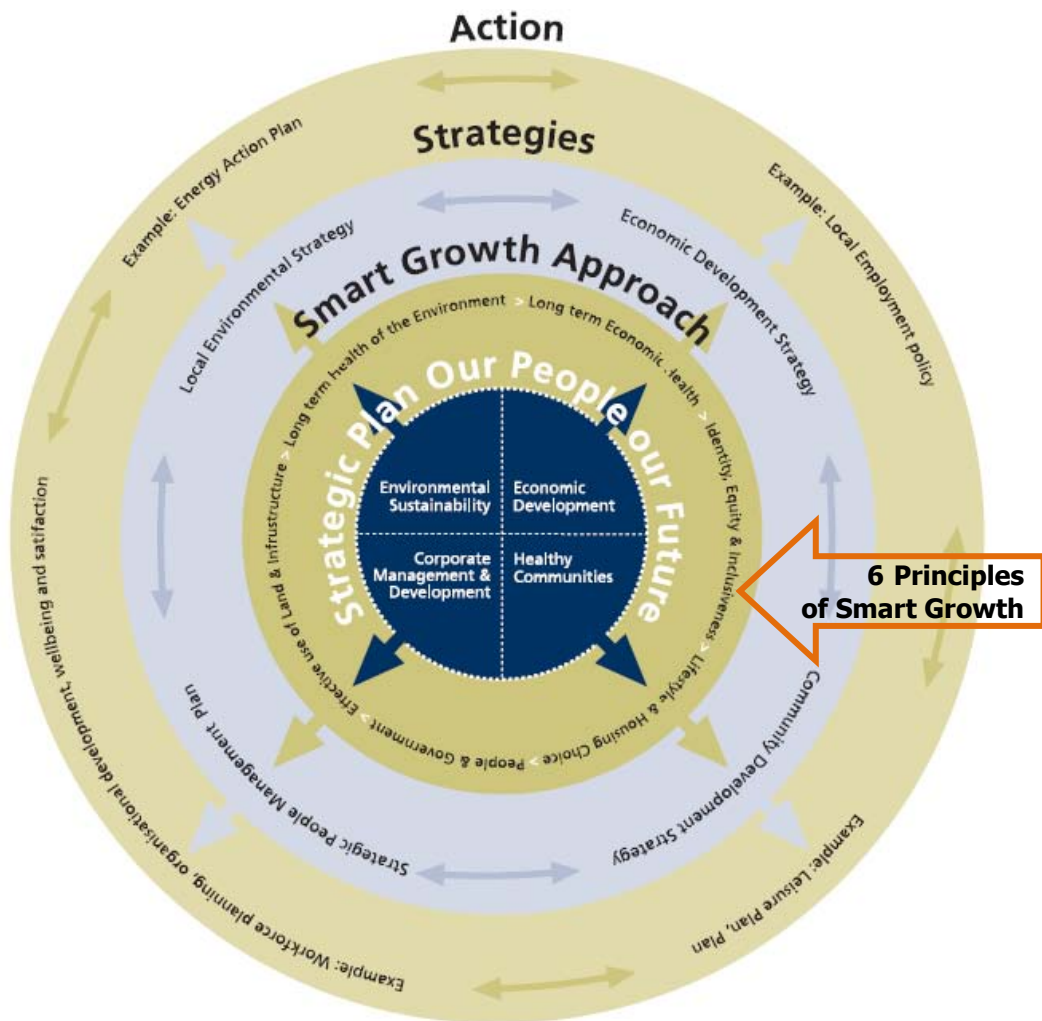
Figure 44: City of Wanneroo population growth predictions



Source: City of Wanneroo (2004a, p.13)

Wanneroo is a mix of older and still developing urban areas. Wanneroo Townsite is its earliest settlement, with Girrawheen and Koondoola being developed in the 1970's as part of the expansion from Perth City. More recent developments lie along its coastal corridor, e.g., Mindarie/Clarkson, Butler/Jindalee and east of Wanneroo Road (City of Wanneroo, 2005b), with substantially more planned development north in Yanchep, Alkimos and Two Rocks (Figure 44).

Figure 45: Smart Growth relationship table



Source: adapted from City of Wanneroo (2005b, p.9)

Wanneroo has adopted a Smart Growth Strategy and Policy to assist in its predicted rapid urban expansion, changing socio-economic needs and environmental challenges (City of Wanneroo, 2005a, 2005b). Defining Smart Growth as „seek(ing) to manage growth more effectively to improve the outcomes of development for new and existing communities“ (City of Wanneroo, 2005b, p.5), the Strategy targets a balanced approach engaging public, private and community stakeholders to effectively coordinate and guide all aspects of environmental, economic and social growth. Economic development is recognised as a strategic goal „to maximise opportunities for balanced economic growth and development within the City“ (p.8). Figure 45 illustrates the relationship of Wanneroo’s Smart Growth Strategic Plan to various specific strategies (environmental, economic, community, management) and actions (policies, plans, etc).

Wanneroo Smart Growth principles envision:

Our homes would be located in well-planned suburbs where vibrant centres of community, retail activity, parklands and transport are all within walking distance. Each suburb (new and established) would integrate existing infrastructure, producing a network of neighbourhoods with lifestyle choices, employment opportunities and facilities to support all ages and life stages. Smart Growth planning would promote a village self-sufficiency approach, respect for the natural environment and a sense of belonging within the local, regional and global environment. Such an integrated approach to our community, environment and economy will result in a more effective use of resources with increased benefits for the community as a whole (p.10).

It is assumed that the strategies and actions associated with underlying Smart Growth principles (City of Wanneroo, 2005a, 2005b) were selected by Wanneroo to purposefully generate this type of community. Such a community aligns with the research outlined in previous chapters identifying the facilitators and factors most supportive innovation and knowledge development. Therefore, the principles and desired outcomes of Wanneroo's Smart Growth Strategy are also likely to be supportive of new economy objectives.

A state leader in wholesale and retail fresh produce, Wanneroo's largest industry sector is traditionally agriculture. However, intensifying water and environmental challenges pushing innovation in agriculture, coupled with a City vision to diversify industry for future economic wealth and sustainability, has seen the growth of new economy industry (City of Wanneroo, 2004a). This includes development of medium and high-tech manufacturing and research (City of Wanneroo, 2010c; Landcorp, 2010). Believing that a broad industrial and commercial base provides greater employment self-sufficiency for current and future residential populations (City of Wanneroo, 2004a, 2004b), Wanneroo's *Economic Development Strategy* and *Employment Policy* have earmarked knowledge-based industry and innovation as key priorities for future growth (City of Wanneroo, 2004a). Indeed, its Employment Policy was the outcome of the high importance its Economic Development Strategy placed on better work/lifestyle integration between industrial land uses and urban planning (City of Wanneroo, 2004b).

The policy required „proponents of any large-scale residential development within the City of Wanneroo to prepare a strategy to encourage local employment self-sufficiency and maximise resultant local containment of the workforce“ (City of Wanneroo, 2004b, p.1). It called for developer contributions, either in the form of monetary donations to Wanneroo's

economic development fund or the construction of infrastructure/urban form supportive of sustainable employment generation (City of Wanneroo, 2004b; Syme Marmion & Co., 2006).

Examples of urban form designed to support economic development as outlined in the policy is detailed in Figure 46. This policy has facilitated collaboration between the City, land developers and other stakeholders to provide „broadband accessibility, availability and affordability, and to develop telecommunications solutions for home-based businesses, as well as support home-based businesses by offering virtual incubator services, including time share office space in main streets“ (Commonwealth of Australia, 2004, p.15). It was, and continues to be, the first integrated economic and urban development policy of its kind in Australia (Commonwealth of Australia, 2004).

Figure 46: Employment supportive urban design

Employment Supportive Designs
Council approved home based business designs included in the portfolio of designs for each lot size of each project builder allowed to purchase sites (these designs to be prominently displayed in the sales and project displays, shown, and offered to all purchasers)
Council approved live/work residential development on display in the development’s ‘display village’
Construction of demonstration premises: <i>Flexible mixed-use</i> <i>Business/commercial/industrial premise’</i> <i>Terrace houses able to be converted to commercial or retail use</i>
Provision of a Public Transport Terminus/Interchange located in Town Centre
Provision of the following services within the town centre: Childcare Centre, Health and Fitness Centre located Community Internet Access Centre/café Community Hall Music and Band Rehearsal and Recording Studio These need to be within 200 metres of: Public Transport Terminus/Interchange Railway Station Major ‘Main Street’ intersection
Provision of ‘Retirement Village’ OR Retirees (over 50s) Housing located within 200 metres of the centre of the Town Centre

Source: City of Wanneroo (2004b, p.6)

In addition to employment policy incorporating the importance of urban design, Wanneroo has a Centres Strategy to:

1. „Adopt a fresh approach to the distribution, size and nature of centres in the City of Wanneroo“; and,

2. „Promote retailing and commercial development throughout the City of Wanneroo, and particularly to encourage more diverse centres based on „Main Street“ planning principles“ (City of Wanneroo, 2000, p.1).

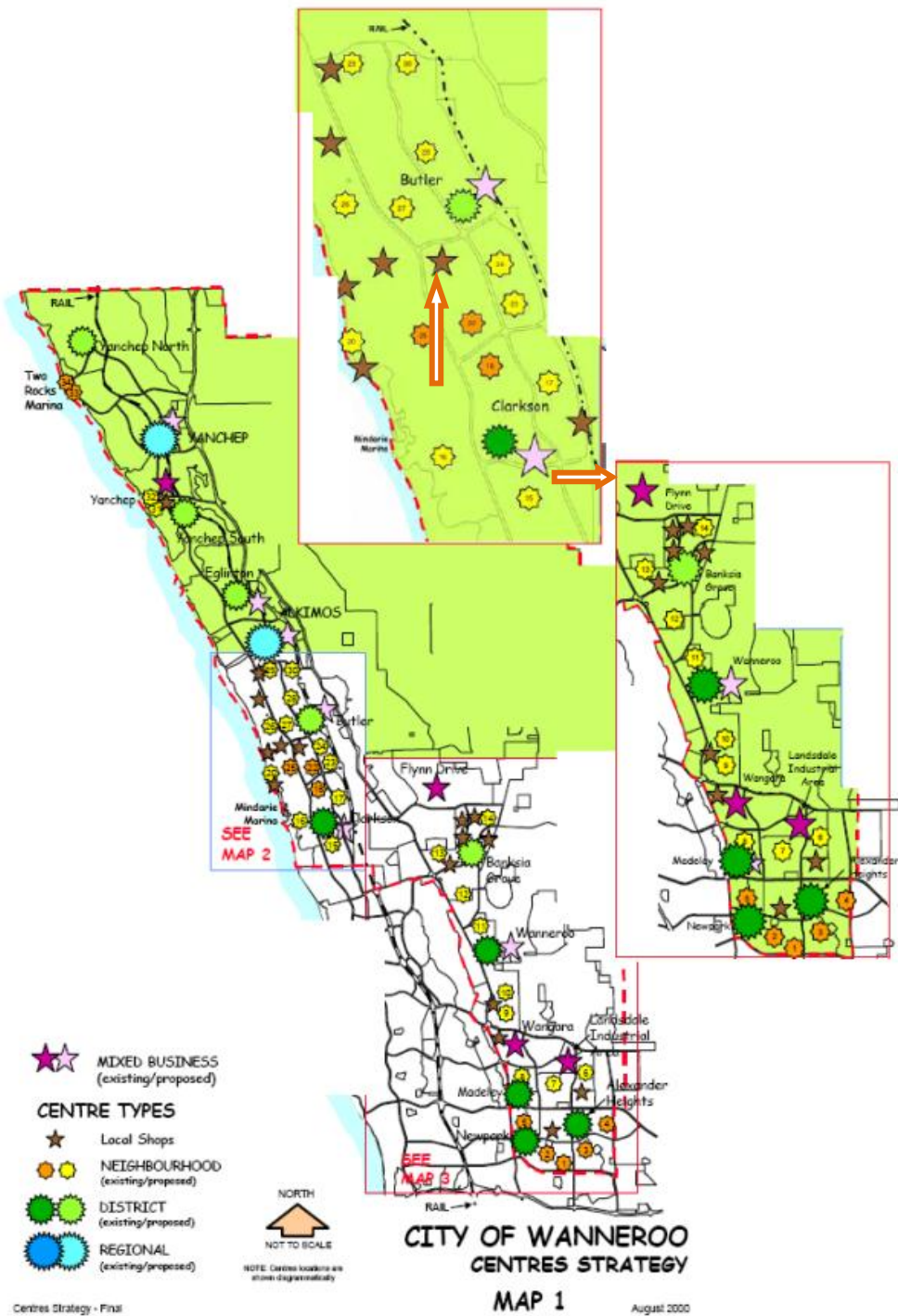
The Strategy’s consolidated approach to centre renewal and development, including encouraging greater mixed-used corridors of concentrated pedestrian traffic, is likely to contribute to greater urban vibrancy and centre „attractiveness“. Though not recognised in this nor related documents, it appears to support elements conducive to the regional flow of knowledge development and innovation (e.g., human interaction, connectivity and movement). The hierarchy of centres given in Figure 47 gives a snapshot of the region as envisioned before *Directions 2031 and beyond*. Yanchep and Alkimos were zoned third tier strategic centres.

The centre of highest significance in Wanneroo under *Directions 2031 and beyond* is Yanchep (WA Department of Planning, 2010), which retains its third tier strategic status (Alkimos drops to fourth tier). When first conceived by Alan Bond in the 1970’s, it was a largely contentious long-term project leaping north past existing Perth development along the coast:

The dream city of Yanchep turned out to be a bit of a nightmare. The natural vegetation covering the sand dunes was cleared for housing, the busway was never built, the ferry services didn’t materialize and neither did Disneyland, although the golf course and a short-lived „Lost City of Atlantis“ and Dolphin Park did. The town centre, adjacent to the marina, supported a hotel and the few basic shops, but school and community facilities were inadequate and local employment was limited (Alexander & Grieve, 2010, p.57).

With development failing to progress as planned, Bond sold the land to Japan’s Tokyu Land Corporation whose corporate motto was „from comprehensive developer to total life solutions provider“ (Tokyu Land Corporation, 2010a). The new (and still current) owners were part of the Tokyu Group holding of companies involved in comprehensive land development and visioning, whose subsidiaries own and develop railway lines, hotels, retail, real estate, leisure services and more throughout Japan (Tokyu Corporation, 2010a; Tokyu Land Corporation, 2010b). City of Wanneroo and Tokyu Corporation (2005) promote Yanchep’s future city centre as a shared vision to create a „dynamic hub of excellence recognized globally as a leading example of regional sustainability in a coastal setting. A place where the community and economy prospers in an enviable environment nestled between the Indian Ocean and Yanchep National Park“ (p.1). The key strategy delivering this is the St Andrews IDEA Project (acronym for Innovation Development Employment

Figure 47: City of Wanneroo Centres Strategy



Source: Adapted from City of Wanneroo, 2000, pp.11-13

Applications), developed to lead „the north west corridor (in) becoming an Australian centre of excellence in knowledge-based, innovative technologies and service-oriented industries. It is intended that the economic network of the corridor have strong linkages into Asia, Europe and North America“ (Tokyu Corporation, 2010b). Yanchep is projected to have an estimated 50,000 jobs at build out, 20,000 of which are targeted for emerging global industries such as health, bio-science, environmental technology, education and information technology. The

Memorandum of Understanding (City of Wanneroo & Tokyu Corporation, 2005, p.10) identified these as:

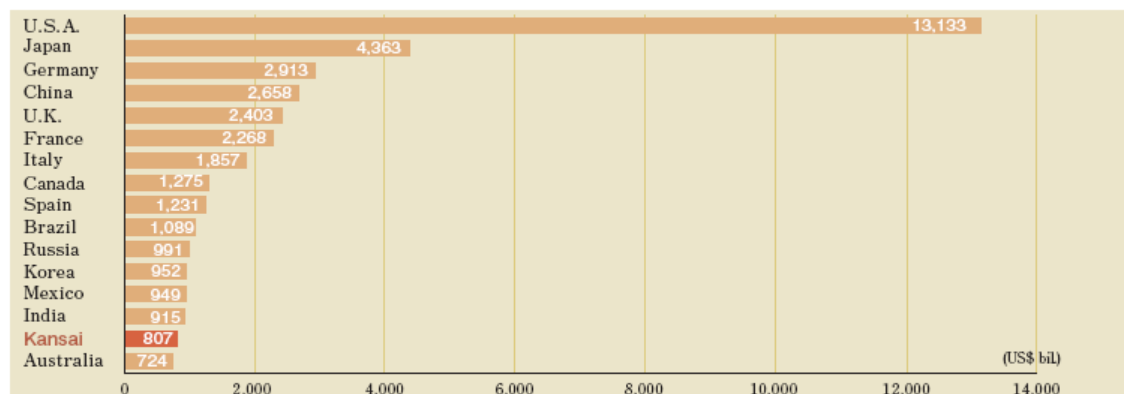
- Knowledge-based employment generators;
- Environmental research and activities;
- Tertiary education linkages;
- Health and medicine;
- Tourism and lifestyle activities; and,
- Value-adding to primary and other products.

To achieve this, a Memorandum of Understanding between the City of Wanneroo and Tokyu Corporation was established outlining the „process by which the key stakeholders can work together to achieve planning and economic development outcomes in an orderly and timely manner“ (Tokyu Corporation, 2010c).

7.4 Kansai Region, Japan

Kansai has a traditional industrial strength in manufacturing sectors, such as textiles, chemicals, general machinery, electrical machinery and metal products, 99.1% of which are small business. More recently, it is encouraging emerging industries, such as environmental and energy technologies, digital products, ICT, and life sciences (Kankeiren, 2010). Its economy is big and productive enough to be ranked against the GDP of the world’s leading nations (Figure 48).

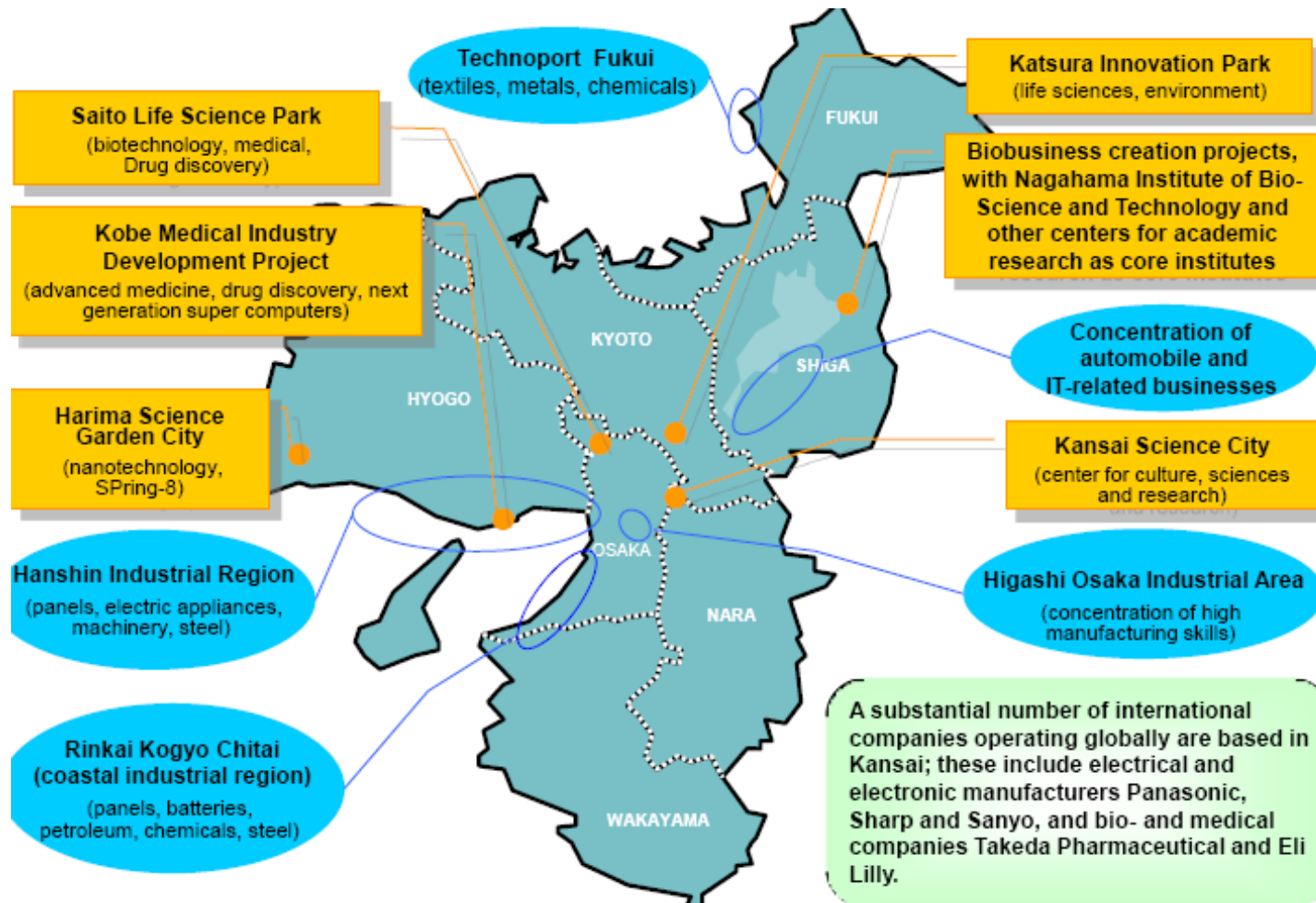
Figure 48: GDP comparison between Kansai and the world’s leading economies (2006)



Source: Kankeiren, 2010, p.2

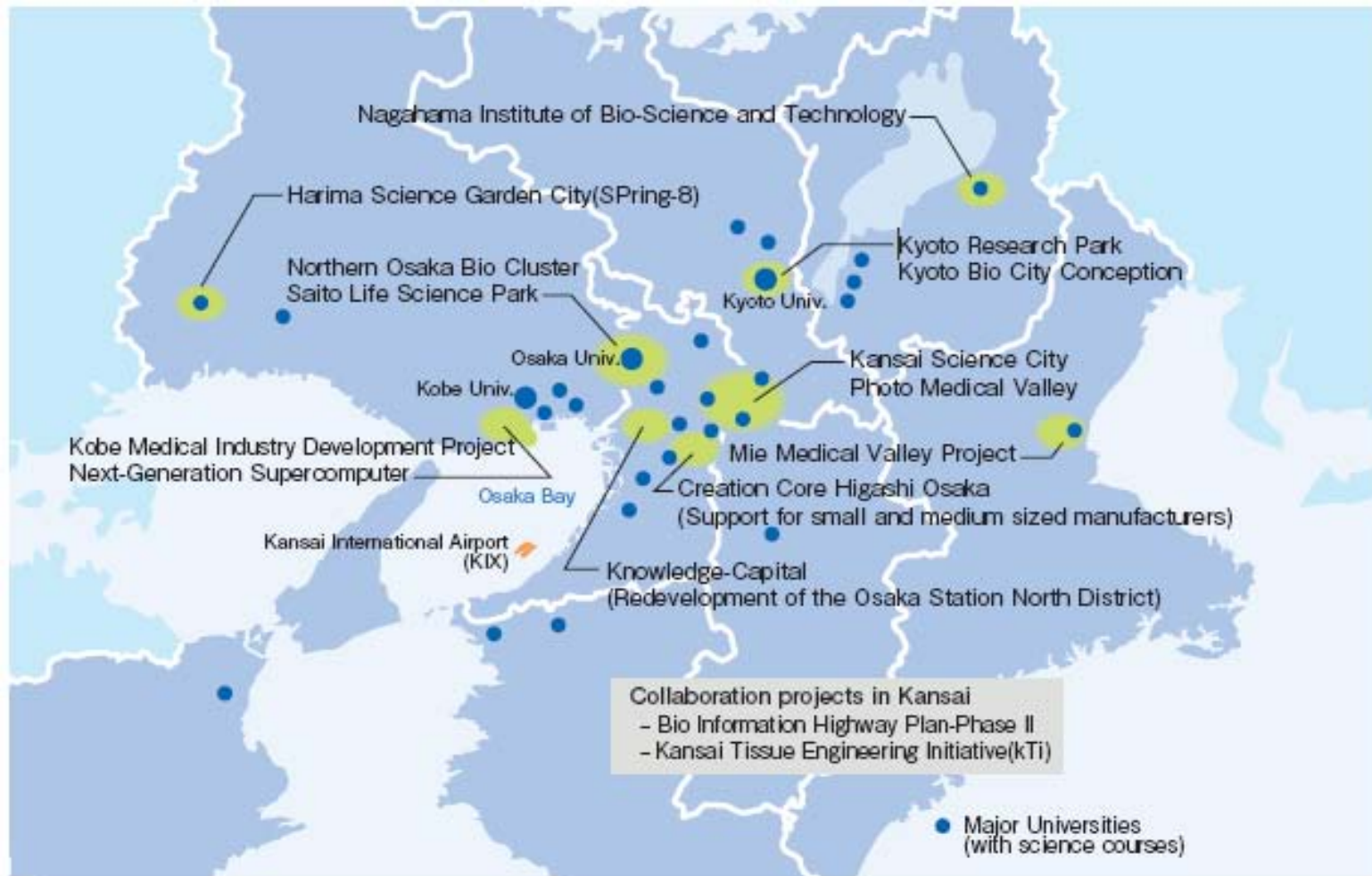
Kansai has well-established industrial parks and knowledge centres as a result of national initiatives to establish technology and industry (see Chapter 6). The distribution of major business clusters are illustrated in Figure 49 and related major R&D development and research cores in Figure 50.

Figure 49: Kansai business clusters



Source: METI-Kansai, 2010, p.6

Figure 50: Major R&D projects and research cores in Kansai



Source: Kankeiren, 2010, p.14

There are several organisations relevant to this study influencing the economic development of Kansai. Firstly, the Kansai branch of the Ministry of Trade, Economy and Investment (METI-Kansai) whose corporate mission is to promote direct foreign investment particularly in robotics and bio-sciences (Osaka Business and Investment Centre, 2007). It does so by implementing METI policy (see Chapter 6) and offering experience-based advice to the Kansai Region (METI-Kansai, 2004). Secondly, the Kansai Economic Federation (Kankeiren), a private non-profit organisation „contribut(ing) to the sound development of the Japanese economy through formulating policy proposals (and) stimulating the Kansai economy by promoting large-scale projects“ (Osaka Business and Investment Centre, 2007). It is has been a major participant in projects such as Kansai Science City and the Kansai International Airport (Kankeiren, 2010).

In 2008, Kankeiren released its Kansai Vision 2020 (Kankeiren, 2008) - „*Ensuring Kansai’s “renewed development” while contributing to the global community with its “breakthrough capabilities”*“ (p.3). Its strategies focused on consolidating industrial strengths through a mix of actions and priority projects largely linked with enhancing aspects of the urban environment. For example (Kankeiren, 2008):

1. Drive the environmental/energy revolution
 - a. Create environmentally advanced model cities (e.g. Kansai Science Park).
2. Promote lifestyle enhancing business
 - a. Focus on increasing access to arts, culture and food.
3. Cement Kansai as manufacturing hub of Asia
 - a. Realise a 21st Century port development plan including the connection of airports, ports and major roads.
4. Make Kansai a knowledge capital
 - a. Redevelop key locations to act as vehicles for the flow of and clustering of knowledge (e.g., Osaka Station North, see Section 4.2).
 - b. Organically link redevelopments with research and knowledge parks, such as Kansai Science City, to form a network of intelligence.
 - c. Establish urban and living infrastructure system to enhance the liveability of Kansai.

The 5th MLIT urban plan (1998b), *The Grand Design for the 21st Century*, envisioned that separate regions (Kansai being one region) are consistent with its proposed *multi axial land* structure and must be:

Independent and to enable people to take pride in their local regions. Each region must develop itself based on mutual participation and cooperation under its own responsibilities, and the plans will play different roles in each region...The various entities participating in regional development must share the same concepts of regional improvement and take action to attain the core objectives in a well-organized manner...Each region should develop regional development plans in line with those proposed in this document, but not limited to them...This document, however, proposes strategies beyond the framework of the existing regional blocks, including the development of regional cooperation corridors and the formation of international spheres of interaction (MLIT, 1998b).

Though each region is responsible for individual urban development plans, alignment to national objectives is overseen and guided by the responsible regional arm of MLIT. For Kansai, this is the Kinki Regional Development Bureau (Kinki Regional Development Bureau MLIT, 2002). Despite flexibility in construction and development guidelines, this suggests regional and local governments are instruments of National industrial and infrastructure policy (Bauman, 1996; Jacobs, 2002).

The overall vision of the National plan for Kinki (or Kansai) as a „cultural and creative hub that makes Japan attractive to the world“ is strongly reflected in the 2000-2015 *Basic Development Plan for the Kinki Region* (MLIT, 2000). The plan sees Kansai as:

1. Representative of Japan’s strength in culture, science and R&D in the global age (MLIT, 2010); and,
2. Part of a multi-core industrial-urban cooperative regional grid for advanced culture and science with urban development enhancing daily living standards and encouraging global competitiveness (MLIT, 2000).

The Kinki plan endorsed several development measures relevant to this research (MLIT, 2000):

1. Create healthy residential environments and advanced urban functions (e.g., business management, information, educational and culture) required for a world-class city, including ensuring employment opportunities through the consolidation of industrial and technological assets.

2. Redevelop the old urban areas for greater urban safety, including improved green zones.
3. Activate local industry by improving local transportation, production, processing and distribution infrastructures, promote the use of new technologies (e.g., biotech) and develop value-added industries based on local resources (e.g., history, culture).
4. Convert land use and improvement of infrastructures in underutilised areas (e.g., where factories used to be).
5. Preserve and recover environmentally significant areas, e.g., coastal and river environment.
6. Create more attractive live/work/leisure mixed-use environments with special care to preserve the individual characteristics of each area (including living, environmental, education, culture and energy aspects of urban life).
7. Develop regional cooperation corridors enabling the flow of people, goods and information within the region and with other regions, including strengthening transportation networks (e.g., improve links between major road and rail systems and construct Kobe Airport).
8. Attract and build a network of world-class cultural, scientific and R&D centres using Kansai Science City as well as associated leading-edge industries (e.g., communications, design) and entertainment industries (e.g., tourism, conferences).
9. Establish large-scale exchange networks of cultural, scientific and R&D achievements particularly with Asia Pacific region, for example by strengthening infrastructure and facilities at international air and shipping ports.

Kansai industrial and urban visions, priorities and development measures are consistent with innovation infrastructure requirements and qualities, and therefore, likely to support regional knowledge development and innovation flows. The following explores elements of urban form which emerged as present in Kansai during the interview and document analysis process and may affect the capacity of development to support or hinder new economy efficiency.

7.4.1 City of Kobe

As a mid-size Japanese city with a population of 1,533,034 (City of Kobe, 2009b), Kobe competes against the larger Kansai city of Osaka with 2,653,552 (City of Osaka, 2010a) and neighbouring Kanto Region cities of Tokyo with 12,989,000 (Tokyo Metropolitan Government, 2010) and Yokohama with 3,672,789 (City of Yokohama, 2010). It has

struggled to achieve its current position as Japan's 6th largest city, with an almost 1 million in 1939 dropping to 300,000 after WWII (Kobe City Info, 2006). Figure 38 illustrates its location in Japan, and Figure 51 summarises major urban features.

In response to post war rapid growth, Kansai, like the rest of Japan, constructed low cost housing in 1960's to 1980's based on UK *New Town* principles (Fujii, 2008; Sorensen, 2005). Basically satellite or dormitory suburbs for residents working in the dominant city centre (Fluchter, 2008; Ohno, 2008), these developments generated outer metropolitan sprawl of „greater residential space per person“ (Ducom, 2008, p.1). Despite attracting many young families excited to live in what represented the latest in urban planning at the time, they have more recently experienced rapid social and economic decay (Tsutsumi, 2008). Unlike the de-urbanisation of other countries where populations decline as industry moves elsewhere, Japan's New Towns appear to suffer only from population aging becoming „dormitory settlement(s) slowly emptying of its social contents“ (Ducom, 2008, p.12).

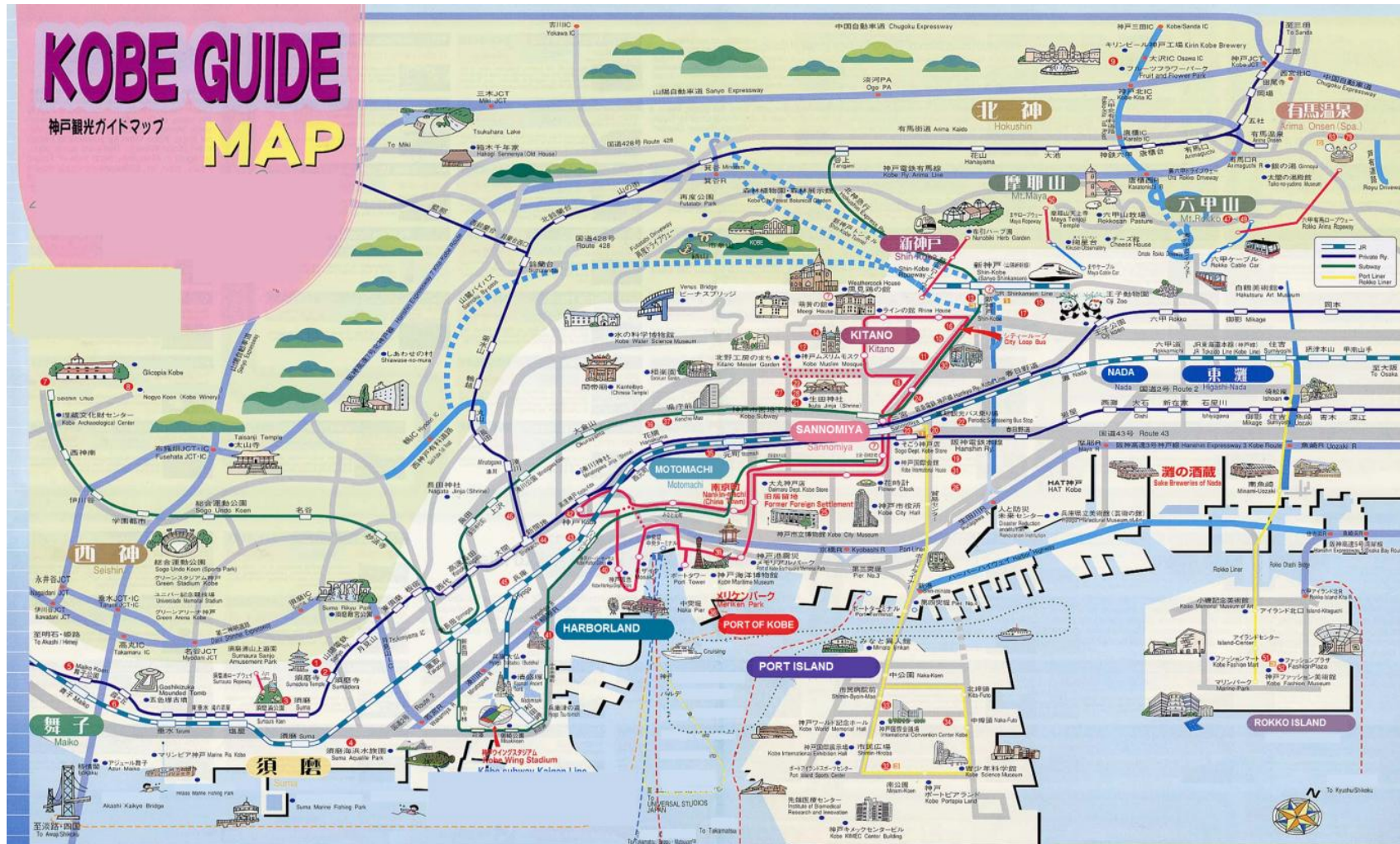
The New Town standardised approach to housing development created monotonous housing (detached and attached) which has become unfashionable and unrepresentative of current Japanese needs (Ducom, 2008; Fujii, 2008). Furthermore, low transport connectivity and limited urban amenities and employment opportunities have meant these developments have failed to attract new residents. Many former child residents (now adults) have chosen to live in the city closer to employment and social infrastructure. This is leaving large urban areas of a fast-aging populations (Doteuchi,1999; Fluchter, 2008), whose declining mobility exacerbate feelings of social exclusion in the low pedestrian-oriented New Towns. Kato (2008a) purported that these issues are likely to worsen with globalisation; he advocated a need for more socially-inclusive approaches to city revitalisation. Ducom (2008) described Tama New Town (outside of Tokyo) as typical of other New Towns around Japan:

These new towns are becoming old towns and concentrating declining suburbs,, problems: massive population ageing and loss, (shrinking) neighbourhoods, buildings emptiness, landscape degradation, urban life erosion (p.2).

Surveyed residents expressed:

...a strong feeling of loneliness and desertion. The expression “ghost city” was often pronounced to describe the new town's atmosphere nowadays. Residents suffer from a lack of social interaction; they don't feel themselves as members of a community (p.10).

Figure 51: Kobe map of major features



Source: Adapted from Kobe guide map (2002)

Ducom noted that these „ghost cities“ were epitomised by:

...closed schools for lack of pupils, abandoned playgrounds for lack of children. A place might be shrinking when its image, in terms of perception, is shrinking... (planning which) avoids accessibilities to basic services and amenities. For example, the principle of separation of cars and pedestrianized streets contributes to important accessibility problems. Highways are located in the valleys and pedestrianized streets on the hills. As a result, elderly people encounter more and more difficulties moving through the new town. Pedestrianized streets become underused, often empty, (flanked by land of no) interest (to) developers (allowing) vegetation to claim back land (p.10).

These urban structural transformations reflect the changing function of cities in Japan, including the increased importance of infrastructure and amenities in attracting human capital. Such areas of outer metropolitan growth and decline are very different to stereotypical Japanese dense urban living. One of the biggest difference between Kansai New Towns and outlying metropolitan suburbs of Perth is Japan's approach to industrial development. The remainder of this section discusses this.

Kobe's key industrial strength has historically centred on its Port facilities linked to an extensive sea, air and land transportation network (City of Kobe, 2008a, 2008b; Kobe Airport Marine Air, 2010). Before 1995, it was the world's 6th leading port contributing 39% to Kobe's gross industrial output (Horwich, 2000). Kobe traditional industries were in manufacturing, namely sake brewing, shoes (in particular, synthetic shoes), automobiles and semi-conductors (Hokugo & Matsushita, 2007).

With Kobe's growing population and significance as a port, City of Kobe undertook several land reclamation projects to provide housing and expand port facilities (City of Kobe, 1997). Firstly Port Island and then Rokko Island were constructed and completed in 1980 and 1992 with the respective visions of „building a new cultural city on the sea for the 21st Century“ (p.2) and „a multi-functional city“ (p.8). Land use in both was divided into two main zones of central urban and peripheral port functions. Port Island is more highly segregated with each zone further broken into smaller sectors; its principles were largely based on New Town development approaches. Rokko Island was more highly integrated being „designed to create a people-friendly town where business/commercial functions and residential functions exist in harmony“ and aiming for an „optimal urban environment“ (p.8). Local authorities were attempting to redefine earlier Greenfield methods of developing land (New Towns), including giving developers a greater role in creating vibrant community networks (Mizuno & Kadono, 2006).

In 1995, in the midst of the Japanese recession, the Great Hanshin Earthquake hit Kansai. It destroyed 32% of Greater Kobe and more than 50% of the city's urban core, including major transport infrastructure. Increases in regional unemployment were substantial, as much of Kobe's business community was destroyed through large-scale damage to property and transport infrastructure (Hokugo & Matsushita, 2007; Karan, 1997; Olshansky et al., 2005). Kobe was able to regain 75-90% of its former capacity by 1999 (Olshansky et al., 2005). Horwich (2000) suggested that this relatively fast recovery was due to only small human capital losses.

The rebuilding efforts of The Great Hanshin Earthquake presented a unique opportunity to explore new urban planning and economic revitalization techniques otherwise limited given Japan's restricted Greenfield development, high urbanization and uninhabitable mountainous land mass. One example of this was its land readjustment process which transformed land from disorganized traditional housing and urban planning to land with wider roads, larger public green space, more well-distributed denser housing, particularly around train stations (Bauman, 1996). Land readjustment „consist(ed) of regrouping and redividing the land...to create new public space for streets and green spaces and reserve land for sale to cover some costs of the redevelopment“ (Hein, 2001: 228). Rokkomichi and Shin Nagata were such sites (City of Kobe, 2010a).

Another example is in the reconstruction and renewal of large tracts of middle-urban areas, again Rokkomichi and Shin Nagata (City of Kobe, 2005, 2007b), which trialed combining bottom-up *machizukuri* (neighbourhood planning through citizen participation by promoting communication between city planners, developers, private business and local communities (Olshansky et al., 2005)) with top-down large infrastructure projects (Tanaka, 2008). The results were mixed. Hein (2001) described Shin Nagata as containing good „examples of large-scale urban transformation and innovative attempts at creating community spaces“ (p.222), while Evans (2002) contested that *machizukuri* in Kobe at the time was more window-dressing than true citizen participation.

Consistent with national knowledge economy objectives and as a means of restoring the devastated city, Kobe sought to leverage its large number of established drug companies and universities to transform it into a centre of advanced medical research and excellence (Kruger, 2002). Technology parks and education precinct developments, such as Port Island life-science cluster and Gakkuentoshi university town (Kobe Airport Marine Air, 2009), were seen as key in establishing Kobe as global information and knowledge exchange hub. Supporting urban regeneration projects commenced in 2001 following the 1998 official announcement of Kobe's Medical Industry Development Project (Kobe Medical Industry Development Project Study Group, 2008). Figure 52 illustrates the comprehensive

connection between aspects of Kobe's urban environment and its „health conscious city“ strategy (p.9), including the advanced medical research and industry found on Port Island.

Port Island was believed to be the ideal location to centre Kobe's new „life-science cluster“ (Nishikawa, 2009; Kobe Medical Industry Development Project Study Group, 2008) and assemble the government, private and academic institutions necessary for cutting edge research and development (MEXT, 2007). Kobe aimed to house the world's No.1 bio-medical cluster, the elements of which are detailed in Figure 53 (MEXT, 2009).

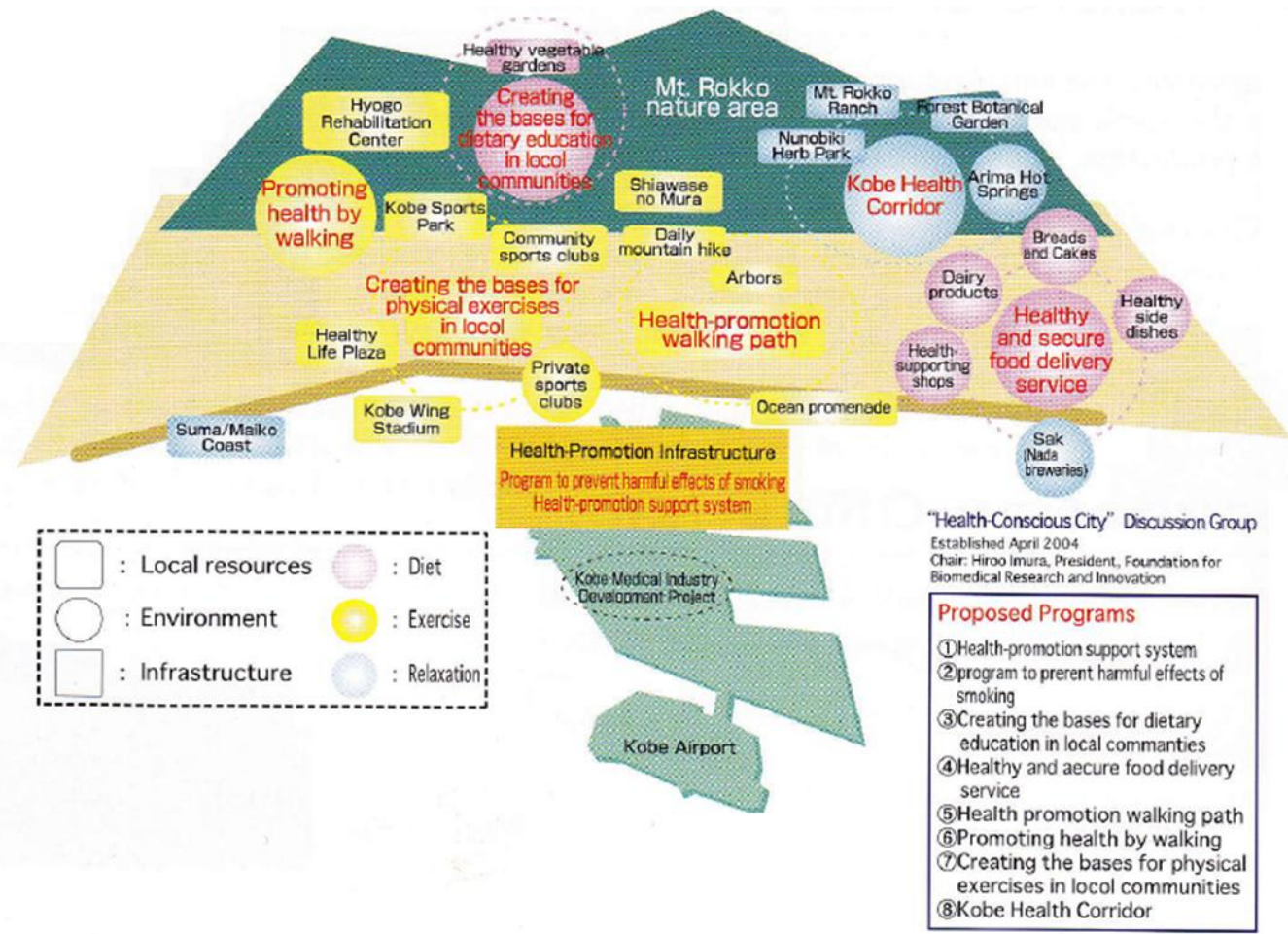
Strongly linked to its knowledge economy vision, Kobe Port was unveiled in 2005 as a „lively port that attracts people and goods from all over the world“ (City of Kobe, 2008b, p.17). The port vision included two precinct developments (Figure 54): 1) a logistics zone to consolidate the existing global port function; and, 2) a water front and entertainment zone leveraging its tourist potential. Work/live/play developments were constructed connecting residential and industrial zones along the waterfront precinct. This is illustrated in Figure 55, and includes:

- Residential blocks of HAT Kobe (abbreviation: Happy Active Town) on land which was previously disused factories and severely earthquake damaged. HAT Kobe bridges the Port's industrial and entertainment function bringing together the central business function of Sannomiya and the Port's entertainment area *Harbourland* (City of Kobe, 2001).
- Harbourland which holds some of Kobe's most icon buildings (City of Kobe, 1992).

The dual *production of goods/attraction of human capital* approach taken by Kobe Port development aligned with Kato (2008b), who suggested that Kobe must move from a „branch plant economic system“ to being a „brain port“ for future economic competitiveness. That is, the attraction of quality human capital as well as high-tech and emerging technology business was viewed as a means of establishing Hyogo as a global mega-region.

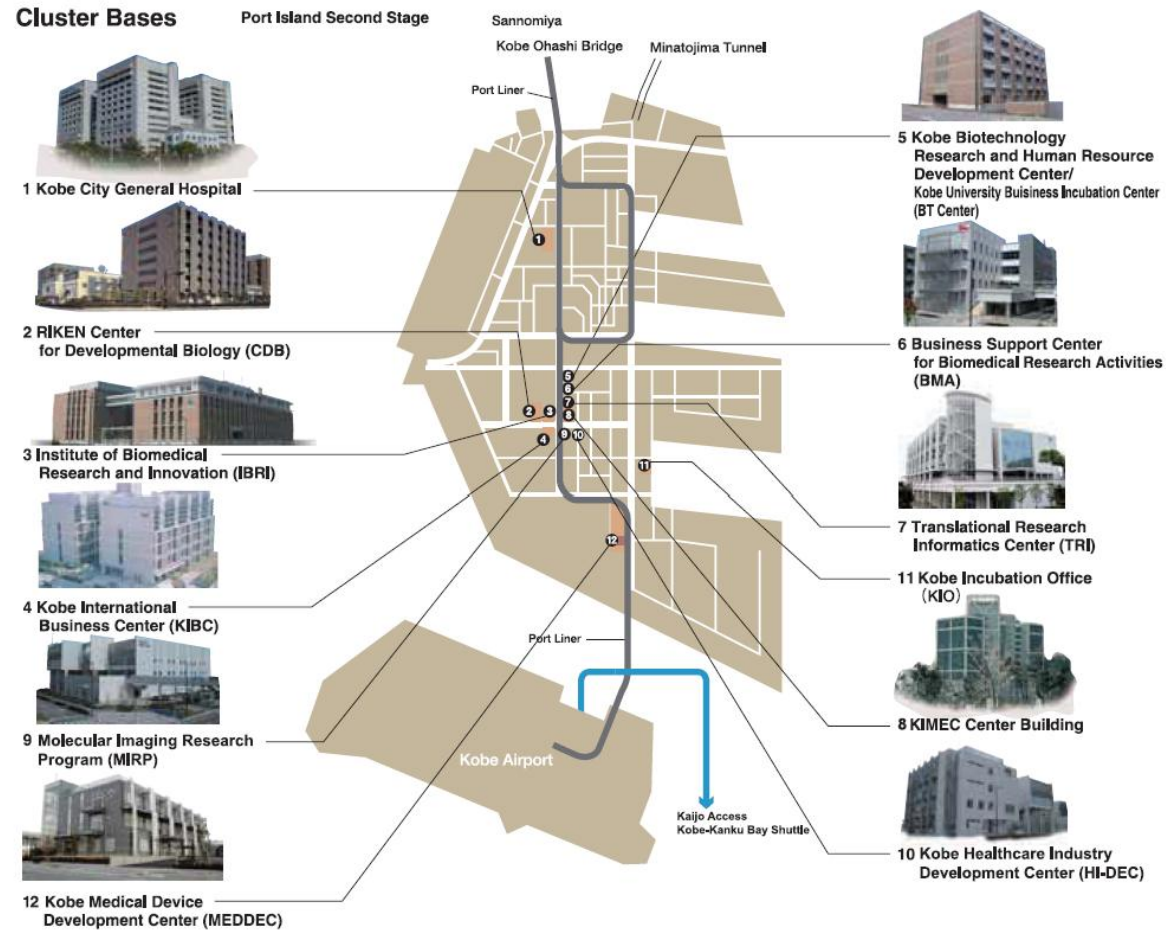
As the result of its strong creative and innovative city image, Kobe was admitted to the UNESCO Creative Cities Network in 2008. Its submission stressed „enhanc(ing) “things unique to Kobe” through excellent designs“ „to create its new attraction and vitality and improve quality of life“ „by enhancing the City's unique resources and attractions from a design perspective“ (UNESCO, 2008). This submission, including its commitment to „city revitalization by strengthening cultural industries“ (UNESCO, 2008), solidified its new economy brand. A range of policies and initiatives were employed to promote design industries (clothing, shoes, knowledge-based industry, R&D) and community-oriented city design (landscaping, urban revitalization, enhancing daily life, culture and art) (City of Kobe, 2008c, 2010b).

Figure 52: Vision for incorporating all aspects of „health“ (community, government, industry and academic) across Kobe and Port Island to foster knowledge development in advanced medical research



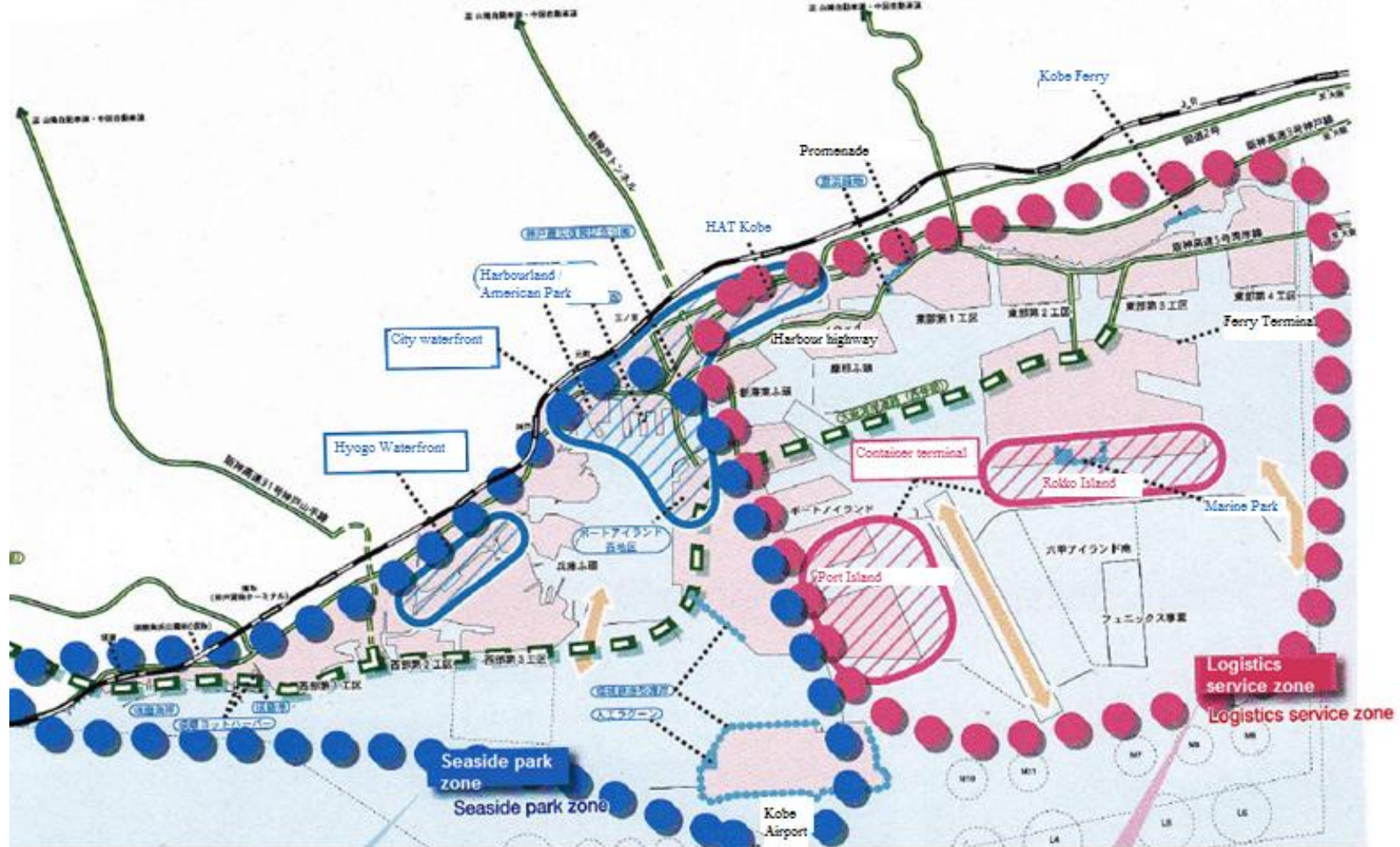
Source: Kobe Medical Industry Development Project Study Group (2008, p.9)

Figure 53: Key institutions of life-sciences cluster at Port Island



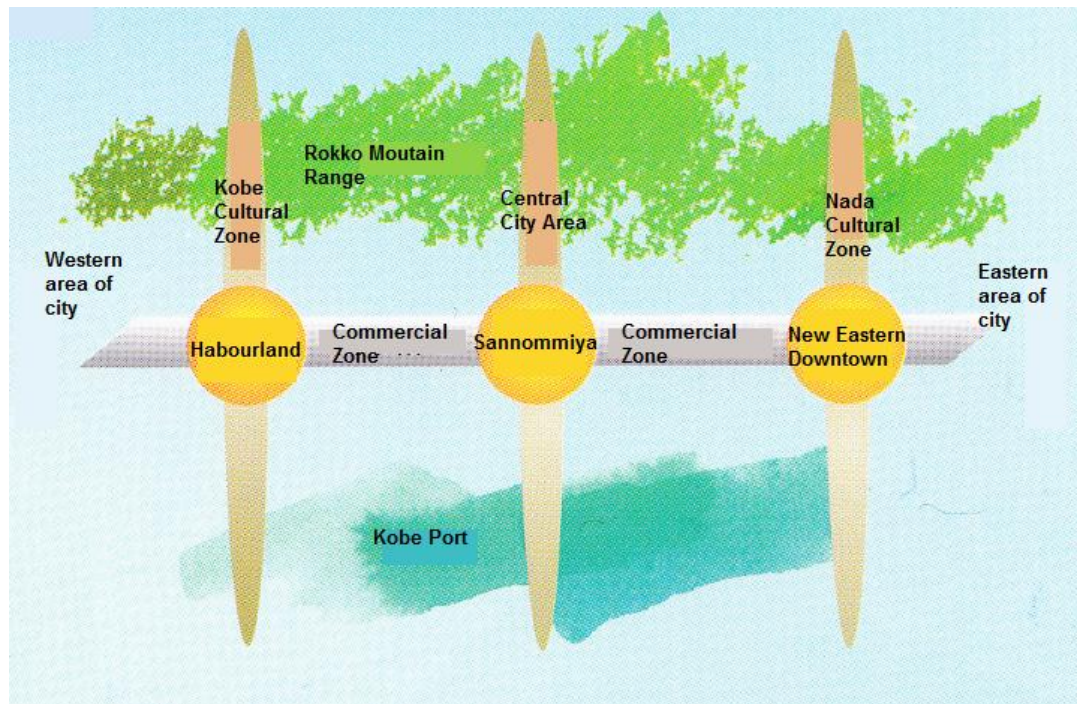
Source: MEXT (2007, p.13)

Figure 54: Future Port of Kobe development plan



Source: City of Kobe (2008b, p.17)

Figure 55: Stylised image of connection between different functions of Kobe Port



Source: City of Kobe (2001, p.1)

Kobe appears focused on being the international industry and knowledge gateway for Kansai. As such, many of its urban development projects centre on expanding air and sea port functions. The theme „connecting people through urban infrastructure“ consistently reoccurs in Kansai urban and economic strategies. It is a city that aspires to leverage design, culture and creativity to generate a world-recognised global city. It is addressing industrial decline in manufacturing by introducing new industry, such as tourism, computers, health, medical, biotech and design. It has embedded its image as a „healthy city“ into all elements of city life to assist and drive emerging research and development. It has consolidated traditional strengths by recognising both the logistics and leisure aspects of the Port. It is recognising the importance of its people and creating more attractive work/life spaces. How successful this has been in generating human movement, interaction and connectivity is considered in the next Chapters.

7.4.2 Kansai Science City (Keihanna)

Kansai Science City is of strategic importance to Kobe as a major technology and research park in Kansai and part of the National Government’s knowledge development and innovation program.

With a population of 263,006 (Foundation of Kansai Research Institute, 2009), Kansai Science City (KSC) is designed as a Greenfield live/work science technology park. Its approximately 15,000 hectares includes the three Kansai prefectures of Kyoto, Osaka and

Nara, 3,600 hectares of which are earmarked to foster 12 districts of different cultural and scientific research clusters (Kansai Research Institute, 2009, 2010a). This is more than any of the other National Government technology parks (Kansai Research Institute, 2010b).

Conceived in 1978 as part of the National Governments Technopolis plan, KSC's vision was based on creating *a new global civilisation for the well-being of mankind* (Kansai Research Institute, 2010a). Its first stage of initial planning and development occurred from 1987 until its official opening in 1994, its second stage focused on attracting industry, academic and government residencies (1996-2005). The third and current stage (2006-onwards) included consolidation of residential areas and major infrastructure, for example construction of rail and new residential areas (Kansai Research Institute, 2010a). KSC currently represents two areas of the National government Knowledge Clusters Program: 1) the Kansai life sciences cluster, including knowledge infrastructure of Kobe and Osaka; and, 2) the Kyoto environmental nanotechnology cluster (MEXT, 2006; 2010). These are complimented by the METI industrial cluster program, of which KSC is part of 3 clusters: 1) Kansai manufacturing and IT; 2) biotechnology; and, 3) Environmental (METI, 2004b). The relationship of KSC to the MEXT knowledge clusters program (including Kobe University and biomedical cluster links) is illustrated in Figure 56.

Figure 56: Relationship of KSC to knowledge infrastructure of surrounding areas



Source: Adapted from MEXT (2010)

KSC is managed and developed by the Urban Renaissance Agency (UR), the housing and land development arm of MLIT (Taniyama, 2009; Chuma, 2003). With a mission to „create cities of beauty, safety and comfort where people can shine“ (UR, 2009, p.2), it is principally involved in the areas of urban renaissance (Osaka Station North in Figure 57), living environment, suburban environment and disaster development (e.g., HAT Kobe). It assists in developing the national governments' knowledge cluster and industrial cluster priorities. For example, it plays a key role in developing Osaka Station North by coordinating efforts of business, industry and academia. Phase 1 of the Osaka Station North project is scheduled for

completion in 2012. Osaka Station (or Umeda) is Western Japan's busiest train station with an estimated 2.5 million users daily (Kankeiren, 2010; UR, 2009). The project aims to develop the last remaining central city land into key knowledge-capital infrastructure, including cutting edge technologies, arts and entertainment (Kankeiren, 2010). It is connected to other knowledge infrastructure such as the Osaka Bay development (hi-tech, IT) and KSC (City of Osaka, 2010b; Kankeiren, 2009). Figure 57 gives an artists' representation of the proposed development.

7.5 Conclusion

This Chapter built on the case study analysis of Chapter 6. Section 7.2 summarised case study site selection methodology and considerations, while Sections 7.3 and 7.4 offered a comprehensive examination of urban planning and new economy development policy and initiatives in the respective regions of Kansai, Japan, and Perth's Northwest Corridor (PNWC), Western Australia. Though both study regions made new economy shift at similar times, Kansai appears to have adapted more quickly than PNWC.

PNWC is expected to accommodate a large portion of Perth's rapid urban growth as a result of the State's burgeoning economy and Perth's continued plans for urban expansion. State Government urban policy supported by strong urban sustainability principles will guide this growth for the whole of the Perth Metropolitan Area. Analysis of Federal, State and local (Joondalup and Wanneroo) documents indicate a strong drive to support new economy industries by promoting knowledge development and innovation. However, to date, there have been only weak links connecting new economy policies and strategies to the planning of cities and neighbourhoods. Indeed, economic development policy itself appears to have no clear role outside of a retail strategy in PNWC.

Nevertheless, many of its urban planning policies and initiatives advocate greater vibrancy and higher pedestrian accessibility, and appear highly supportive of new economy needs. Historic precedent shows PNWC's biggest challenge will be adhering to these strategic and policy guidelines in the face of decreased short-run profitability for developers and long-term gain for communities. This may not be easy given the profit-motivations of developers and the car-based planning expectations of citizens.

Figure 57: Proposed knowledge-capital development outside Osaka Station North



Source: Adapted from City of Osaka, 2010

There appears to be two major constraints on the degree to which the environment of Joondalup's urban core can support knowledge economy development, its highly segregated and car-based nature. These infrastructure constraints may have contributed to its difficulties in competing with Perth Capital's commercial core to attract and facilitate knowledge-intensive industry and investment.

Nearby Wanneroo is also primarily car-based, though recent documents demonstrate slightly higher levels of integration between economic development and urban planning priorities. Outside of Joondalup's education precinct, the most promising area for growth in PNWC for knowledge-based industries is in yet-to-be developed Greenfield sites, such as Yanchep. Needless to say, the success of this is difficult to measure. Nevertheless, Yanchep's future State strategic significance is highlighted by its newly appointed position as a third tier activity centre and possibility of it becoming second to the Perth Capital commercial core. Its biggest challenge will be to adhere to strategic and policy guidelines in creating more pedestrian-oriented and connected spaces and not succumbing to the temptation of the easy profits afforded by tried-and-trusted car-based planning approaches. Its recent elevation to a third tier centre is likely to directly compete with Joondalup for State and Federal infrastructure and other large commercial project funding. This may force Joondalup to rethink its regional strategic position by re-evaluating urban competitors and refocusing priorities and actions in order to achieve its now aspirational second-tier activity centre target.

Situated adjacent to the powerful Kanto region, Kansai cities (Osaka, Kyoto, Kobe, Nara) have struggled against the industrial and business dominance of Tokyo and its Greater Metropolitan Area. National government policy has been used to redress this by attracting business and investment to regions outside of Tokyo, as well as strengthen national industrial competitiveness. The national government has traditionally taken a top-down approach to ensure a high degree of integration between urban planning and economic development for national economic success.

Regions, such as Kansai, and cities, such as Kobe, also have highly integrated urban planning and economic development policies being largely linked to national policy directions. As a result of recent high-tech and knowledge-based economy policy shifts, Kansai has a well-developed system of industrial parks, education precincts and knowledge centres. Kansai industrial and urban visions, priorities and development measures appear consistent with innovation infrastructure requirements and qualities. This is demonstrated in the post-quake reconstruction of efforts of Kobe and industrial parks such as Kansai Science City, both appear sensitive to the industrial and knowledge strengths of the surrounding Kansai area in which they sit. Indeed, both Kobe and KSC appears to leverage the connectivity and mobility of people to develop and support industrial and innovation growth.

The connections between Osaka Station North, Osaka Bay development, Kobe biomedical clusters and KSC illustrate this.

More recently, Japan's compounding population issues and post-war car-based planning techniques have created visible socio-economic disadvantage between the residents of outer metropolitan and those of mid and inner metropolitan areas. In an era where the speed of human connectivity, movement and creativity in local economies matters, this is highly undesirable and potentially economically inefficient. Kansai (along with the rest of Japan) has focussed on the attraction of human capital through bottom-up development approaches (machizukuri) to revitalise communities and create more liveable and vibrant neighbourhoods.

The way in which Japanese economic development has been facilitated through policy and coordinated strategy provides interesting insights for Perth's Northwest Corridor who has not been successful in generating a coordinated urban planning and economic development policy approach. The success of the respective regional policies and strategies outlined in this chapter in generating environments capable of contributing to the innovation system is explored in the following chapters.

CHAPTER 8: STATIONS IN CASE STUDIES⁷

8.1 Introduction

This chapter analyses case study sites according to the methodology outlined in Chapter 3 to assess capacity to support knowledge development and innovation. Section 8.2 details site selection and methodology. Section 8.3 and 8.4 document infrastructure and amenities (INAM) of two representative train stations in each Kobe and PNWC. It examines the how urban form, as determined by INAM, might influence human movement and flows around train stations by mapping surrounding human flow lines as spatial indicators of human movement and vibrancy. This is used to determine the likelihood of the development and immediate surrounds to contribute to the regional innovation system by supporting new economy priorities of human vibrancy, connectivity, movement and creativity. A version of these sections was published in 2010 State of Australian Cities Conference (Martinus, 2009). Section 8.5 compares the results of the central cities of Joondalup and Sannomiya to those of the cities of innovation (see chapter 3).

8.2 Site selection and methodology

This chapter uses the methodology and assumptions outlined in chapter 3 section 3.2. As such, a study of transit-oriented developments (TODs) in the respective central cities and suburban areas of PNWC (Joondalup and Clarkson in Figure 58) and Kobe (Sannomiya and Rokkomichi in Figure 59) which analyses patterns of pedestrian movement and activity, not intensities, will be mostly independent of Kansai and WA population density variations.

This study defines TODs as vibrant socially-inclusive hubs of mixed-use transport, affordable medium-density housing and small business developments (DPI, 2005). The layered transport, residential and business function of TODs aligns with other studies speculating on the role of railway stations as both a *place* (containing opportunities for social and economic human exchange and networking through a range of shopping, tourism,

⁷ A version of this section was published in Journal of International Knowledge-Based Development (Martinus, 2012b, forthcoming).

business activities) and *node* (transportation access point) (Oosten, 2000; Peek et al., 2006). It is argued that urban form which layers human activities and amenities optimises the quality and diversity of human capital flows, providing locations where chance meetings may lead to productive human interactions (Bertolini, 1999). In addition to the local socio-economic *place* function of TODs in general, the case study TODs were purposely selected as the most-pedestrian-oriented location in each study region which best fulfilled the selection criteria of chapter three.

Figure 58: Position of Joondalup and Clarkson in relation to Perth City

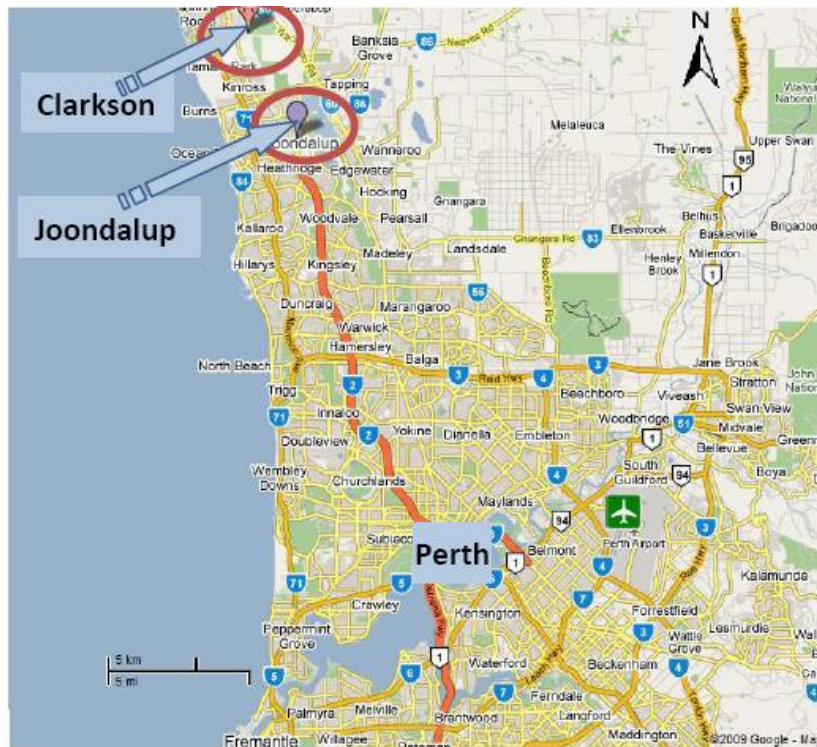


Figure 59: Position of Sannomiya and Rokkomichi in relation to Osaka City



Source: Adapted from Google Maps (2009)

Table 19: TODs node (inside station) and place (80m & 1km radii) functions

INAM categories	Sannomiya (dominant area)			Joondalup (dominant urban area)			Rokkomichi (secondary area)			Clarkson (secondary area)		
	Place		Node	Place		Node	Place		Node	Place		Node
	80m-1km radius	80m radius		80m-1km radius	80m radius		80m-1km radius	80m radius		80m-1km radius	80m radius	
Transport options (e.g., train, bus, pedestrian, tram)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
Community open space (e.g., parks, public squares)	✓	✓	✗	✓	✗	✗	✓	✗	✗	✓	✗	✗
Retail (e.g., small and major)	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Supermarket (daily grocery)	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
Personal services (e.g., beauty)	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓	✗	✗
Business services (e.g., computer, accounting)	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓	✗	✗
Financial services (e.g., banking, financial advisory)	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✗
Public wireless hotspots (e.g., cafes, hotels)	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗
Entertainment (various clubs, fun activities)	✓	✓	✓	✓	✗	✗	✓	✗	✓	✗	✗	✗
Cinema	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
Theatre	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Restaurants, cafes	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗
Accommodation (e.g., hotels, motels, B&B's)	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
Sporting services (e.g., gyms, specialist retail)	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
History (e.g., museums, tourism)	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗
Library (public & private)	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
University	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
Education (e.g., technical colleges, other learning)	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
High school	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
Total	18	10		17	2		16	7		6	4	
NB: Higher value indicate higher socio-economic <i>place</i> function & lower values reflect stronger transport <i>node</i> function	28/38		7/19	19/38		1/19	23/38		5/19	10/38		2/19

As in chapter three, general categories of INAM types (based on Table 6) were assessed as either present (✓) with a value of 1 or not (✗) with a value of 0 (Table 19). This allowed *place* and *node* values within and surrounding each station to be estimated. A *Node* is identified by the absence of socio-economic opportunities, and the degree of *place* by the number of natural and constructed INAM within an 80metre and an 80metre to 1kilometre radii taken from a *central point* (civic space) just outside each TOD. The 1km radius was chosen as consistent with studies of the limiting size of pedestrian cities (Salingaros, 2003) and TODs (DPI, 2005).

A higher total value indicates a higher *place* function and a lower total value reflects a stronger *node* function. The limited socio-economic amenities inside PNWC stations (Joondalup having 1 and Clarkson 2 out of a possible 19) point to a stronger node function than Kobe stations (Sannomiya having 7 and Rokkomichi 5 out of a possible 19). This is also reflected in place indicators, as both PNWC TODs (Joondalup is 19 and Clarkson 10 out of a possible 38) score more weakly in both the 80m and 80m-1km radii than Kobe TODs (Sannomiya having 28 and Rokkomichi 23 out of a possible 38). Clarkson's overall results suggest a high node function.

Assessing a locations' innovative capacity needs an understanding of human flows as well as *place* function. Using Google Maps to identify spatial distribution of key INAM, daily human movements around each TOD were observed by the researcher in a series of site visits over 1992-2009. Human Flow Lines (HFLs) observations are documented in sections 8.3 and 8.4.

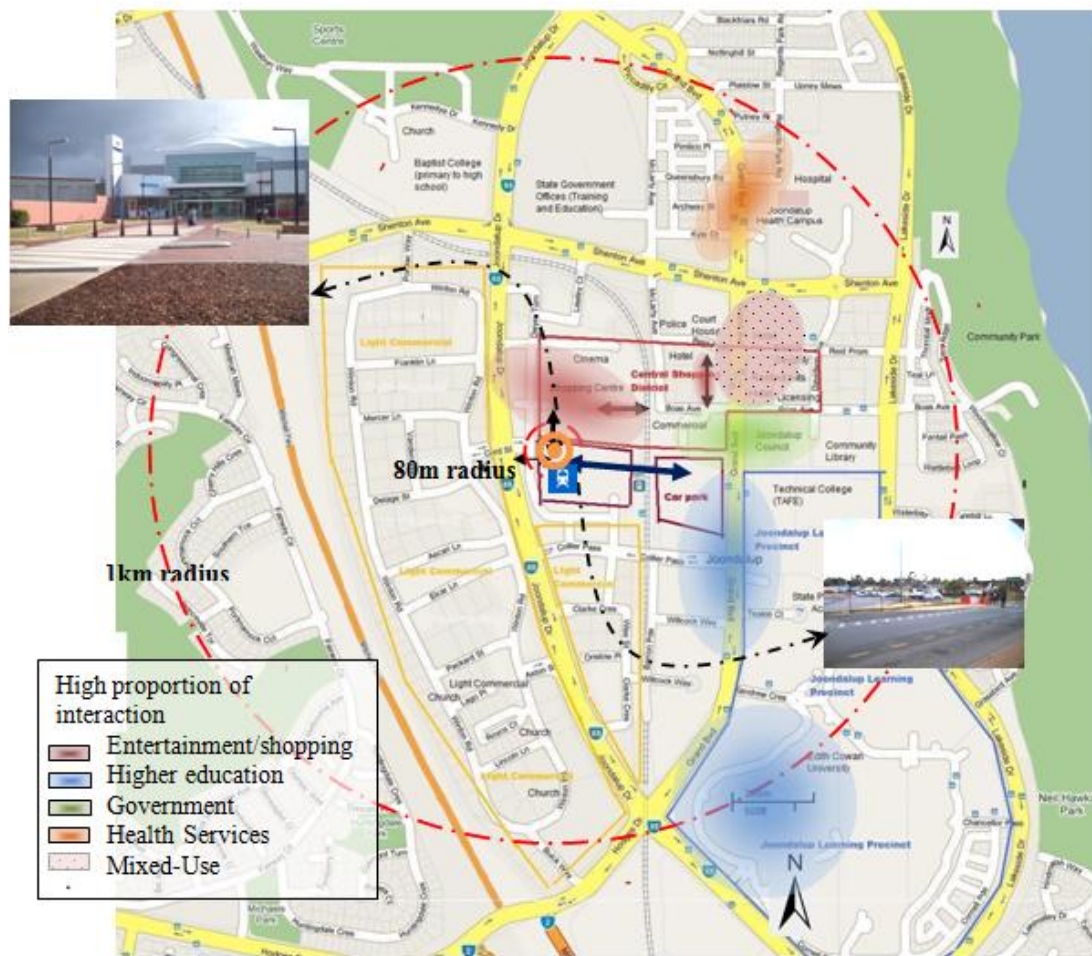
8.3 Perth's Northwest Corridor, WA, Australia

Consistent with Perth's Network Cities approach (WAPC, 2004b), the rail stations at Joondalup and Clarkson were respectively developed as a strategic urban transport hub and a local TOD (DPI, 2005). Given PNWC's predicted future growth and knowledge-based priority outcomes, both can contribute to the social and business networks of WA's knowledge-related industries.

Joondalup city centre is divided into the five precincts of business, shopping, retail, administration and education (Hill, 2005), much of which is within 1km radius of the Joondalup Station. As a result, there is only limited mixed-use planning (residential/commerce) (Figure 60). The station itself sits on the southern edge of the central urban core, surrounded on three sides by access roads and car parking and on a fourth by a major retail shopping complex. Between the station and shopping complex lies a grassed/bricked space (with seating) (*central point*), where observations of short HFLs

suggest it is a passageway to the retail complex. In general, the planning around the station appears to facilitate quick dispersal and absorption of users primarily into adjoining car parks.

Figure 60: Socio-economic neighbourhood of Joondalup



Source: Adapted from Google Maps (2009)

The HFL between the station and Joondalup Learning Precinct (containing Edith Cowan University, WA Police Academy and West Coast Institute of Training) is longer, with students moving through a car park and over a busy road. A pedestrian-oriented commercial district on its north side generates only short HFLs. As such, the HFLs represent a significant loss of urban vibrancy and social capital development.

Relatively new and still under development, the Clarkson TOD has a nature reserve to the east, and car parks, medium-density housing and businesses to the west (Figure 61). Users were observed to either walk to car parks or wait for alternative transport in a civic space (*central point*) immediately outside the station (divided in two by a bus access road). Its planned pedestrian focus appears to target those living or working in its immediate vicinity as there is little pedestrian integration with nearby major destinations points, such as beaches (about 4kms away), major shopping and employment (about 2kms away). A short boulevard of shops and town houses generates a short HFL, which is unlikely extend as the

development matures. The boulevard becomes a road flanked by residential lots and parks, leading from the station exit for over 2kms to a local vibrant hub of various retail (large and small retail stores, furniture, etc), entertainment (cafes, restaurant, bars) and services (business, library, banking, sporting centres, auto/bike repairs, music studios, etc). There is no significant human flow between these locations.

Figure 61: Socio-economic neighbourhood of Clarkson



Source: Adapted from Google Maps (2009)

Both PNWC stations generate low levels of pedestrian flow despite being located nearby vibrant retail precinct. The short distance between the Joondalup station and retail complex creates only short flows, and the long distance of primarily housing lots between the Clarkson Station and local commercial precinct creates no flows above those expected in a normal suburban setting. Planning decisions that have contributed to car dependency (the provision of large car parks and wide roads) on prime land surrounding the train station creates pedestrian movements which are not spatially concentrated, generating limited urban vibrancy and human interaction. Table 19 results and observations of human flows indicate that the urban form around each station does not facilitate social interaction. That is, the environment created by surrounding infrastructure and amenities has limited capacity to attract or retain the movement of people for anything above the transport function of the train stations. This decreases the likelihood of unplanned meetings (which strengthens human connectivity and social capital) and generation of urban vibrancy, both of which can be viewed as a function of the attraction and retention of people. Given the literature review of previous chapters, this low capacity for urban vibrancy and natural social capital building is

likely to be economically inefficient for economies focusing on knowledge development and innovation. Such urban form is likely to add barriers, hampering policies efforts to facilitate PNWC knowledge-economy vision through increased vibrancy, social capital and knowledge transfer.

Table 20: Presence, comparative densities and distribution of INAM in a 1km radius of the main train station in Joondalup

Indicator	Joondalup		
	Presence	Density	Distribution
Transport options (e.g., train, bus, pedestrian, tram)	✓		
Community open space (e.g., parks, public squares)	✓		
Retail (e.g., small and major)	✓		
Supermarket (daily grocery)	✓		
Personal services (eg, beauty)	✓		
Business services (e.g., computer, accounting)	✓		
Financial services (e.g., banking, financial advisory)	✓		
Public wireless hotspots (e.g., cafes, hotels)	✓		
Entertainment (various clubs, agencies, theatres)	✓		
Cinema	✓		
Theatres	✗	n/a	n/a
Restaurants and cafes	✓		
Accommodation (e.g., hotels, motels, B&B's)	✓		
Sporting services (e.g., gyms, specialist retail)	✓		
History (e.g., museums, tourism)	✗	n/a	n/a
Library (public and private)	✓		
University	✓		
Education (e.g., technical colleges, other learning)	✓		
High school	✓		
Average density and distribution of INAM	17/1		
Total presence score (out of 19)	9		

Key

Low density and not evenly distributed	Mid level density and semi-evenly distributed	Dense and well distributed
--	---	----------------------------

The INAM around the Joondalup station was examined further according Chapter 3 highly-innovative cities“ analysis. 7 to 16 pedestrian intersections were counted in the densest 400-metre radial areas of the study area. Public transport was observed as well-distributed (train, bus), but limited as Joondalup was only linked with the international airport through Perth Capital central city. Therefore, it was concluded that Perth Capital central city absorbed the majority of international people movement. Table 20 documents the presence, density and distribution of INAM.

Figure 62: Map of study area (Joondalup)



Source: Adapted from Google Maps (2009)

Figure 63: Relative density and distribution by INAM in 1km radius study area of Joondalup

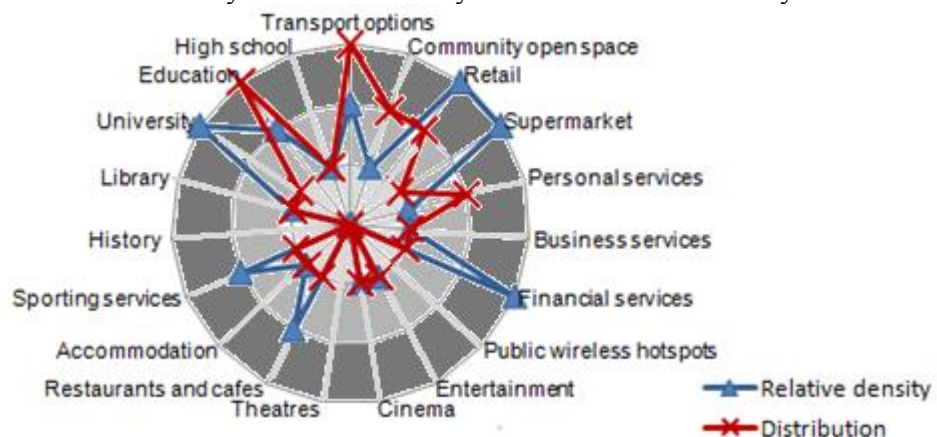


Figure 63 describes the relative density and distribution by INAM type in the 1km radius of study area. INAM are concentrated in a small section north of the station (red area of Figure 62), this section is dominated by a suburban shopping centre. It was also the most walkable and had the highest mixed-use of INAM with primarily retail and restaurants, supermarkets, various services (business, financial and personal) and entertainment (including cinema). It is relatively small compared to the densest areas of Chapter 3 innovative cities.

The rest of the 1km area had little mixed-use, being dominated by single-use zones of large car parks, university/higher education, light industrial (commercial), medical (hospital) and sporting precincts. The most evenly distributed INAM were transport and education. Retail, university, supermarkets and financial services were most dense (darkened area of Figure 63) and, other than retail, were highly concentrated (i.e., unevenly distributed). There was only one wireless hotspot (McDonalds) and no places of historical significance (tourism) or theatres (the arts). On average, the INAM of Joondalup recorded both low density and distribution. Section 8.5 compares Joondalup results with Sannomiya and the 4 highly innovative cities of Chapter 3.

8.4 Kansai, Japan

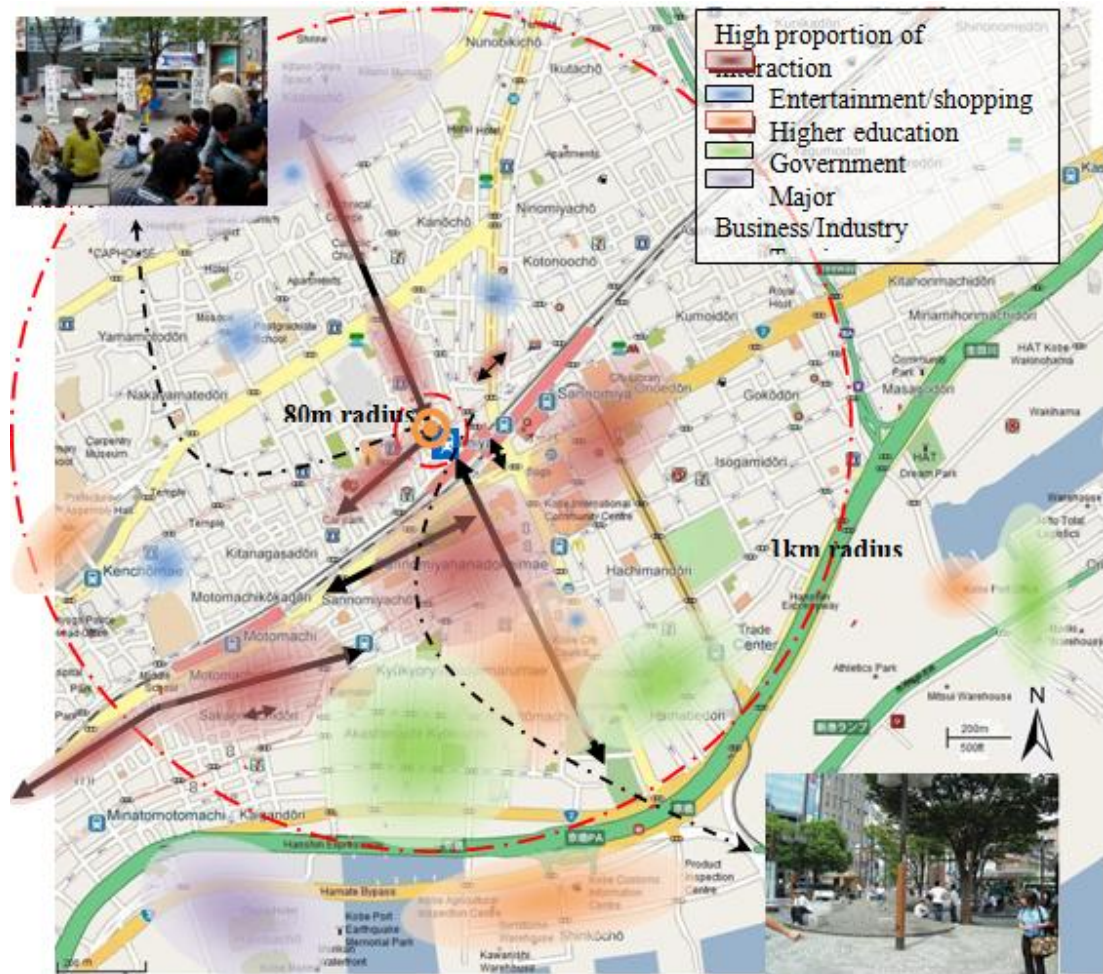
Sannomiya Station is centrally located in the major regional transport, education, entertainment, shopping and administrative hub of Kobe (Figure 64). Surrounding land is primarily for roads, daily pedestrian, business and social functions with car parks in walking distance. The size of the station affords alternative civic spaces within the 80m radius, including the *central point* for this study outside the Hankyu line. Site descriptions and selection methodology are described in chapter 5 section 5.3.1.

Human movement away from here flows along energy corridors of commercial activity, pedestrian traffic is pushed towards major activity centres of tourism, administration and industry, as well as various other education, tourism and commerce points distributed throughout residential areas. HFLs are long, some travelling the full 1km radius of the study site.

Japan Rail (JR) Rokkomichi is located in a suburban shopping and business district. The *central point* for this study is the north-side brick plaza facing primarily retail and food speciality stores (Figure 65). HFLs are fewer than those in Sannomiya, but similarly follow energy routes of commerce leading to destination points of more shopping, industry and transport; with further education administration and commerce distributed throughout residential areas. HFLs are long, some travelling the full 1km radius, such that HFLs from neighbouring Hankyu Rokko station (outside area of this study) easily reach Kobe

University. HFLs to the south follow a similar pattern alongside a large community park and towards a large shopping complex and industrial areas.

Figure 64: Socio-economic neighbourhood of Sannomiya

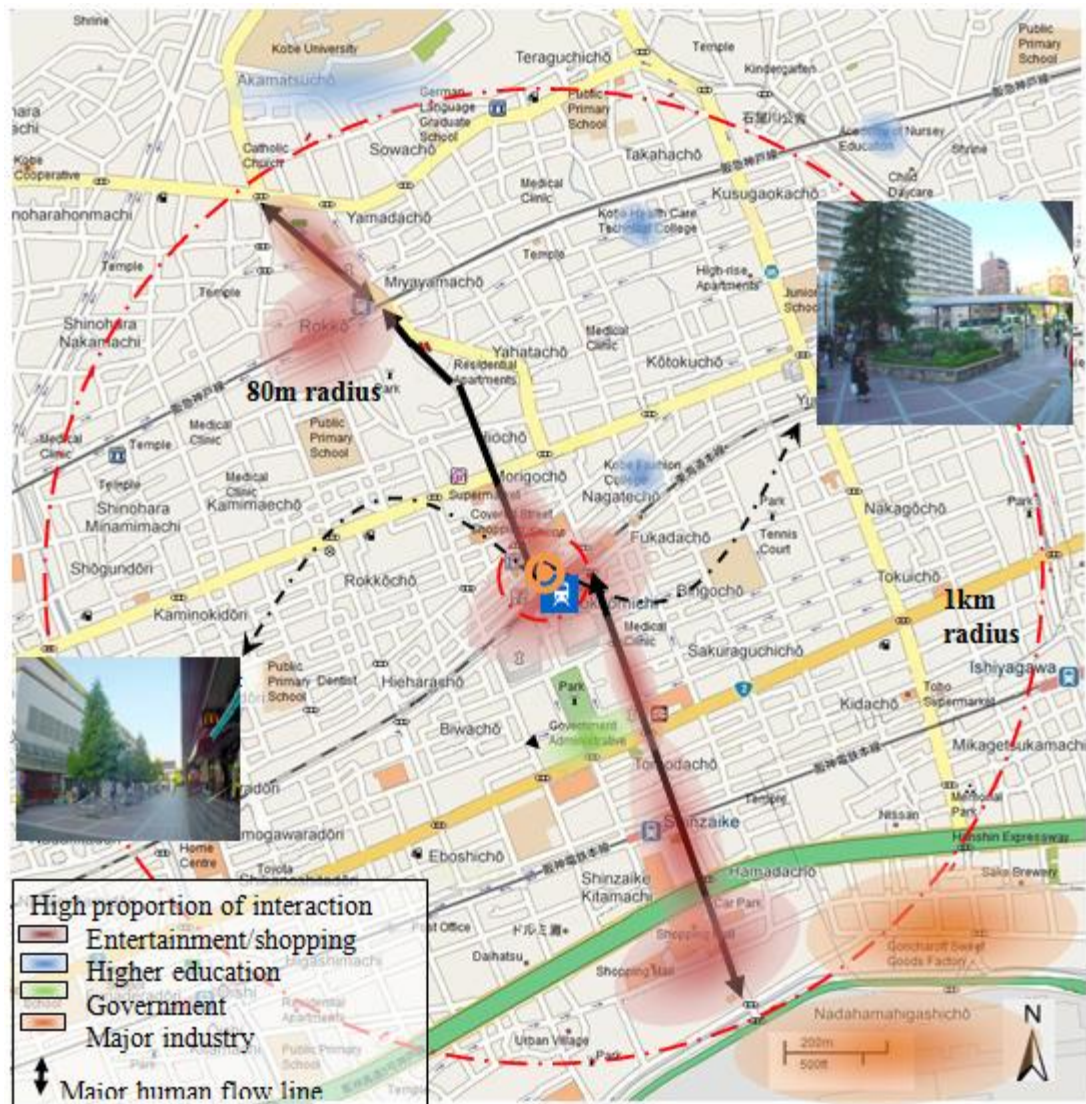


Source: Adapted from Google Maps (2009)

The mix of business and social activity generated by the amenities and infrastructure surrounding both Kobe stations create an urban „buzz“ or vibrancy. The infrastructure immediately surrounding each station is primarily for pedestrians (car parks are a short walk away). Streets lined with various commercial, education, retail, food and entertainment (shaded red) push movement from each station to local destinations of tourism, cultural, school, shopping, etc, creating long HFLs. Urban vibrancy appears to be generated through these concentration flows, and a high level of mixed-use (ie, residential/commercial) suggests high social inclusion. In short, the strong place value of the development (Table 19) combined with observations of HFLs and urban vibrancy indicate that both Kobe stations have urban characteristics likely to support activities relating to knowledge development and innovation (such as strengthening social capital, human connectivity and increasing urban vibrancy). Unlike the PNWC example, these stations appear to have urban form most economically efficient for economies targeting knowledge development and innovation. That

is, the environments created by such urban form are likely to contribute to the flow of knowledge and ideas, and therefore, form part of the regional innovation system itself.

Figure 65: Socio-economic neighbourhood of Rokkomichi



Source: Adapted from Google Maps (2009)

As with Joondalup, the INAM around Sannomiya station was analysed following chapter three methodology. 45 to 48 pedestrian intersections were counted in the densest 400-metre radial areas of the study area. Public transport was observed as extremely well-distributed (train, bus), including train, bus and ferry links to international and domestic airports. These elements indicate its potential high connectivity and global movement of people. Table 21 documents the presence, density and distribution of INAM.

Figure 66 describes the relative density and distribution by INAM type in the 1km radius of study area. INAM are well distributed throughout the study area (red area of Figure 67), which was highly walkable and had a good mixture of uses. The INAM most dense and well-distributed were transport, retail, restaurants & cafes. Other well-distributed INAM were

supermarkets (including Japan’s ubiquitous 24-hour convenience stores), business services, accommodation and universities (lots of small campuses). The density and distribution of INAM appear comparable with those of the four innovative cities.

Personal and financial services, sporting, history and education were all densely located with moderate distribution, except for financial services which were clustered in a small area of the 1km study zone. The absence of „theatres“ is not considered highly significant given the cultural differences between Japan and the West, and that it is more than compensated by the other cultural aspects of the dense and moderately well-distributed „history“ (including temples, Chinatown, historic foreign residences, traditional port facilities, museums). On average, the INAM of Sannomiya recorded both moderate density and distribution.

Table 21: Presence, comparative densities and distribution of INAM in a 1km radius of Hankyu train station, Sannomiya

Indicator	Sannomiya		
	Presence	Density	Distribution
Transport options (e.g., train, bus, pedestrian, tram)	✓		
Community open space (e.g., parks, public squares)	✓		
Retail (e.g., small and major)	✓		
Supermarket (daily grocery)	✓		
Personal services (eg, beauty)	✓		
Business services (e.g., computer, accounting)	✓		
Financial services (e.g., banking, financial advisory)	✓		
Public wireless hotspots (e.g., cafes, hotels)	✓		
Entertainment (various clubs, agencies, theatres)	✓		
Cinema	✓		
Theatres	×	n/a	n/a
Restaurants and cafes	✓		
Accommodation (e.g., hotels, motels, B&B’s)	✓		
Sporting services (e.g., gyms, specialist retail)	✓		
History (e.g., museums, tourism)	✓		
Library (public and private)	✓		
University	✓		
Education (e.g., technical colleges, other learning)	✓		
High school	✓		
Average density and distribution of INAM	18/19		
Total presence score			

Figure 66: Relative density and distribution by INAM in 1km radius study area of Sannomiya

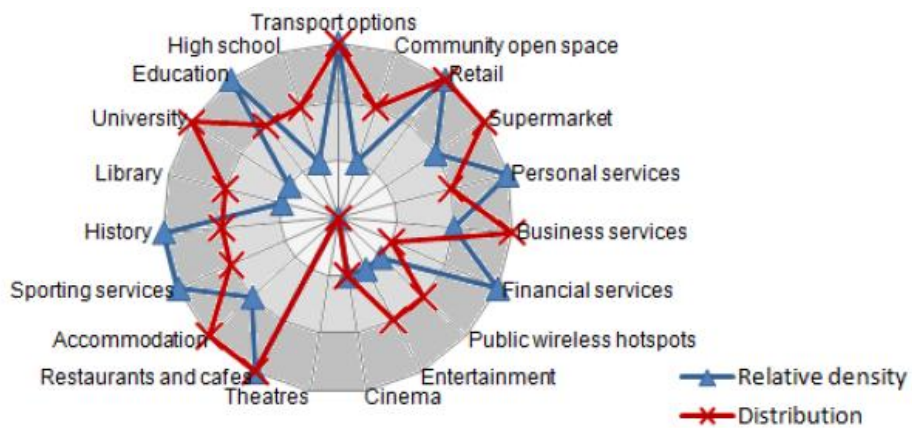
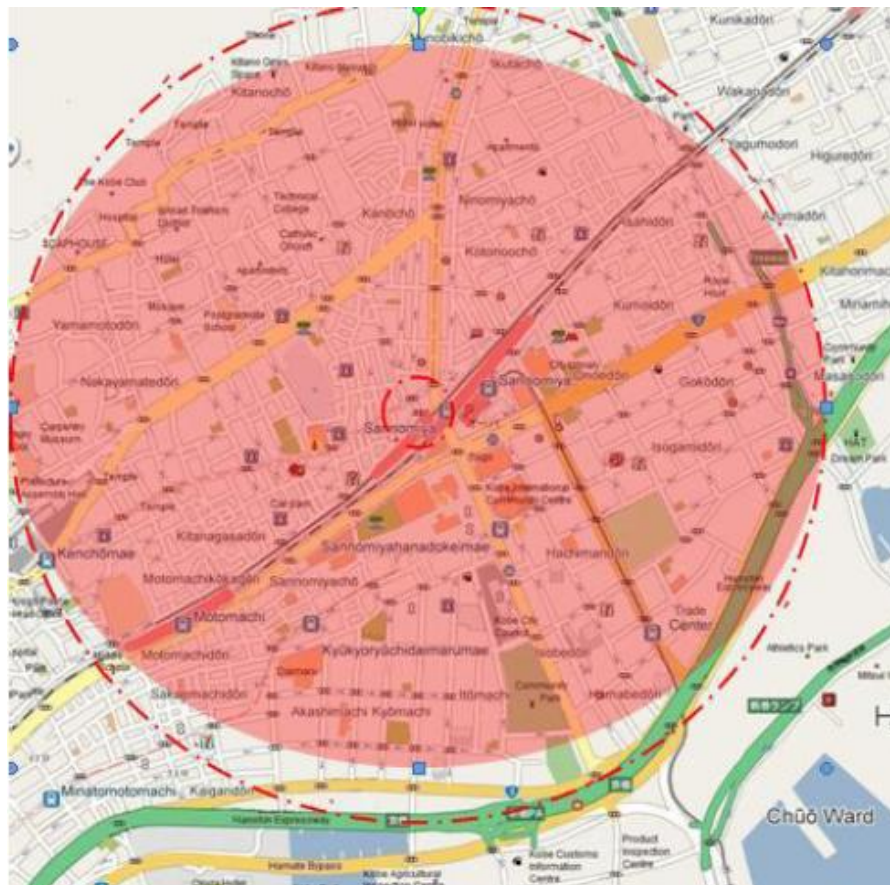


Figure 67: Map of study area (Sannomiya)



Source: Adapted from Google Maps (2009)

The following section compares Sannomiya results to Chapter 3 highly innovative cities.

8.5 Comparing study regions to innovative cities

Figure 68 compares the average relative density and distribution of Sannomiya and Joondalup INAM to that of the four innovative cities in chapter three. Rounding figures off

to total 100% for each city, Table 22 classifies figure 69 results according to: 1) *higher* (11% of Joondalup and 37% of Sannomiya INAM), *same* (26% of Joondalup; 26.5% of Sannomiya), *similar* (11% of Joondalup; 26.5% of Sannomiya), *lower* (26% of Joondalup; 5% of Sannomiya) and *significantly lower* (26% of Joondalup; 5% of Sannomiya). This indicates both the general degree to which INAM support innovative capacity (e.g., factors such as strengthening social capital, human connectivity and increasing urban vibrancy) and the types of INAM needed to improve economic efficiency in innovation and knowledge development (Chapter 2).

Figure 68: Average relative density and distribution by INAM: Comparison between 4 cities,

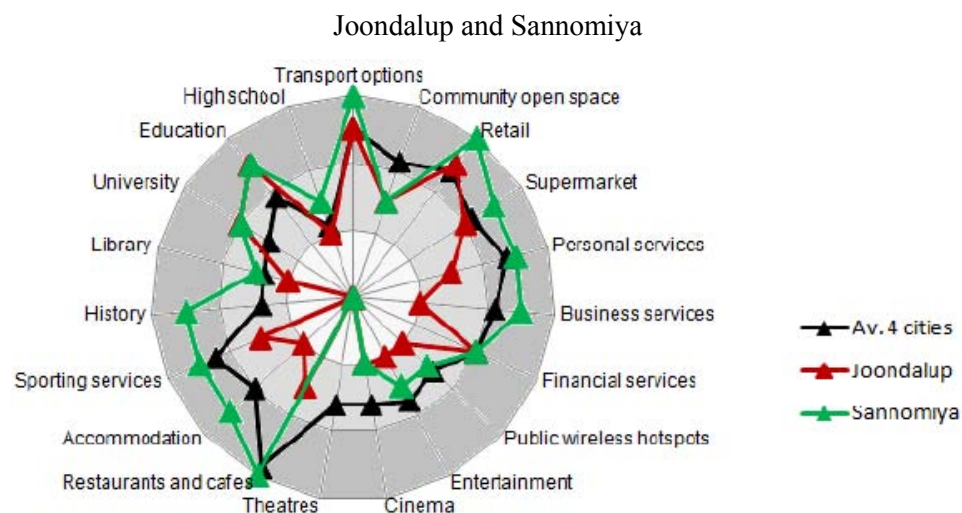


Table 22: Comparing Sannomiya and Joondalup with INAM of 4 innovative cities (percentages are of total assessed INAM)

Compared with innovative cities	Joondalup	Sannomiya
Higher	University, education (11%)	Transport, retail, history, university, education, high school, supermarket (37%)
Same	Transport, retail, supermarkets, financial services, high school (26%)	Personal services, financial services, free public wireless, restaurants & cafes, library (26.5%)
Similar	Community open space, library (11%)	Community open space, business services, entertainment, accommodation, sporting (26.5%)
Lower	Entertainment, sporting, cinema, personal services, free public wireless (26%)	Cinema (5%)
Significantly lower	Theatres, restaurants & cafes, history, accommodation, business services (26% of Joondalup INAM)	Theatres (5%)

As 48% of Joondalup INAM rate well and 52% poorly against the 4 innovative cities, Joondalup's INAM have a slightly lower capacity to support and facilitate the delivery of innovation and knowledge development priorities. Its focus on academic and educational

(11% higher than 4 innovative cities) aspects of the city is consistent with its Learning City Policy. It has only 52% of the business, entertainment and leisure INAM of the innovative cities, along with comparatively low levels of free wireless, global pedestrian movement (complex public transport access to the airport) and pedestrian intersections. These results imply a limited creativity/culture, connectivity and diversity of human capital within a city, three of five identified INAM types. Chapter three identified these as key INAM in the four cities of innovation. In addition, Joondalup's precincts are not based on providing „unique“ human experiences as noted in the 4 cities of innovation, but on particular INAM type (e.g., zones of retail (light commercial district, suburban shopping centre), education, government, financial services).

In contrast, 89% of Sannomiya INAM rate well and 10% poorly against the 4 innovative cities. This suggests that the INAM of Sannomiya is consistent with that of the innovative cities, and therefore highly supportive of innovation. The two aspects „cinema“ and „theatre“ that appear deficient are counter-balanced by the culture and vibrancy afforded by the high density and distribution of history and retail.

Sannomiya urban form facilitates high connectivity with a high number of pedestrian intersections, linkages to airports and free public wireless. In addition, it has several highly pedestrian-oriented mixed-use precincts of unique human experience within the 1km study area: Chinatown (near Motomachi station), business/administrative (south of Sannomiya, including large city park), tourism (Kitanocho, including historic European precinct) and entertainment/leisure (bars, clubs, shopping, eateries, etc, surrounding the station both below and above ground, particularly north of the station running up to Kitanocho). Many streets associated with the different precincts are named (Japanese streets typically have no names being organised in numbered blocks) and branded accordingly with stylised street furniture and particular shops types (further discussion in chapter eight). Therefore, Sannomiya INAM and urban form aspects of the city appear highly consistent with the findings of highly innovative cities.

Sannomiya is likely to be highly economically efficient in the new economy. Evidence of this exists in its rapid new economy success once the switch to knowledge-based industry was made (Table 18) and in the generation of urban form around key public infrastructure sites (such as train stations) supportive of high human connectivity, movement and diversity. Likewise, Joondalup urban form and INAM appear economically inefficient in generating the conditions supportive of the new economy priorities. This is documented in Table 18 which shows Joondalup has struggled to achieve new economy success despite government policy and initiatives.

8.6 Conclusion

This chapter analysed representative train stations of the case study regions by looking at surrounding infrastructure and amenities and concentrations of human movement and vibrancy. It suggested that understanding urban form around key public infrastructure can indicate a developments' success to support facilitators of knowledge development and innovation (e.g., human diversity, vibrancy, movement and connectivity).

A study of transit-oriented developments in both regions highlighted different regional capacities for human movement and interaction. TODs in car-dominated PNWC were found to have relatively lower levels of INAM limited human flows and vibrancy (with Clarkson having almost none) in the 1km radius of the stations. PNWC urban form appeared to facilitate quick dispersal of people to adjoining transport or buildings, limiting opportunities to leverage soft infrastructure assets for vibrancy and interaction. Conversely, TODs in pedestrian-oriented Kobe appeared to have greater levels of INAM with longer, more vibrant human flow lines. Urban planning appeared to use retail and commerce to form natural reticulation lines of human movement towards major destination points, such as business, education, tourism, and shopping.

Further analysis using the methodology of chapter three found that Joondalup INAM levels were inconsistent with those of the most innovative cities. Firstly, though public transport was easily accessible, there were no links to the international airport. Secondly, all INAM types were not found in the study area, and only a small section of the study area was highly mixed use and contained the most residential and commercial density. Though this section contained the highest number of intersections, it was still relatively low when compared to the number of intersections in the most innovative cities. Thirdly, there were no districts of unique human experience. Fourthly, the INAM of Joondalup was poorly distributed and had low density. Joondalup's INAM appeared to provide limited support for innovation and knowledge development. This is likely to create knowledge resources inefficiencies and impediments to fulfilling new economy policies and priorities.

In contrast, Sannomiya INAM levels were consistent with the findings of highly innovative cities. Firstly, public transport was easily accessible with multiple links to domestic and international airports. Secondly, though „theatre“ INAM was not found in the study area, it was more than compensated with high levels of other entertainment, leisure and tourism INAM. In addition, INAM were found well-distributed and dense throughout the 1km study area suggesting high mixed-use. The number of pedestrian intersections was consistent with Chapter 3 innovative cities, being higher than the USA innovative cities but lower than Germany's. Thirdly, there were numerous districts of unique human experience. Fourthly,

the INAM of Sannomiya displayed mid-level distribution and density. Sannomiya's INAM are likely to be highly supportive of high innovation and knowledge development. They are capable of facilitating greater knowledge transfer, development and creation fostering environments of high efficiency and productivity for available knowledge resources.

This chapter concludes that the INAM, human flow, interaction and vibrancy elements of Kobe train stations are more likely to strengthen local social capital, and therefore facilitate new economy policy factors supporting high knowledge productivity and innovation.

CHAPTER 9: INTERVIEW ANALYSIS

9.1 Introduction

This chapter describes the outcomes of two site visits to each case study region to: 1) gather initial documentation and establish trust with potential interview participants in 2009; and, 2) conduct final interviews in 2010. Aside from the language and cultural trust issues outlined in chapter four, there were two reasons why the two site visits were of particular importance to Kansai participants. Firstly, it dispelled initial fears associated with the research process and ensured the best outcome for final taped interviews.

Secondly, it reassured Japanese participants of the validity of the different research approach of Australian universities. That is, research conducted at Japanese universities relies on an underlying code of conduct and trust implicitly understood by both parties rather than the explicit legal obligations set out in ethics and consent forms as required by Australian university ethics clearance. In Japan, such forms signaled distrust and using them risked offending participants. The trust and rapport established during the first visit to Japan allowed the researcher to explain these research differences and voluntarily obtain signed ethics and consent forms.

9.2 Elite interviews

This section explains the elite interview process undertaken in each region.

9.2.1 Participant selection process

Each PNWC and Kansai interview participant was specifically chosen for their unique insight into urban design, regional planning or economic development. All data needed to inform the research was gathered during six PNWC and five Kansai interviews. Table 23 lists participants.

Cultural and proximity differences meant that PNWC participants were chosen and directly contacted by the researcher and Kansai participants were introduced by a Professor of Economic Geography and Regional Policy at Hyogo University. Hyogo Prefecture is a sister-state of Western Australia, and Hyogo University is a sister university to Curtin

University where the researcher is completing her PhD candidacy. The Professor at Hyogo University was introduced to the researcher as the most appropriate contact in the Kansai Region by the Director of the Hyogo Prefectural Government Cultural Centre based in Perth.

9.2.2 Interview questions

Interview questions were developed from the literature review to focus on urban planning supportive of national or state innovation and knowledge economy objectives. The interview question sheet is found in Appendix 2.

Questions 1-3 established the participants' experience in either/both economic development or urban planning. Questions 4-6 assessed respondents' awareness of economic development and urban planning links, where:

- Question 4 focused on future emerging economies;
- Question 5 on the integration between national or state economic development and urban planning; and,
- Question 6 on the economic impact of single-use and mixed-use zoning.

Question 7 was divided into five urban planning statements (*a-f*) associated with human connectivity, movement and vibrancy as identified in the literature review. Participants were invited to comment and assign a value between one and five regarding the success of their respective regions in achieving each statement.

9.2.3 Interview process

Several weeks prior to formal interviews, participants were sent the interview question sheet (Appendix 2), ethics approval and consent forms. Japanese translations of English versions were provided to Kansai participants. During each interview, the researcher explained research objectives, ethics considerations, participant's rights and interview format before taping commenced. Participants were given the opportunity to ask questions during this time.

Interview questions were posed in the participants' native tongue; answers recorded and later transcribed. For Japanese interviews, a native Japanese did the transcriptions which were later checked for accuracy by the researcher. The researcher was responsible for the final transcript and translated text. This ensured some level of consistency between the expressions used by English and Japanese participants.

Participants were encouraged to supply supporting documentation or refer to information resources which could be researched later.

9.3 Interview findings and analysis

This section details participants' interview responses and supporting evidence either supplied by the participants or found by the researcher to corroborate claims and analyse responses. This analysis, documentation and literature reviews of previous chapters enabled triangulation of data and conclusions.

Each participant responded at the spatial level (neighbourhood, local and/or regional) relevant to their work. In Kansai, for example, the Urban Renaissance participant working under auspices of National Government commented on Kansai region, while City of Kobe participants working at the local and neighbourhood level commented on Kobe and its local precincts.

9.3.1 Participants background

Participants were selected for their professional experience and unique contribution to different aspects of urban planning and economic development in the respective regions. Combining these various perspectives for each study area allowed a regional picture to emerge. Table 23 summarises background experience and present employment responses of each participant to questions:

1. Which organisation do you work for?
2. How long have you worked for this organisation?
3. What is your role?

Participants were encouraged to expand answers to include previous employment and relevant project experience. Abbreviations given in this table are used for the remainder of this thesis.

„Length of overall regional experience“ replaced the original *„how long have you been in this job?“*. The short time many WA participants had been in their current employment compared to the Japanese reflected different employment cultures and attitudes to job change. Australians tend to move work organisations frequently for either lateral (experience) or vertical (financial, prestige) gain, while Japanese stay with the same organisation moving laterally to different roles or vertically up the organisational hierarchy. *„Previous relevant experience“* allowed other relevant work experience to be included for those who had recently changed employment or completed relevant projects not part of current job description.

Table 23: Background and present employment of interview participants

Organisation and role	Experience and role	Present employment description	Previous relevant experience	
PNWC	City of Wanneroo	Economic Development	Create, attract, retain and expand businesses in the City of Wanneroo.	Economic employment strategies for Alkimos-Eglinton and Yanchep-Two Rocks; Examine efficiency of Southwest Corridor Structure Plan for WA State Government; Economic modeling for Perth and Peel Industrial Land Strategy.
	Yanchep Sun City	10yrs; Private developer	Urban and financial planning for Yanchep-Two Rocks.	
	Curtin University	30 yrs; Professor Urban and Regional Planning	History of land use planning in Western Australia; sustainability indicators; water sensitive design	
	Taylor Burrell Barnett	40 yrs; Urban Planning Consultant	Town planning and urban design; Senior Director of design and strategy. Key focus: sustainability, liveable neighbourhoods and traditional urban design. Public transport and local jobs linked with density, compactness and sense of place decreasing work trips for better daily work/life balance.	
	Mike Allen Planning	30 yrs; Urban Planning Consultant	Statutory and strategic planning with the Shire of Roebourne: projects such as capacity of Karratha to move from population of 15000 to 50,000; development of the Yanchep City centre.	Strategic and statutory planning for WA State planning department. Final role: Executive Director.
	The Planning Group	31 yrs; Urban Planning Consultant	Research governance and strategy.	Director of State Strategic Policy and Research at Department of Planning – project managed <i>Directions 2031</i> ; CEO of City of Wanneroo; Town planner.

Organisation and role		Experience and role	Present employment description	Previous relevant experience
Kansai	City of Kobe Urban Planning	20 yrs; Urban Planning Division	Redevelopment of old neighbourhoods particularly those affected by the earthquake.	Redevelopment, city planning, construction, building inspections.
	City of Kobe Waterfront	17 yrs; Waterfront Development Division	Project managed 15-year Kobe Masterplan (particularly waterfront plan) including: 1) coordination of public transport (private & public rail Hanshin, Hankyuu, JR); 2) future concept plan of port and parks.	
	Urban Renaissance	37 yrs; Director Western Japan	City planning: coordinate land development of space including housing, city and planning research, coordination of local and National government to ensure integrity of development as developers can't be trusted, support research residents of Kansai Science City to expand as global city.	
	Hyogo University	27 yrs; Professor of Economic Geography and Regional Policy	Role includes Director of Institute for Policy Analysis and Social Innovation. Lecture in industrial geographic theory specialising in urban and regional economic policy and combining economic, geographical and urban perspectives.	
	Mukogawa University	6 yrs; Urban researcher	Urban regional research, lifestyle environments.	

9.3.2 Which industries define future competitive advantage in your region?

This question targeted the changing structure of economies under globalisation and shift from manufacturing and low-skilled industries to knowledge-based and high-tech. A summary of responses is given in Table 24.

Kansai participants appeared to have a better shared vision of future regional economic drivers than those from PNWC. Kansai responses were more globally-oriented and centred on the generation of knowledge and innovation in emerging industries, such as biotech, renewable energy and environment. This finding may be the result of strong National Government economic and industrial visioning. PNWC responses were more Perth Capital centre area-oriented ranging from economic drivers (e.g., knowledge development and innovation in key industry sectors such as mining and education) to economic supporters dependent upon economic drivers (such as retail, land development, lifestyle and local tourism). The following details answers.

Perth's Northwest Corridor

Most respondents chose to respond first to the future competitive advantage of Perth and then to PNWC, seeing PNWC as reliant on the Perth Capital centre area.

Perth was viewed as having a competitive advantage in the Southeast Asian Region, being in the similar time zone as global economic powerhouses (TPG; MAP) and having political stability (MAP; YSC). Most noted Perth's competitive advantage in mining, oil, gas and related services made it a global mining and resource hub, with TBB adding these industries were changing WA employment patterns. He observed the „*socially irresponsible*’ nature of WA's dual economy as an increasing number fly in and out between Perth Airport and regional WA spending their large incomes primarily in Perth and little in regional towns. TPG commented that urban planning's role in the mining and resource boom was to accommodate the expected 3.5 million population increase and balance Perth's economic growth.

CU noted the education structure of Perth's workforce, including that of PNWC, was shifting towards an increasing number of higher qualifications (Bachelor and above). He reasoned this was because there was a fear of not getting a job because others are more highly qualified „*as well as a culture of social and economic advancement*”. He explained that Australia's high migration also fuelled this as migrants see „*education as a way to assimilate, be stable*” as well as be a platform for the „*next generation to do better*”.

Table 24: Summary of how respondents viewed respective regional economies

	Traditional (if noted)	Present	Future	
PNWC	COW	Agriculture	Manufacturing (e.g., construction), high-tech mining & health services	Large commercial retailers, land & infrastructure development, mining services, business and financial services, goods transport
	YSC	Agriculture	Service industry, agriculture	Education and associated tourism, mining research
	CU		Service (e.g., mining), building, government	Knowledge-related (e.g., services)
	TBB		No industrial base	Tourism and lifestyle of coastal attraction
	MAP		Limited	Lifestyle and local tourism
	TPG	Agriculture, horticulture	Coast – tourism and lifestyle	Yanchep IDEA project (knowledge-based industry)
Kansai	CKUP	Synthetic shoes, manufacturing	Tourism	Shin Nagata - Anime (manga), creative; Kobe – medical, super computer
	CKW	Port, heavy manufacturing (e.g., iron)	Medical, supercomputer, port function	Medical, port function
	UR	Major industrial belt	Scientific research	Generation of knowledge, innovation
	HU	Iron and steel, shipbuilding, maritime, synthetic shoes	Agriculture. Medical, bio-medical, IT (supercomputer). But still emerging, infant industries	Research development, innovation, knowledge management. Link agriculture industry with bio-tech
	MWU	Port & associated public security function for goods/people; shipbuilding, iron ore, synthetic shoes	Medical; fashion (design), super computers, IT	Medical, fashion, IT, port and related security function

Respondents answered differently to the question of PNWC's economic composition or future economic advantages. Some citing service and agriculture (YSC), others clustered manufacturing and construction (residential and commercial) in industrial areas, such as Wangara and Landsdale (COW). TBB noted *„the NW Corridor is difficult to target because it has no old industrial base on which to grow, it doesn't have a harbour, heavy rail or an airport and it probably needs all of those“*.

TPG observed that Wanneroo traditional agricultural industries were being threatened by water shortages, urban growth and increasing land values. He remarked that this was challenging economic fundamentals, such that agriculture was no longer stereotypically based on poor-migrant family-based employment. COW noted similar changes in the composition of industrial land. He commented that industrial parks undergo land price rises as they fill up which attracts large commercial retail (e.g., in places such as Osborne Park and more recently Wangara) and forces manufacturing to move to increasingly outlying areas (e.g., Neerabup). He believed that Wanneroo would remain strong in manufacturing in the medium-term (5-15 years) as population increases would drive food distribution⁸, construction, mining and related services.

MAP did not see any competitive advantage in PNWC noting *“there (was) nothing of sufficient differentiation between the NW Corridor and anywhere else“*. He stated that competitive advantage could not be gained through the presence of a government department (e.g., the Police Department in Joondalup), but through *„brand differentiation“* such as the quality of PNWC beaches which would increase tourism. He noted that PNWC international tourism was severely under-developed as it did not have *„a tourism draw like the Southwest (of Western Australia)“*. As TBB noted:

PNWC has got great coastline and very easy land form to work on being all sand, rock, no hard water tables, no acid sulphate soils. The extension of the rail (to Yanchep) will be about a third of the cost of the Mandurah Line. The few developers to negotiate with could be convinced to give the land free of cost and do bulk earthworks. This would produce a rail corridor, with bus and rail delivered ahead of development. Imagine the change that would have on the delivery of density and the diversity of product and jobs north of Perth. It would create reverse commuter flows in the corridor.

TPG also found little economic advantage in PNWC *other than* its coastline, citing that it was the weakest performing in Perth for self-sufficiency ratios. He noted this was due to a

⁸Based on traditional Wanneroo agriculture and that the WA meat industry recently moved North of Wanneroo to Muchea.

lack of critical connecting infrastructure, such as *„a port or an airport or a major freight-rail network or major hub facilities for transport“*, describing it as *„the biggest cul-de-sac in the world“*. He commented that Directions 2031 had tried to rectify this by proposing a second airport, as well as better freight networks and east-west road links (*„connecting Neerabup industrial area to the east across to Gnangara and the northern railway where there is major freight“*) in PNWC. COW added that the construction of major roads into Northwest WA (Perth-Darwin Highway and Perth-Mucchea road link) would better position the cheap land adjacent to Neerabup and Pinjar to attract clusters in high-tech and mining related services. He concluded that the government should retain some industrial land in these areas for non-retail release at a later date (e.g., knowledge-base industry).

However, in general, responses highlighted confusion with the meaning and implementation of a *knowledge economy*. MAP noted that despite understanding it was *„where major job growth was predicted“*; he felt there was little meaning in the overly-used phrase *„target jobs in the knowledge economy“*. CU stated that *knowledge* was not attached to one industry, but a part of a process of economic maturation across all industry. He argued that a knowledge economy can be created by either attracting *„people with knowledge“* or *„certain industry types“*. He observed that PNWC workforce in key industries (construction and mining services) was primarily comprised of *„tradespeople and public servants“*, though *„there (was) an emerging knowledge element“* for traditionally low-skilled occupations. He contended that this was driven by two elements. Firstly, PNWC workforce is more highly qualified than other Perth corridors, with *„people working and living in PNWC being primarily middle-class with children who have attended university over the last 10-15 years“*, which was creating a supply-driven demand for knowledge-based jobs as residents looked to work in the region. Secondly, it is driven by the changing expectations of a socio-economic environment where all workers, even manual trades, are required to operate in context of *„wider knowledge environment“*. He commented that a *„much more complex decision environment“* would push PNWC to become a future *„knowledge corridor“*.

COW and YSC also saw potential for PNWC to develop knowledge resources, with COW stating that Joondalup’s knowledge-related business had not developed as planned despite the strong presence of health services - *„they planned based on what they knew at the time (but) it has developed into what it is“*. He commented that a smaller health cluster, *„a GP super clinic“*, was targeted for Wanneroo to complement Joondalup’s larger medical service cluster. He viewed this as a critical step in building Joondalup’s position as a primary centre⁹, where the critical mass of business (including business and financial services) was still *„five to ten*

⁹ Second-tier centre: Interview was conducted before Joondalup has been officially downgraded to a third tier in *Directions 2031* (Department of Planning, 2010).

years” too early to justify „*multi-story buildings*”. He noted that the extraordinary growth of Perth Capital centre area created an „*imbalance in services and infrastructure compared to the rest of Perth*”, hindering Joondalup’s economic development by limiting its attraction to business and investment (both public and private) despite current and predicted large PNWC residential population¹⁰ increases. He stressed the merit of „*population-driven demand*” development processes where retail is established before knowledge-based industry can be attracted. He saw the timing of these „*higher-order*” industries and associated industrial areas as „*quite critical*”.

YSC envisioned Yanchep as eclipsing other urban centres to become a key knowledge hub in Metropolitan Perth. He explained that the Yanchep District Structure Plan emphasised a future education hub capable of servicing international education tourism, particularly from Southeast Asian countries. He expressed the need for effective regional branding linking the education hub to sustainable agriculture or the State’s resource sector (i.e., mining-led education and research such as engineering and geology), emphasising plans to leverage PNWC natural assets (such as environment and agriculture) rather than just introduce finance or business services.

Kansai Region

Responsible for delivering aspects of National Government economic priorities, UR commented on the economic vision for the Kansai Region as a whole:

Kansai was developed as one of Japan’s two major industrial belts from about 110 years ago, it prospered with smoke pouring from factories polluting the environment. Around 40 years ago, its economy shifted from production centred on factories and manufacturing to being organised on universities and research progressing mankind. It was no longer just about simple economic development (relating to production of goods). Kansai Science City emerged from this desire to do scientific research of a more global perspective for the benefit of mankind.

UR noted that Kansai’s vision to build a completely new industry outside of traditional heavy industry centred on knowledge-based investment and resources was founded on 1960’s global movements to create science parks. He stated that Gakuentoshi (a university research city) was the first to be built after which came Kansai Science City (KSC) with stronger „*future-oriented philosophies*”. He observed that it was not until much later that KSC began exploring what this „*meant to the economy, what areas to research and so on*”. He remarked that since then „*thinking has changed*” because of

¹⁰ „*Wanneroo is growing at 5-6% annually; basically 10,000 new residents or 3000-4000 new dwellings*” (COW).

societal shifts over the last 30-plus years and the increasing importance of global over regional economies.

The (1960's and 70's) theme was factories and basic research, after the word „innovation“ emerged in the 80's and it became connectivity of industry. Similarly, in the future it will be something else (UR).

UR noted that it was about „*mixing and combining research at a national level*“ rather than „*cultivating technologies one by one*“, as only doing information technology „*is no longer acceptable*“. He commented that Japan's focus was now on „*the environment as the largest problem facing mankind*“. He illustrated this through in a recent survey of 2982 KSC research workers which found most work in information technology, then manufacturing, and thirdly Biotechnology and eco-technology. He quoted three examples of how KSC combines research fields to influence how people feel about technology and environment:

1. Research and implement a smart grid to decrease total volume of CO2 emissions, focusing on „*efficient total control over flows between electric supply and electricity users*“ for both solar and hydrogen energy generation.
2. Leverage the Kyoto Protocol through a comprehensive environmental approach embodied in the marketing phrase „Do you Kyoto?“¹¹.
3. Encourage the spread of the electric car by mixing technologies to make it cheaper and more popular.

UR's explanation of shifting Japanese industrial and economic ideologies is strongly supported by the changing Japanese policies documented in previous chapters. Comments of other interviewees focused on the economy of Kobe City. HU noted Kobe's traditional strength in design was „*operated like a time-factory*“ (i.e., primarily low-skilled menial work) in key heavy industries of „*iron and steel, shipbuilding*“, as well as other maritime-related activities. CKW reported similar beginnings, noting recent shifts towards innovation and knowledge-based industry:

Kobe was originally planned as a Port City with heavy manufacturing and iron-related industry, such as Kawasaki Heavy Industries, Mitsubishi Heavy Industries and factories for building ships and shinkansen trains. Now, it has a growing 21st Century industry mix establishing it as a medical city. Port Island has the second biggest medical industry as well as supercomputers.

¹¹ As the birthplace of the Kyoto Protocol, City of Kyoto symbolises an environmentally important city. The globally-recognisable phrase „Do you Kyoto?“ means „Do you do something good for the environment“ (City of Kyoto, 2008).

HU added that opportunity to develop knowledge-based industry arose as *„Kobe’s economy struggled when manufacturing factories could not adequately resume operations after the 1995 Hanshin Awaji Earthquake”*. CKUP supported this, stating that despite post-earthquake negotiations of financial support, the traditional and renowned *„local chemical shoes industry”* (synthetic shoes) of Shin Nagata did not survive. He suggested this was because of cheaper labour costs in other countries (such as China) and that the industry was made up of largely small business unable to afford the large machines needed to improve production efficiency. He added that the situation was worsened by businesses deciding to relocate and centralise operation in Tokyo, noting:

Residential and retail commercial could be reconstructed, but there was limited intellect capable to rebuild factories. Kobe has always been a residential city close to the Kansai industrial hub of Osaka ...so we decided to focus on residential (CKUP).

HU remarked that *„something needed to be done on a policy level...to revitalise Kobe”*; subsequent government pushes to introduce a medical industry resulted in *„global medical and bio-medical clusters springing up one after another”*. He observed that usually government intervention is founded on existing *„bio-medical research and hospital facilities”*; but *„in Kobe there was no bio-medical base at all”*. He remarked that though people questioned government moves asking *„did it really need to be done?”*, the economic aftermath of the earthquake left no choice. He stated that success in introducing new industry was due to two main factors. Firstly, the Riken Research Institute¹² set up a campus in Kobe to give it an intellectual capital starting point. Secondly, the National Government provided the majority of funding needed to attract the new industry with the proviso that *„a supercomputer industry was introduced to Port Island”*. He asserted that this was done, but as *„IT is an extremely competitive industry”* it didn’t take off. However, it *„enriched the intellectual resource of the region”*, facilitating the much larger success of the *„later-established bio-medical cluster”*. As a result, *„Port Island is now home to a bio-medical cluster which has done well even by global standards”* as well as supercomputers, and *„West-Arima has Spring-8¹³ ...the world’s biggest such research facility”*.

1½ years after announcing the Kobe Medical Industry Development Project...a lot of bio-medical research and business has relocated to Kobe attracted by a new hospital, venture capital and the joining of Kobe and Tokyo Universities bio-medical research forces (HU).

¹² Recognised globally as specialising in cutting-edge medical and scientific research.

¹³ A synchrotron radiation facility.

Nevertheless, HU cautioned that Japan as a whole is still behind other nations in terms of *„knowledge economy flows“*. To illustrate this, he spoke of the *„large electronics panel factory built by Panasonic and Matsushita in the Osaka Bay Area“*:

Without a doubt it is a leading knowledge-based factory, but it is based on the production of goods not the management of next-generation knowledge and research development. This type of manufacturing is going to countries, like China, which can produce it more cheaply. Panasonic and the world’s number one, Sharp, are building many new factories in China and Eastern Europe which also develop new knowledge.

HU observed that this was a *„reoccurring issue“* continually *„driving the knowledge production agenda“* in Japan. He noted that *„high-quality high-skilled electronics“* formally produced by Japan is *„fast being centred in Asia“* because the *„pay is not high enough for Japanese“*. He suggested that the higher paying jobs are in *„innovation and knowledge“*, like those in bio-medical which is *„slowly being established as an industry of future importance“*. He concluded that prospects in such industries rely on strengthening academic and industry partnerships: *„Japanese universities are big, but there is not a strong valued relationship between universities and business...(like) countries, such as Finland, where that bond is tight“*.

Some of participants felt that the combination of traditional and emerging industries in Kobe was ensuring future economic success. For example, HU proposed that combining Kobe’s natural competitive advantage in its traditional industry of agriculture with biotech could provide a future industry of economic value. CKUP agreed, noting that the City of Kobe actively encouraged new industry based on traditional strengths. For example, it built a cartoon character in Shin Nagata named *Tetsujin No.28*¹⁴ to leverage and foster a small local anime and creative arts industry. He advised that this industry was expected to strengthen the local economy by encouraging tourism and attracting young residents and students to replace an aging population.

Kobe Port is another traditional asset being economically diversified by the City. Some observed that its recent slow decline was because large international ships could not enter Kobe’s shallow waters (MWU) and the construction of large Chinese and Korean ports whose increasing quantities of freight were creating a hub pulling international trade from Kobe (CKW). Nevertheless, CKW recognised Kobe’s position as a major domestic port (being third largest after Tokyo and Yokohama) was still an economic strength for the City.

¹⁴ Translation: *Ironman No.28*.

MWU suggested that Kobe Port also has a traditional „public security“ function being Japan’s long standing key entry/exit point for goods and people. She observed that the construction of Rokko and Port Islands by the City of Kobe were partially to strengthen this, as well as industrial activity around Osaka Bay. She noted that though original plans for the Islands were conceived before the war, construction did not start after the war by which time development focus had shifted slightly towards „*progress(ing) plans for Machizukuri¹⁵ to strengthen the public security function*“. MWU commented that the difficulties experienced by initial industries housed on the Islands (shipbuilding and iron ore) meant they were eventually replaced by industries such as medical (bio-medical) and fashion (design). The fashion industry found on Rokko Island¹⁶ aims to leverage Kobe’s sophisticated image associated with design strengths emerging from its traditional chemical shoes industry (synthetic shoes).

9.3.3 What government economic development policies inform urban planning in your region?

This question established participants understanding of underlying economic development policies influencing urban planning in each region. Table 25 summarises responses.

Overall Kansai participants appeared to have a better understanding of economic policies guiding urban planning decisions in their respective regions. This was as expected given the policy analysis of previous chapters. In the Japan case, there appeared to be a clear division in the economic role of National Government-led infrastructure and urban planning as opposed to that provided by local government. In PNWC case, there was no clear understanding as to who provided which infrastructure or what the role of this infrastructure played in fulfilling State and National economic objectives. Respondent answers are detailed in the following sections.

¹⁵ Translated as: create neighbourhoods or neighbourhood planning.

¹⁶ The small area of Rokko Island has the shopping precincts of *Fashion Mart* and *Fashion Plaza*, as well as a *Fashion Museum*.

Table 25: Summary of identified economic development and urban planning policy links (if stated)

		Previous	Present	Impeding documents (at time of interviews)
PNWC	COW			Directions 2031 and beyond & related urban growth strategy for each corridor
	YSC	Not successfully linked	Not aware of any linking document	
	CU	Not successfully linked	As a function of Landcorp and preceding bodies	
	TBB		New urbanism	
	MAP	Urban planning model which links suburbs to Perth Capital centre area for employment		
	TPG	None	None	
Kansai	CKUP	City has own policy which is influenced by National government because they hold the purse		
	CKW			
	UR	National government economic policy influences regional land use policy		
	HU	Policy links economy and urban planning – to favour certain elements of the economic environment		
	MWU	City master plan has embedded economic development plan		

Perth's Northwest Corridor

YSC was unable to identify a policy linking economic development and urban planning in PNWC. Defining economic development as „*simply why people want to invest or bring a company (big or small) into region*“, he acknowledged that increasingly „*government (at local and State level) wants to merge both planning and economic policy*“. He noted that State economic development is „*service infrastructure describing how things are connected*“, that is „*where business activities should be*“. YSC presented a contradictory view on whether economic development is the role of government, saying both „*it should not guide economic development...just planning (infrastructure, district structure, and so on)*“ and „*good planning and infrastructure is not enough. Government should provide tax incentive policy, fast-track building approval and facilitate business connection*“.

He advocated the importance of attracting knowledge-based industry and building a critical mass of knowledge resources, for example „*agricultural knowledge resources*“ brought by an agricultural export company moving to Yanchep. YSC felt that „*this is what attracts people not just planning*“, noting:

The (structure) planning doesn't detail which industries to attract; that is for developers and government to decide. Yanchep is targeting particular industries, such as renewable energy, as it is easier to construct purpose-built grid systems in a Greenfield than it is in established cities.

CU felt that „*Perth's planning system traditionally had not successfully engaged with economic development. The two have been running in parallel*“. He asserted that the current urban model where people are living increasingly „*further away from their place of work*“ is unsustainable with issues such as „*the rising cost of petrol*“. He stated that „*we can't continue building a city by essentially rolling out the suburban carpet at the end of corridors and having mainly centralised workplaces*“, noting that planners are being forced to engage with economic development to bring jobs closer to residential areas.

COW commented that the planning process of *Directions 2031* required economic development strategies for Perth and its Corridors, with each Corridor needing its own urban growth strategy for efficient growth within existing infrastructure. However, he advised that integration of local government economic development and urban planning depended on who was in charge of planning, and if they considered economic development as important in the planning process. He suspected that these attitudes would change with the elevated value of economic development in State planning policy. He acknowledged the importance of „*triple bottom line sustainability*“ and that there „*can't be an urban growth management strategy without managing economic growth*“. He cautioned that the absence of a Northwest

Corridor Structure Plan at the State Government level might be problematic given unstable relations between Wanneroo and Joondalup. He noted that recent Council endorsement of a „*Regional Governance Framework*“ was the first step to „*negotiating an economic development framework*“.

TBB viewed „*new urbanism*“ as „*the great new innovation (in) urban design*“ as economic development (or the „*delivery of local jobs*“) was a natural outcome. However, he acknowledged that it just allocated space but could not „*guarantee certain job or investment patterns*“. He thought such things were attracted by „*great urban amenity*“ creating „*the right environment which attracts industry, leaders, thinkers and investors*“.

If you can't get the general manager of IBM to live at Two Rocks – why would he invest there? (TBB).

TBB observed this was a common issue for Perth's outlying metropolitan areas, for example in Mandurah whose council is „*striving for a new identity*“ to increase competitive advantage over Rockingham. He noted that Mandurah had „*embraced changes in its urban fabric and planning*“ to deliver the „*3000 new top-end jobs needed over the next 50 years*“. They „*destroyed the pattern of the old grid system*“ coming dangerously close to taking „*all residential out of downtown Mandurah*“, not realising that „*great mixed use*“ is critical for urban fabric.

CU felt that current planning methods of industrial areas which entailed „*literally painting purple on a map*“ was irresponsible, and decisions of economic infrastructure must be better informed „*by some knowledge of particular industrial land needs from specific economic sectors*“. He noted that the industrial land focus of the State Government agency, Landcorp¹⁷ employing staff for both „*industrial structure and land-use planning*“, has helped „*deliver economic structure and jobs*“ in WA. He stated that „*in thinking about the future of an area we must think about employment*“, explaining that „*the expansion of Mandurah*“ would not be carried out without consideration as to „*where people are going to work*“ unlike „*10-15 years ago when there was no employment apart from a relatively small Alcoa plant in Pinjarra and a few shopping centres*“. He remarked that the biggest question related to whether people followed industry or whether it is the „*population structure and characteristics that attract industry*“, noting that future urban planning must think more strategically than past population-driven processes.

Similarly, MAP commented that past Perth strategic planning has „*everything revolving around the Perth Capital centre area*“, including transport policies which use „*the Perth*

¹⁷ Former Industrial Lands Development Authority

*Capital centre area as a hub*¹⁸. He contended that though this was *„at some level... perfectly understandable and sensible“*, *„government needs to encourage economic drivers outside of the CBD“*.

Perth Capital central area is head and shoulders above anywhere else in terms of employment. The more government policies emphasise Perth Capital central area as a primary economic driver, other parts of the city are less able to gain economic momentum (MAP).

He observed that this was an issue for all Corridors, in particular the NW Corridor *„having the highest job deficiency by population“*. TPG noted that the long-term and complex framework of economic development made it difficult to attach key performance indicators to evaluate progress. He observed that this made community and economic development vulnerable to financial cutbacks when local councils decrease budgets. He felt that not employing economic development specialists compromised the urban planning process, as *„part of the role of economic development is to argue with planners to attract and generate employment“*.

TPG perceived PNWC to have *„a huge number of challenges to get significant employment“* despite the advantage of major stakeholders, such as *„Yanchep-Two Rocks with Yanchep Sun City; Alkimos-Eglinton with Delphin Land Lease connected with Landcorp“*. He noted that though YSC and Alkimos-Eglinton both targeted greater *„centre-orientation“* as recent structure plan approvals had *„enough designated light industry land“*, the absence of a *„coordinated strategy brief for economic development“* made this difficult to measure. He observed that the Northwest Corridor Coordinating Committee set up to better *„coordinate economic development with infrastructure and growth“* became *„ineffective as it became political“*.

Only Labour members of Parliament were allowed on the Committee, mayors weren't...There was a war between the Mayor of Wanneroo, John Kelly, and the government at the time. I think that is really what killed that tank (TPG).

TPG stressed there was an overall void in WA economic planning skills and organisational bodies guiding urban planning at the State level.

All participants agreed that infrastructure to attract both people and industry should be part of the Corridor economic development strategy. TBB advocated that targeting high amenity and creating liveable spaces could encourage new economy industry, with natural amenities (like the pristine coastline of PNWC) enhanced by high quality constructed amenity to create

¹⁸ For example, Mandurah and Joondalup rail lines.

„great places to live and attract the knowledge economy“. MAP argued that it was easy to say *„we want a knowledge economy“*, but the reality of attracting *„the associated jobs (being footloose around the world, the global nomads, the young highly-qualified entrepreneurial creative people and so on)“* is much more difficult. He observed that in the global knowledge context PNWC is competing with other highly desirable cities:

...Why are they going to come to PNWC? Why to Yanchep-Two Rocks? Why not Paris? Or wherever you think is the best place in the world...What does PNWC need to do to make it stand out from the crowd?

He questioned popular notions of the policy importance in attracting *„creative“* people and industry to the city, noting *„you can apply “creativity” to just about anything“* even *„truffle farming in Pemberton“* which is *„innovative, entrepreneurial and risk-taking“*. Others, such as YSC and TBB, noted the importance of a domestic airport connecting PNWC to the State’s NW resources. YSC contended that *„Perth’s Domestic Airport is at over-capacity“*, constructing one in PNWC would increase local connectivity and encourage people to move to PNWC.

Kansai Region

CKUP reported that development in Japan occurred on three levels: 1) urban neighbourhood, 2) local, and 3) prefecture. He noted that though National Government funding meant less control at the local level before and during earthquake reconstruction, *„political power had shifted“* with the increasing importance of neighbourhoods such that now *„Kobe City decides the standards and the National Government pays the money“*.

At the prefecture level, UR thought economic and urban integration was successful in areas such as Kansai Science City (KSC) with *„urban planning...organised in clusters of unknown future resident companies by developers“*. He commented that this *„provided a broad frame of reference...which adapted to suit prevailing conditions...where final outcomes are the result of negotiations“*.

It is not about the influence of different urban planning approaches, but about urban planning influenced by large changes in the socio-economic environment (UR).

For example, UR noted that the environment, as a rising global issue, was changing the way urban environments were constructed, and KSC residential areas *„are research or test sites“* with manufacturing factories and company headquarters in different places:

This links factory products, product levels and companies more efficiently not just in Japan, but for the whole of Asia and even the globe ...we are facilitating the flow of production (UR).

He stressed that KSC *„works from a whole Kansai regional viewpoint“*, and current projects included *„creating new business around Osaka train station to attract people...by understanding linkages“*¹⁹ (Knowledge Capital Plaza of previous chapter). He noted that involving residents in the research process generated real outcomes as well as real challenges with UR unable to force current or future resident company participation. UR noted that this was different to previous New Town approaches which basically developed *„bedtowns for Osaka and Kyoto“* with *„the intention not to create new neighbourhoods in city planning but new residential areas blanketed in a wider philosophy“*.

Residential environments need to be enriched more than further economic development (UR).

At a city policy level, HU felt city planning and economic development were fundamentally in *„opposition“*, and that city planning dominated. He suggested that planning was *„highly institutionalised...protecting those that hold the (city’s) interests“*, that is, the strengths of the city are promoted. He commented that now that strength was *„innovation, an engine driven by the discovery of new things“*. He felt that integration was difficult as *„city planning is fixed and the economy is trying to change; they are theoretically in opposition“*. However, noted that Kobe was trying to overcome this, stating:

I’m the Chair of the Kobe City Planning Inquiry Committee as an economist; having an economist at the head of the Planning Inquiry Committee is an advantage. It highlights the inclination and intention that urban planning is structurally part of developing Kobe’s economy, nevertheless Committee discussions still reflect attitudes that economic development is not part of urban planning (HU).

MWU thought that the Kobe City Masterplan had tried to integrate industry and city planning, but was unsure of its success because of economic difficulties in Kobe, and Japan as a whole. She remarked that both attracting industry and community welfare appeared more important than ever, but doubted that a direct connection had been made between machizukuri and economic development in the new economy. CKW felt Kobe was successful in integrating economic and urban functions of the city; particularly the links between its industrial port and the rest of the city. He noted three aspects of this:

¹⁹ Linking Knowledge Capital of Osaka station and businesses in KSC.

1. Strong distribution system: good freeway networks to provide effective factory-to-port freight (products) transport function.
2. Land reclamation: high-growth of heavy industry around Port created residential land shortage, so land was reclaimed to create new towns and areas for manufacturing²⁰. New towns were planned to create community neighbourhoods where people in residential areas commute to adjacent employment (such as in industrial parks).
3. Industry cluster: As primary entry point for imports of wheat, flour and vegetables, new Master Plan needs to balance „Kobe’s economy, neighbourhoods and large industry“ by protecting interests of industry clusters against the increasing drive to convert large tracts of land along port into planned neighbourhoods.

At the neighbourhood level, HU believed that the systems and controls used by urban planners to manage land-use conflict were in direct opposition to economists who valued the energy generated by having conflicting and similar elements jumbled in one space. He acknowledged that though „Japan is quite dense“ creating „large tracts of highly mixed-use land“, city planning basically „separates areas by colours (housing is in a housing zone, industry in industrial, commercial in commercial)“ to decrease issues of conflicting land use. He explained that such a system does not foster a „cities“ energy source“ which has become increasingly important as a „shoved together mix allows different seeds to germinate interactive relationships and facilitate innovation“.

HU offered Japan’s public transport system as an example of successful integration in city, neighbourhood and economic planning. He noted that Tokyo’s system was owned, operated and fully funded by the publically-owned Japan Rail (JR), whilst Kansai has largely private rail with surrounding land primarily privately developed, such as by Hankyu and Hanshin rail and land development companies. He explained that in Kansai competition for ridership led Hankyu to investigate new land-use management methods to build high-grade developments and more competitive train lines²¹. Hankyu proposed constructing a rail line between Takarazuka City (northeast of Kobe) and Kobe to carry commuters working in Kobe CBD, but the one-way nature of this traffic (during rush hour) was inefficient so attractors were built in Takarazuka to reverse commuter flows²².

Takarazuka new hot springs (onsen) and indoor pool were created under the belief that "given a goal or purpose people would ride the trains" even in the country-side. However, it didn’t generate the people, so taking inspiration from popular youth

²⁰ For example, manufacturing on sea cities (Port and Rokko Islands) and new villages on Rokko Mountain where the dirt from building Seishin New Town (mountain was shaved down) was transported via conveyer belt to reclaim land (in the Bay).

²¹ During the Meiji era (1868-1912) under guidance of Ichizo Kobayashi.

²² Kobayashi suggested a zoo or entertainment complex.

choirs of the time (they) put a lid on the pools, constructed simple audience seating and tried a women-only musical performance and theatre (adapted from Takarazuka Review Company, 2010).

Hankyu Corporation had successfully constructed the nationally-renown Takarazuka Review in Takarazuka along with highly-mixed housing estates (Machizukuri) along the rail line. This was the first time the concept of „*machizukuri*“ had appeared in Japanese urban planning. CKUP defined the modern machizukuri process as carried out through citizen consultation where a survey to ascertain attitudes and collect ideas is passed around to all residents of an area earmarked for development. He stated that machizukuri had become a basic responsibility for Kobe local government, adding that in the Japanese planning process the prefectures were responsible for „*tying the cities together*“ fairly and the National Government for the construction of major roads and infrastructure. He noted that this process was happening in cities throughout the country; „*there is no standard, Kobe builds the best neighbourhoods for Kobe...there is freedom in the fact that cities are best left to manage this*“.

Speaking about neighbourhood planning in new towns, CKUP stated that they initially tended to attract people with higher qualifications. He asserted that „*from a company’s standpoint having people with a higher education is a great environment*“ of easy access to a pool of intelligent people, including housewives wanting to work part-time. CKW agreed that the „*residential adjacent to industrial area model*“ of 1970’s and 80’s new town developments had made them hugely popular, he offered the example of Port Island where several tens of thousands of residents „*all moved in as soon as it was built*“. He observed that this popularity had created one of the biggest issues facing Kobe „*new towns*“, their aging populations which are slowly turning these neighbourhoods into „*old towns*“.

These people who were in their 30’s and 40’s are now in their 70’s or 80’s...The neighbourhoods certainly need new families and new blood, but you can’t tell the people living there to leave (CKW).

CKUP stated that neighbourhood planning in the aging suburb of Shin Nagata helped to overcome socio-economic difficulties after the earthquake. He observed that „*Kobe offices and factories collapsed*“ or „*centralised business by moving nearer headquarters in Tokyo*“ to increase „*operational efficiency*“. He noted that this „*land was converted to residential*“ and infrastructure built on traditional (chemical or synthetic shoes) and new (creative manga) industrial images, such as Shuzu Plaza²³ and Tetsujin 28²⁴. He stated that mixing

²³ Meaning Shoes Plaza, which is a shoes retail district.

„different things together“ by *„creating a new environment of amenities and art“* along with putting in universities, residential and retail *„attracted a new Shin-Nagata population high in young people and students“*. He felt that understanding the core drivers of a neighbourhood and *„introducing something new allows all elements to align“*, acting as a tourism attractor boosting neighbourhood economic wealth. He stated that *„assembling lots of these sorts of things compactly“* stops the decline of populations and *„boosts the use of public transport infrastructure“*, he felt that this was a basic function of economic development for Shin-Nagata and Kobe, as a whole.

MWU observed that Port and Rokko Island new town neighbourhood developments were built to strengthen the public security function of Kobe Port and house the growing and future predicted populations of Japan’s post-war extraordinary economic growth: *„the City built residential areas on both the mountains and sea to house population overflows“*. CKW explained changing neighbourhood planning ideologies:

There have been gradually newer versions (since the) very first purely residential were built... (For example), streetscapes are used to create a much higher level neighbourhood to attract new people (or) we modernise and make old developments attractive by moving away from single-zoned residential and commercial which becomes increasingly inconvenient as populations age.

MWU suggested that the Islands exemplify the changing local government approach to community and industrial development, with first Port Island constructed solely by Kobe City government and then Rokko Island by a public/private joint development committee. She asserted the Rokko Island development signalled Japan’s first attempt at joining the forces of a local government and private enterprise²⁵ to create better community-oriented and quality residential neighbourhoods. She noted that in both cases City of Kobe had a key role in directing industrial development, which appeared driven by *„policy responding to the changing nature of industry“*. Port Island construction was *„centred on (three universities,) a large City Hospital and supercomputer facilities“* to attract new economy industry and counter-balance *„declining shipbuilding and port“* activities. While Rokko Island *„was built around the concept of (medical,) fashion and design“*.

²⁴ Meaning Ironman, which is a gigantic „life-size“ 18-metre 50-tonne statute of a globally popular comic hero launched in 1956 (known as America as Gigantor, and is the subject of several TV animation series). Its creator was from Kobe (Manga Entertainment, 2007; Inhouse Entertainment, 2011).

²⁵ A competition was issued calling for private enterprise to submit proposal for Rokko Island neighbourhood development; City of Kobe chose partner private enterprise from entrants.

9.3.4 How important are single-use and mixed-use planning zones to the future economic development of suburbs?

This question targeted how single and mixed-use zones were utilized for local and regional economic benefit. Table 26 reviews participant responses.

The term „*mixed-use*“ raised cultural and interpretive issues, with PNWC respondents having a clear mutual understanding and Kansai participants confused as to how else city centres would be planned. This was partly because the urban growth boundaries and limited land supply of most Japanese cities generated higher mixed-use and pedestrian-orientation than in the land-abundant urban-sprawl model of PNWC, particularly around train stations. Mixed-use was interpreted by Kansai participants through the Japanese „*compact city*“ concept being the density and mix of infrastructure and amenities in a neighbourhood or city as a whole. The uniformity of PNWC answers is a likely outcome of social, economic and environmental discussions generated by PNWC car-based planning and associated spatial segregation of activities and infrastructure.

Direct comparison of attitudes towards the economic value of mixed and single-use zones was difficult for two reasons. Firstly, responses were based on the above very different regional standards regarding how mixed-used is assessed. Secondly, both regions appeared to clearly and similarly identify the economic value of single-use in housing regional economic drivers and mitigating conflicts arising from incompatible land-uses, but showed little or no understanding of the knowledge economy contribution of mixed-use. Specific answers are given below.

Perth's Northwest Corridor

TPG and MAP stressed the importance of single-use zones having the capacity to adjust to industrial changes as areas mature (TPG) and their function to isolate „*heavy and/or noisy, and potentially polluting industry*“ (MAP). TPG noted that issues arose as areas zoned light industrially, such as Wangara Industrial Park in Wanneroo, went „*through transition becoming very much mixed-use (with) more retail*“. He asserted that such light industrial areas „*need to be replaced*“, but in the case of Wangara there is insufficient consideration regarding its expansion in East Wanneroo Structure Planning.

Table 26: Summary of the economic importance of single and mixed-use zones

Mixed-use		Single-use	
PNWC	COW	Better access to public transport (e.g., rail)	Accommodate natural business transition with urban maturity from outer fringe development to built up area
	YSC	Better space activation; more efficient use of infrastructure; access to amenities; facilitation social inclusion	
	CU	Attract quality human capital; human connectivity; stimulate creativity	
	TBB	For intrigue and sense of place; to attract human capital (e.g., entrepreneurs)	Avoid future health and safety issues
	MAP	Access to economic opportunities; enable more efficient use of infrastructure	Heavy industrial with high pollutants (noise, environmental)
	TPG	Provide work/living situations; diversity	Accommodate industries that support regional growth; house complimentary light industry
Kansai	CKUP	Access to amenities	
	CKW	Access to amenities	
	UR	Two different levels need to be balanced well otherwise detrimental to life environment: industrial (business mix in clusters) and residential (focus on humans and access to amenities)	To separate business causing grievance in residential areas
	HU	Provide employment and daily amenity for residents	
	MWU	Provide daily amenity for residents	

As key areas housing regional economic and industrial drivers, TPG commented that urbanising and mixing of uses in single-use zones threatened regional growth. COW concurred, suggesting that if a region *„is a strategic centre economically important to the State. Then government land...needs to be retained“* to reserve land for future industry, such as high-tech, or for *„demonstration projects, (such as) mixed-use and density around transit-oriented developments“*. He proposed that the State government should guide this through an economic development strategy, given that the responsibility and strategic importance of such decisions is beyond local government or private developers.

TBB noted that single-use planning failed to *„build intrigue and sense of place into the urban fabric“*, as well as contained *„obvious impediments to good mixed-use“*. He noted that *„people are afraid to mix uses“*, so mixed-use remains *„not well understood (nor) underpinned with an urban design process...(which inherently) delivers mixed-use and diversity“*. He explained *„imagine dumping Fremantle on PNWC; the technocrats (engineers, etc) would freak out“*, defining *technocrats* as *„people who only think about single-use, hierarchy, health and safety and auditing future problems“*.

The only way to solve a future problem which may never arise is to separate everything and over-design. Planners are the worst...making their livelihood out of it, so they write rules. (For example,) the LEED document in America deals with sustainable design in a ticker box system – 190-pages of LEED compliant design assessment because Americans don't have regional planning like (Australia). County after county are adopting it...developers prefer to go to LEED compliant consultants because they hope to get approval quicker. Compliance is an easy way of developing more. Separate the uses and problems and then over-design (the development) so it hurts the poor devil living there (TBB).

MAP thought that, in general, residential land would continue to be planned single-use *„with the occasional shopping centre or small corner store and such“*. He observed that the *„trend is for mixed-use centres with economic opportunities close to where people live and for the efficient use of infrastructure“*, he suggested that this was *„the traditional town centre...with a mixture of uses have been around in other parts of the world for hundreds of years“*. TPG and YSC also alluded to the trend of mixed-use zoning. YSC noted that mixed-use provided a more efficient use of the urban environment by decreasing the number of dead spaces, being those *„spaces active during the day and dead at night“*.

From a safety and social perspective, people should always be interacting in an area; mixed use helps achieve this. For example, a university shouldn't be planned

campus-style as it is exclusive and does not encourage community-use or ensure the safety of researchers working at night. It should be street-based (YSC).

Using Notre Dame University in Fremantle as an example of a successful street-based campus, he stated *„those going to the university walk in the city; street-based retail is stimulated by the daily flow of (people) buying food, shopping, coffee and so on. It is a more efficient use of resources and infrastructure (as) the university doesn't have to provide these services on-campus“*. He observed that the car-based campus-style planning-to-date did not encourage people to walk and that more integrated spaces were essential for greater interaction and connectivity between different types of people. YSC stressed that *„interaction between research and industry“* and *„infrastructure and connectivity“* was important for R&D, the commercialisation process and local business. For example, through the supporting services of *„retail and accommodation“* as *„good planning is a good café operating 7 to 12 o'clock full of different people; the morning people probably aged 40-50 with their coffee and breakfast after a run, the lunch-time working crowd for meal and the night-time tourists“*. MAP agreed, stating that urban planning should target *„at least more than 9-5 usage“* as 24-hour use was impractical. YSC proposed that generating better use was probably about *„understanding the age structure of (the urban) environment; even the elderly must be integrated into the community“*.

COW related mixed-use to transit-oriented developments, seeing it as *„the timely delivery of public transport prior to development“*. He offered two scenarios for the rail extension from Brighton to Yanchep, such that mixed-use planning occurs either: 1) on the rail before development; or, 2) when the population can support viable train ridership. TPG stated that the mixed-use associated with current *„best-practice town planning“* was difficult to achieve in reality, noting *„there is a propensity in planning to designate something mixed-use and assume that it will happen“* but *„if you are not careful (elements, such as large retail,) will overtake and you won't achieve your objectives“*. He suggested that incentives for mixed-use needed to be provided, but urban planners often did not have adequate economic knowledge or understanding of industrial drivers to make decisions about which business to attract to mixed-use developments. TPG noted that Directions 2031 policy was requiring greater mixed-use:

Turning shopping centres into town centres and having more intensity, more diversity and more connectivity...The real battle grounds will be (transforming) Whitfords and Karrinyup (shopping centres).

He considered mixed-use in PNWC difficult being dominated by large retail (such as *„the big box players like Coles, Woolworths, BigW, Kmart“*) which often undermined good mixed-use.

He suggested two approaches to minimise a shopping centres' impact were intensifying mixed land-use in: 1) shopping centre car parks; and/or, 2) immediate surrounding land which is frequently „single-detached housing“. He noted that the latter is „not easy to do, (and has to be done) within the commercial market“. TPG quoted Rouse Hill in Sydney „as a leading example of a mixed-use centre“, but was sceptical that Landcorp could implement it in Alkimos given their „half-hearted notion of mixed-use in Clarkson“.

CU expressed uncertainty regarding the link between mixed-use and certain economic outcomes, despite noting different development types attracted different sectors of the community.

Traditionally, PNWC attracted families with young children because of its proximity to the beach, Perth CBD, schools, etc...But equally there is a younger group that wants different physical and designed environments to the classic suburbia. These are mixed-use, a bit edgier...more 24-hour spaces with mixed services, employment, entertainment, recreation, accommodation, etc. These latter environments attract people not drawn to working with their hands, but with their heads so like to be where they can mix with others. (These) people...don't work well in isolation; actually, it is quite dangerous...They don't always stay relevant, (but) need interaction and to bounce (ideas) off others to advance and create (CU).

He noted that mixed-use environments become „part of (a city's) activities base“ regularly attracting people living from far across the city. In contrast, he felt that residents of mixed-use areas (of Perth) did not necessarily „go out and visit the suburbs on the weekend“, though residents in other „highly urbanised“ cities often need to get away from the stress of the „intensity of combining life and work“. He acknowledged that the lack of divisions in the lifestyles of such spaces can be „highly productive“ compared to „the suburbs, where the moment you jump into the car and are driving up the freeway you are in a different world“. CU observed that these changing work patterns were particularly evident in GenY, who „are at the workplace often working very intensely. This builds up stress, where they just walk away, take a year off or switch from a high-powered to low-powered job“. He felt that this was „affecting the way we build cities, the way cities operate and the way people respond to cities“ with the biggest problem being how to define the new economic needs and how to target high-level workers.

Kansai Region

The Japanese participants required an explanation of „mixed-use“, after which they were asked what they thought „mixed-use“ meant in the Japanese context. UR viewed the „mixed-use of human activities and industrial activities very differently“, noting that „Kansai Science

Park is about the mixed-use of Japanese economy and industry". He felt that mixed-use was *„not necessarily guided by procedure and design*", but colours on a map and land values such that the ratio for *„yellow*" residential to *„purple*" industrial land can change over 10 years depending on which will make more money.

If residential land becomes more profitable, it may become totally residential; or if industry becomes more profitable because it is near a highway interchange, industry will dominate (UR).

He added that this impacted how mixed-use was benchmarked and whether planning could actually generate *„mixed-use*". He stressed that mixed-use must encapsulate *„a wider meaning*" of how business and people co-exist *„otherwise it is detrimental to the life environment*", for example, human-oriented developments placing a higher importance on commercial facilities and entertainment as *„grievances arise when factories and residence are too close*".

He noted that car-based planning followed traditional zoning methods of *„pre-determined residential, commercial and industrial areas*", such that *„a park was a place that only human beings played in, roads were where only cars went, and residential areas where only people lived*". However, he felt that Japan's aging issue had *„further condensed*" the concept of mixed-use and made benchmarking even more difficult: *„the elderly eventually get to a stage where they can no longer drive and living becomes difficult... Mobile youth have a wider living environment*". He observed that in the end *„industry and economy rule*" as *„global movements (and flows) are the result of movement in money and economic worlds*".

CKUP noted that *„mixed residential and other land use*" was a natural outcome of Kobe's compact city approach to relatively limited usable land, creating a *„very long and narrow city between the mountains and the sea*". He observed that combined with good roads and public transport system, *„Kobe is a very liveable city by national standards*":

Osaka was always the city people worked in, Kyoto the city people studied in and Kobe the city that people lived in (CKUP).

He felt that excess demand to reside in Kobe was one of the reasons for *„places like Port Island (and other new towns) to be built*", he explained that each of *„these new towns was built as compact residential cities with employment and amenities concentrated in the neighbourhood urban core of either a train station or somewhere else*". CKW suggested that *„Kobe's increasing population and traffic*" was the driving force behind its pre-earthquake *„city planning philosophy*" to develop *„as many residential areas as possible by creating suburb after suburb around the inner urban area*".

The subway went through with stations placed at the heart of each development. It was not as much about creating a walkable environment as it was about absolute numbers (CKW).

HU and MWU concurred, maintaining these new towns were not built with adequate economic infrastructure. HU noted that *„Japan’s first new towns, Memawaridanchi (目周り団地); literally „a housing estate you can cast your eye around”, were basically residential areas with some shops for daily groceries and such, as opposed to the English new towns which also had places of work“*. MWU added that Japanese new towns had basically *„standardised”* housing and amenities, ranging from purely residential *„bedtowns”* to *„university towns”* with residence and facilities for daily life (*„primary, junior and senior high schools, universities and supermarkets”).*

Many noted this standardised planning and inadequate amenities made Japanese new towns inflexible and unable to cope with Japan’s aging population, exacerbating issues of urban degeneration and declining populations. HU explained that the strong *„residential community”* building focus and limited *„population turnover”* since the *„initial rush of young residents”* had created areas of little mixed-use work and other activities, such that new towns were basically *„drying up and dying”*. CKUP described the changing environment:

Lots of people living in spacious houses with 3 children created a nice environment, but the kids grew older and moved out for work leaving only parents and grandparents. The houses began to empty slowly leaving a scattered residential pattern, no longer compact or as safe...In addition, some elderly moved closer to hospitals and other amenities, because giving up the car, selling the house and living in an apartment became more convenient. This meant even less people living in outer suburbs. As zero population is not a good living environment; (City of Kobe) needs to attract families by revitalising these areas properly. It is staging development with some (more dangerous) areas being transformed into parkland or re-vegetated back into mountainside, while (others) with train stations are being consolidated and made more compact.

HU commented that fundamentally Japan had good *„social mix”* as from as much as *„half a century ago planning had promoted different social levels living together”*. However, he noted that better mixed-use planning would revitalise declining new towns by attracting a better age mix to combat an aging demographic, for example, by *„adding facilities, such as universities, to forge spatial connections”*. CKW explained that on a national-level declining population meant regions and cities were in competition for diminishing population resources:

Kobe is trying to attract people and grow; the Masterplan supports this objective...It is about using what we have created and have to this point rather building more.

Others also observed a movement towards greater mixed-use in new neighbourhood developments. MWU expressed that Rokko Island built 20 years after the first new towns (in the 1980's) *„incorporated different functions into its neighbourhood core“*. CKUP stated that recent *„neighbourhood redevelopments have residential on top, shops on the bottom and schools close-by“*, cautioning that *„the correct mix (of amenities) is very important as extremely concentrated planning can cause problems“*. He advocated locating public transport with convenient access to residential apartment blocks, shopping streets and life necessities (etc), as planned in newly restored areas like Shin Nagata. CKW thought that the mass exodus of people after the earthquake signified a major turning point in neighbourhood planning for Kobe, *„we realised that community was very important so the compact city model was used during restoration to create (new) walkable neighbourhoods of school, work, shops, medical, and so on“²⁶*.

9.3.5 How successful has the existing planning in your region been in achieving the following?

This question evaluated land form likely to facilitate human interaction, mobility and connectivity as inputs of knowledge development and innovation (Chapter 2). Each statement *a-e* targeted a different aspect of production efficiency in the new economy.

Statements *a* and *b* examined the fluidity of regional global human flows by exploring access to public transport, where *a* targeted links between airport and major city centre and *b* those of major city centre and outer suburbs. As presented in previous chapters, many highly-innovative cities have well-developed and efficient public transport systems. Perhaps this is due to the capacity of mass transport to decrease spatial distance and increase social inclusion providing a foundation for greater human diversity and movement within a city.

Statements *c* and *d* focused on generation of vibrant socio-economic communities given the importance of the car in modern cities. Statement *c* gauged vibrancy in key socio-economic pedestrian-oriented developments, such as around train stations or in the CBD. Statement *d* examined the car-pedestrian balance and whether the car belonged in pedestrian-oriented developments.

²⁶ By employing land readjustment (see Chapter 7) to rebuild badly destroyed areas, such as Rokkomichi and Shin Nagata.

Lastly, statement *e* examined how each region maximizes pedestrian movement and accessibility in residential suburbs, which are often comprised of detached or semi-detached style housing on mid to large size plots creating fundamentally car-based developments. Such suburbs can exacerbate the social exclusion of the less mobile and socio-economically advantaged, compounding wealth disparities with those in high amenity areas. As noted in earlier chapters, constructing suburbs which facilitate the widening gap between the „haves and have nots“ is highly inefficient in cities of innovation.

The following table notes average regional ranking by each participant; where PNWC is represented by () and Kansai Region by (). On average, PNWC was rated lower than Kansai Region. Specific responses are detailed in below sections.

Table 27: Average response of participant’s view of their region

Statement	Rating				
	Not successful		Successful		
a. Public transport links between the international airport and the CBD.	1	2	3	4	5
b. Public transport connectivity and accessibility to the central city for those living in the suburbs.	1	2	3	4	5
c. Capacity of suburban pedestrian-oriented developments to be vibrant socio-economic hubs, in particular around train stations or in the urban core.	1	2	3	4	5
d. Balance between car and pedestrian in pedestrian-oriented developments.	1	2	3	4	5
e. Urban form in the suburbs maximising pedestrian movement and accessibility.	1	2	3	4	5

(a) Public transport links between the international airport and the central city; and (b) Public transport connectivity and accessibility to the city centre for those living in the suburbs.

In general, Kansai respondents felt major urban centres were well linked through several alternative modes (bus, ferry, train) to the airport, with most suburbs highly accessible having a comprehensive and efficient network of trains and buses. However, all conceded that there are accessibility issues in some outlying new town developments.

In contrast, PNWC participants noted the airport was highly accessible by taxi or private car from urban centres (Perth and Joondalup central city) as well as suburbs, but not public transport. Most commented that public transport links between the airport and Perth Capital

central city were too complex to be considered as viable. All agreed that access from Perth Capital central city to inner and middle suburbs was good, but that services to outer metropolitan areas (including secondary economic centres) depended on the distance from the rail line with some areas having little or no public transport.

Site visits and participant observation supported these comments, finding that transport accessibility (including aspects of scheduling, location) was generally better in Kansai than PNWC. It was concluded that Kansai facilitated higher overall pedestrian movement and mobility between suburban train stations, central transport hubs and the airport for its given population size.

(a) Public transport links between the international airport and the city centre.

Perth's Northwest Corridor

CU observed that Perth's outer regions had excellent road links *„compared with most other cities“*, and the airport was well positioned giving it *„potentially good public and private transport links“*. He believed that progressing light rail to Perth airport was not a priority. He argued that the airport's *„close proximity to Perth Capital central area meant a direct link (was currently) less important“* (but perhaps needed in the future). He added that *„wherever you are in Perth you can get to the airport“*, with the hotel shuttle bus running between Perth City and the airport sufficient to service those coming from the outer suburbs by train. TBB agreed, stating that a Joondalup to Airport bus was impractical, and that those who can afford to wait²⁷ considered taxi's a form of public transport.

All other PNWC participants disagreed. MAP stated that *„public transport links between the airport and almost anywhere, not just PNWC, are appalling“*. YSC noted *„poor public transport doesn't mean poor access; people still can drive there easily“*, but that taking a regular bus with luggage to the airport was impractical when the car was so easy.

COW, MAP and CU admitted exclusively using private transport (car or taxi) to the airport; with MAP stating that *„driving and paying the \$35 day parking is still less than half the price of a taxi fare“*. COW's and MAP's exploration of possible public transport routes resulted in confusion and uncertainty as how to reach the airport. TPG viewed public transport as critical for the future, stressing heavy rail access to the airport. He noted that the *„underutilised“* land-use approach of the Federal Government (leaseholders of airport land and surrounds) did not connect the airport to the rest of Perth, with future connectivity

²⁷ Taxis are currently in shortage in Western Australia; so customers have to pre-book or wait in long lines for a taxi.

threatened as *„(they were) not bound by State planning documents and can ignore all State planning controls“*.

MAP stated that the *„land bank“* value of an airport²⁸ so close to a CBD²⁹ meant a long-term private lease had allowed Perth Airport to *„rapidly become a major employment hub of the whole Metro area“*, increasing the need for better transport links for *„thousands of workers and all the airplane passengers“*. YSC and TPG concurred, with TPG noting that the *„spread out (airport) development design without a notion of a transit path“* presented large connectivity issues. He argued that without a proper transit system³⁰ the land around the airport would become *„one of the most congested parts of the city“*, acknowledging that *„the experience around the nation is that transit doesn't pay“*.

Most agreed the link between PNWC and the airport was severely inadequate, with comments such as *„even worse that the Perth Capital central area to the airport; because at least (it) has proximity“* (MAP) and *„(links are) pretty much non-existent“* (COW). COW observed that *„better public transport links would be cheaper and more efficient“* given the number of workers living in PNWC flying in and out to the States northwest oil, gas and resource projects. He added that *„Occupational Health and Safety policies don't permit them to drive as they have been awake for too many hours“*.

TBB commented that future transit plans for Perth focussed on connectivity of regions:

The new 2050 Transport Plan for Perth's predicted 3 and ½ million population is well linked; the line out of the airport goes through Ashfield and straight under the Morley Shopping Centre, then north to East Wanneroo coming into Yanchep...At least, they are thinking about regional planning all the way from Yanchep/Lancelin in the North to Bunbury in the South. This hasn't been done for 15 years; a lack of regional planning at the master plan-level is one of the reasons for limited SmartGrowth delivery in outer areas. (There is even) talk about inner Perth City high speed train links right into Bunbury.

Kansai Region

UR noted that a recent survey of KSC workers found most indicated the direct airport shuttle to Kansai Airport³¹ was convenient (servicing the whole of Kansai Science City). He observed that this model was typical of Japanese cities.

²⁸ Perth Airport is a little over 2100 hectares.

²⁹ 12 kms from the Perth CBD; which is relatively close compared to other airports.

³⁰ *„There is no public transport component in the Masterplan for Perth Airport published last year“* (TPG).

³¹ Taking about 80 minutes and leaving from/arriving at a central point (Keihanna Plaza) every hour.

Similarly, CKUP and CKW observed Kobe had convenient airport access with various land/sea options depending on where you were coming from³²: JR, Hankyu and Hanshin rail lines, Yamate subway, special airport direct limousine bus and ferry services. Both stated that direct local buses from Sannomiya Station took about 70-75 minutes and the ferry from Kobe Port around 30 minutes.

MWU was less confident with several train changes making travel from Kobe central city via the Osaka-Kansai Airport train route „doable“, noting that the bus was still most convenient. HU thought there should be a direct train between Kobe central city and the airport allowing people to „get to places more quickly and less expensively (than taxis)“, adding that bus and ferry services were „easy if you know the city but not for first-timers“. He contended that the „large gap“ between „city planning and industrial development in Japan“ meant „industrial infrastructure, like the airport and freeways, usually develops areas for industry not for human interaction“. He argued that human interaction required „an efficient train system“, adding „it is very late if direct rail links to knowledge economy infrastructure (such as „Keihanna Science Park, Kansai International Airport and the old Itami International Airport) is only just being discussed now“.

The government is finding that Keihanna Science Park can't function properly without rail, so JR is slowly constructing a station at a time. An express direct from Osaka, Kobe and Kyoto should run to Keihanna to connect researchers to various work and shopping activities. Kansai International Airport is central, so transport from there needs to run directly into the centre of Kobe, Nara and Kyoto - not just the current direct link to Osaka.

Those who create knowledge travel all over the world; entering Kansai International Airport would give them the impression Japan is „behind“ which may hurt business. This is the disadvantage in Japan's systematic planning system; those building the airport only built the airport and those building rail only built rail. There is no overarching understanding or system describing how airport and rail developments link the region as a whole (HU).

(b) Public transport connectivity and accessibility to the city centre for those living in the suburbs.

Perth's Northwest Corridor

Participants generally noted a lack of connectivity and accessibility of PNWC's outer metropolitan areas to rail stations. MAP highlighted two reasons, firstly by planning „from

³² Kansai International Airport and Kobe city centre are on opposite sides of Osaka Bay.

day 1 which compromises rail planning” by running rail and building stations *„in the reserve down the middle of the freeway*”, creating physical and psychological barriers for pedestrians walkability. He acknowledged that such planning was appropriate in built-up areas as alternatives (*„tunnelling*” or *„demolishing houses*”) were *„economically unviable*” and *„socially destructive*”. Secondly, the long distances between stations to allow *„train to run as fast as possible outpacing other transport modes*”. He noted that while *„adding stations...lost the speed advantage of trains (by forcing them to slow down, stop and accelerate)*”, they were *„the only usefulness*” to development. As such, he stated stations *„must be located to maximise utility*” and not *„in the middle of the freeway surrounded by car parks and then low density suburbia*”.

TBB found connectivity in Joondalup to outlying suburbs improving despite the absence of airport links and better amenities in key tourism assets (such as the coast) would attract more people from Perth CBD. MAP and CU thought that Joondalup-Perth central city public transport link was good despite *„obvious issues of car congestion around railway stations*” (CU). CU suggested this could be avoided by better *„management of movements*”, for example, driving to train stations on Sundays when bus services were limited but there were lots of car parks. Acknowledging some weekday inconsistencies in bus frequency, MAP felt that connectivity from Joondalup to the suburbs *„should be reasonable*” given the Perth Transit Authority *„fundamental principle of using rail stations as hubs from which buses go to suburbs*”.

COW, TPG and YSC disagreed, citing PNWC connectivity issues particularly in fringe areas such as Yanchep. YSC stated that *„public transport is efficient only for those living in a 5-kilometre radius of the Joondalup CBD*”. He noted that a 20-minute car drive from Joondalup to Yanchep took approximately one and a half hours by bus during the week with no service on the weekend. He added that bad scheduling meant anyone travelling to Perth *„waits another half an hour for the train*”. YSC felt that the lack of connecting infrastructure made planning for employment and transport in Yanchep difficult, asking *„what is going to attract people to Yanchep when it is easier to live in Joondalup*”.

CU suggested that a solution to future transport difficulties in outer suburbs was *„downscaling the bus fleet*” from one *„designed for arterial traffic (to one for) local traffic*” to facilitate *„better bus feeder routes to train stations*”. He suggested the *„classic Perth kiss-and-ride*” model, based on previous commuting patterns where a *„mum taxi driver*” transports family members to the station, did not *„reflect current lifestyles*” where *„everyone is working in different directions and needs their own car*”. He proposed: *„no bus stops just a hail system on a set route*” serviced by *„smaller size vehicles (up to a 20-seater) doing figure-8 loops around the suburbs (centred on) the railway station*” would be *„easy on*

residential streets with lesser traffic...solving issues of people wanting to use rail but unable to as parking spaces are full by 7:30 or 8 o'clock.

TPG stated that the inner and intermediate suburban orientation of Perth's public transport system encouraged the concentration of infrastructure and services around Perth CBD. He described Perth's *„normal classification for a mass transport system“* as being a *„regular bus every 15 minutes (where) anything away from the main railway needs to be serviced by buses“*. He noted that lack of connectivity of areas not adjacent to rail lines made Perth a *„radial city“* rather than network city, which needed to be addressed through a circular light rail route allowing better east-west cross-suburb travel.

One of the objectives of Directions 2031 and the Metropolitan Activities Strategy is connectivity and mass transit from key urban centres. This aligns with TODs principles (TPG).

TPG observed that the proposed light rail of The Knowledge Arc would exacerbate connectivity issues of outlying suburbs by linking the four specialised centres of: 1) Murdoch hospital and university; 2) Curtin University and Bentley; 3) international and domestic airports, and; 4) University of Western Australia and QEII hospital. He noted that each were priorities for transport and development being potential research and development growth catalysts and regional economic drivers. He suggested that the resultant increased concentration of human and capital resources around Perth Capital central area would further disadvantage outer Metropolitan Perth if lack of infrastructure was not addressed.

Kansai Region

All participants reported relatively easy and safe access between major urban centres and suburbs in Kansai. HU felt Japan's public transport system position as one of the best in the world, despite some accessibility issues (i.e., escalators, elevators, etc) currently being addressed by the government. He stated that *„declining overhead costs“*³³ of rail development included in the ticket price made the lower ridership of Kobe public transport comparatively more expensive than Tokyo. He noted this made *„non-commuting journeys“*³⁴ *... (from/to outer areas) difficult, particularly for those who do not work“* as the work-related commute was *„generally funded by employers“*.

Describing Kobe's main station, Sannomiya, as *„a big terminal and major transfer point with about 500,000 passengers daily“*, CKW stated that *„travelling east and west from it into surrounding suburbs was easy by bus and public and private rail“*. CKUP felt most regions

³³ As fixed overhead costs get cheaper the more people ride trains.

³⁴ Such as, shopping, entertainment, etc.

and urban centres in Kobe were basically accessible with highly pedestrian-oriented stations *„built on flat land before surrounding development“*. He noted that in places, like Shin Nagata, the local government was improving accessibility and pedestrian safety by constructing and linking under and above ground passages.

Most participants recognised the accessibility issues of outlying new towns. CKUP observed that though *„residents love living between the sea and mountains of Kobe“*, walking is difficult in many of the new towns *„built on the mountainside“*. HU and MWU noted that these accessibility issues were exacerbated in new towns with limited or no train services (i.e., bus only) or sometimes even no public transport at all. MWU explained:

The scenario of poor or young people living on the outer fringe isn't true in Japan...instead difficulties arise because everyone lives in the heart of the city. The elderly live on the outskirts having bought there when they were young and economically well off; lower mobility and lack of accessibility makes life increasingly difficult as they get older.

UR confirmed that Kansai Science Park new towns also had *„limited access from the Keihanna Plaza train station into neighbouring areas“*. HU noted that Gakkuentoshi (a university research park new town East of Kobe) was an exception being successfully based on *„the belief that rail was needed from the start“*, so the local government *„constructed rail in conjunction with urban development giving residents immediate access to train services“*. He observed that this was unusual for Japanese new residential developments at the time.

(c) Capacity of suburban pedestrian-oriented developments to be vibrant socio-economic hubs, in particular those around train stations or in the urban core.

The meaning of *socio-economic hub* was unclear amongst Kansai participants, being unable to comprehend urban planning which did not concentrate socio-economic elements of a neighbourhood. PNWC participants needed no explanation, though responses reflected wide variation in accepted norms and standards of practice. This cultural difference was associated with public transport's importance in regional planning strategies and availability of land for development. That is, Kansai's limited land put high value on public transport's role in moving people. Train stations are centred in a neighbourhood core of commercial/everyday activities with limited car parking. This basic compact land-use model concentrates human movement and vibrancy, such that even car-oriented new towns have socio-economic hubs around train stations.

In contrast, PNWC is primarily developed to facilitate car accessibility with extensive car parks outside of key infrastructure and train stations located considerable distance from commercial/everyday activities. This planning model has generated a pattern of dispersed socio-economic activity, socially isolating those with limited or no car access. More recently, PNWC has attempted to readdress this through developments of greater pedestrian integration and mixed land-use.

Despite these differences, participants of both regions reported similar overall socio-economic changes between traditionally-planned and post-war car-based neighbourhoods.

Perth's Northwest Corridor

CU observed that the network city concept was about connecting key activity centres to *„deliver a whole range of services to the people living in that region“*. He noted that the critical mass of services and infrastructure relating to recreation and entertainment of inner city activity centres (e.g., Leederville) attracted residents of outer centres. He suggested that this movement of people was one-way, and that people living near inner city centres did not travel to the outer centres (e.g., Joondalup).

YSC thought that redeveloping inner areas was easier because *„people are already there“*. COW agreed, stating *„it is a business case; the 40 million to sink the rail is viable when developers can get \$800-\$1000 per square meter for surrounding land“*. He noted that land in Yanchep and Two Rocks (in Wanneroo) still did not generate enough demand to justify rail. He felt it was government's job to support *„risky development...(which was) in the interests of the community“* as developers are probably *„not prepared to take a risk“*.

All participants demonstrated mixed, even negative, feelings regarding the socio-economic capacity of developments around key PNWC infrastructure. Specifically, COW believed that *„Wanneroo Centre is probably an example of how not to do a pedestrian-oriented centre“* describing it as a *„series of boxes“* lining car parks and a busy road dangerous to pedestrians. He commented that the direct access of Wanneroo Central Shopping Centre loading dock to Wanneroo Road was *„a failure of the planning system“* because it did not create the pedestrian-orientation and liveable neighbourhoods advocated in planning policy. In contrast, MAP noted that *„the (future) Yanchep city centre local structure plan“* appeared more focussed on *„fixed transport infrastructure“* than previous plans.

Others commented on the transit-oriented development of Clarkson train station (in Wanneroo). TPG, COW and MAP observed that the maximum R80 density established by local government was disregarded by developers who built R40 as there was no set minimum standard. As TPG stated *„it has the street system of liveable neighbourhoods, but*

*not intensity of development*³⁵. YSC added that its lack of mixed use meant it died by close-of-business at 5pm. TBB noted that, despite having some density and retail being right at the station, its location on the freeway reserve meant it could only ever be *„half a TOD*”. TPG summarised with: *„how many kangaroos actually use the railway station?”*. MAP commented that its *„one-sided catchment*” surrounded by houses will limit its capacity to *„transform itself into a high density and vibrant centre*” as the people in the *„retail facilities near Marmion Avenue*” are unlikely to *„walk through suburbia to get to the station*”.

Others commented on the socio-economic neighbourhood of Joondalup CBD. CU thought it was good that *„the railway comes off the freeway into the heart of the activity centre*” as *„better and more activated spaces*” could still be generated from its 1970’s design. MAP disagreed, saying that the *„foundation planning for Joondalup is 1970’s car-based and spread out; it is not the best basis for a 21st century city*”. Acknowledging that *„a city can’t grow in 35 years*” and Joondalup central city is *„technically walkable*”, MAP doubted Joondalup could *„achieve what was planned even in 15 years (when it is 50 years old)*”. YSC commented:

There is the lack of retail around Joondalup train station; people’s movement was very poorly calculated. Those walking to the university never pass retail or coffee shops, but walk through the bush, cross the road, then back in the bush. It is dark and dangerous at night.

MAP described its walkability:

People don’t really walk from the council offices through the shopping centre to the service commercial area. It is (also) difficult for students to walk into the Joondalup central city as Edith Cowan University campus is too spread out. The lake is on one side, so it will only ever be a one-sided catchment and doesn’t help it function as a city. Also, it is insane that a major train station in the middle of a city is surrounded by car parks that close at night and half of the weekend.

TBB suggested a more integrated approach than its current *„three huge campus”³⁵ surrounded by trees and car parks*, like: 1) *„New York City University which is part of the town right on Times Square...(and whose) library is public*”; and, 2) *„Savon University which is part of the Paris street system...(and whose) medical faculty looks just like a big section of the city station*”.

TPG purported that Joondalup *„employment development*” performance was affected by lack of integration and energy in its CBD, as well as the large private land ownership of its *„one-*

³⁵ Being Joondalup Learning Precinct with Edith Cowan University, West Coast Institute of Training and Western Australia Police.

*sided development*³⁶. He suggested that the government „sold off land prematurely“ instead of retaining control over „significant sites“ for release during its „maturity cycle“ when network links had sufficiently „intensified and improved“.

Both COW and YSC were more positive, with YSC stating „Joondalup is quite a good concept; ...the best greenfield station development I have seen in WA because you go straight into a shopping centre from the train“. YSC assumed the car parks surrounding the station would eventually „become buildings“. However, his observation that Japan had also experienced increased shopping centre development over the last decades was tempered with „but not near stations“ which, he noted, were focused on „creating a more community-type feeling to attract people“.

Others, such as TBB and TPG, thought Joondalup’s campus planning was responsible for its vibrancy issues. TBB commented that the original Gordon Stephenson plan, „based on the grid planning of Perth City and Fremantle“, was overturned by the demands of large retailers for „big-box, car-based shopping“ on Joondalup Drive rather than shopping in „Joondalup Town Centre grid near the Council Chambers“. He suggested that this compromised the train station which was depressed under the shopping centre and car park development. He noted that despite opposition, the Joondalup Development Corporation refused to exert „absolute planning control“³⁷ leading to Joondalup’s current campus planning with „the good fabric near the council chambers and big box (shopping centre near the train station)“.

Both TBB and TPG agreed that the large retail centre had absorbed city vibrancy, which TBB offered was „only (inside the shopping centre) as externally is absolutely nothing but a sea of bitumen“ (i.e., car parks). TPG noted that shopping centre owners argue: „people will not use public transport to go shopping; they need their car to put their bags in and go“. He observed that their preference for single-use land concentrated with large retail left the „street fabric of Joondalup up on the hill with no vibrancy as there is no traffic, no circulation or anything there to create interest. It is really just secondary parking“. TBB suggested that „the best thing for Joondalup Shopping Centre is to break it up with streets and connect it to the rest of the town“, describing shopping centres as:

Totally controlled by one owner, where you are not a citizen so don’t have citizen’s rights and can be told to move on, don’t drive so quickly, no dogs allowed, don’t smoke, kids can’t move in groups, don’t dirty the windows and such. Vandalism is high, security guards and cameras obvious, because they are badly designed.

³⁶ Joondalup city centre is located adjacent to a lake.

³⁷ As granted by „an Act of Parliament“.

TBB suggested that new „mixed-use“ shopping centres were emerging which were more conducive to vibrancy, for example Rouse Hill (in Sydney) whose „single owner (is under council) mandate to have a main street and square surrounded by a public library, hall and cafes with residential above“. Overall, respondents felt PNWC did not have good examples of vibrant development. Some added there were few in Perth; MAP offered the walkable catchment of mixed residential, retail, business and government facilities at Cockburn Central³⁸ as means of increasing vibrancy around freeway-centric stations. Nonetheless, he concurred that infrastructure was generally „under-utilised“, such as „train stations being positioned in the middle of the freeway surrounded by low density“.

YSC thought the walkability of PNWC train stations were in reality more like 200m than the targeted 400m of *Liveable Neighbourhoods*. He felt that TODs in Perth were still in „a study period“ with generally poor pedestrian access, night time security and inadequate bike storage (given „Australians love of riding...and good cycle paths“). He attributed this to overly-car focused planning making the car more convenient than other transport modes, noting two differences in car-oriented Japanese new town station developments:

1. Limited car parking provision made driving of „no benefit“ other than drop off or pick up.
2. Increasingly immobile elderly of outer areas had better access to bus than outer PNWC residents.

YSC argued that Japanese stations were surrounded by activity (shopping, entertainment) creating feelings of security which encouraged pedestrians to walk from/to work and home. He explained that stations with business activity clustered on one side generated dead spots in less dense areas, which people avoided „or took a taxi or bus if there is no choice“ because „they feel unsafe“. TBB alluded to the conflict in Perth between new urbanism advocates arguing „good design outcomes“ and those concerned with statutory rules and regulations „bringing up policies and codes to stultify everything“. He suggested fundamental changes were needed in „the thinking about the sort of places we want to live in“.

CU contended that future Perth train station precincts appeared focused on „developing into highly active and attractive places“ to create „real vibrancy and a sense of identity...different from the life in suburbia“. He noted that an alternative to the current „suburban model...(of) the dormitory suburb with people working in CBD“ was one where „railways stations are not just stepping stones to get to work but centres for a broad range of activities“. He suggested that places along the Fremantle-Midland line such as Claremont, Cottesloe and Subiaco

³⁸ Station placed in the middle of the freeway in Perth's Southern Corridor.

provided good examples, but observed the ideological conflict between „wanting activation“ as well as „to park right in front of a coffee shop“.

TBB thought that the key to success in PNWC lay in clustering amenities and infrastructure in nodes on its beautiful coast, with „in-built public equity...(as) transit set well back“ but accessible to „boats, coffee on the boardwalk and beaches“. He felt that consolidating the natural amenity with built amenity and form would attract wealth providing the „basis for a knowledge community“, which he illustrated through the future Yanchep Town Centre plan:

It is designed as a series of mixed-use residential street grids surrounding a central train station with hotels and a marina in one area, sports and medical in northeast, retail and mixed-use in northwest. Education is built into the street and includes TAFE, university and student accommodation.

MAP agreed in the importance of early infrastructure and amenity provision, but observed that density and population were key development drivers in Perth. He suggested that the government played a crucial role in how planning was delivered, and it was unfair to expect developers to commit to a certain density or mixed-use (etc) „ahead of an absolutely rock-solid written commitment from government to build the infrastructure“. He cited the Mandurah line case where government decided on only one station between Cockburn Central and Kwinana after developers had already developed land for the initially planned two stations.

Kansai Region

Mixed-use and socio-economic hub were not well understood by respondents given that Japanese train stations and CBD's have always been planned with the greatest employment and residential mix and concentration. HU noted that „walkable neighbourhoods are a basic component of Japanese planning“: from first tier activity centres (like Sannomiya) which „attract people on a grand scale“, to second tier centres (like area of Rokkomichi and Shin Nagata stations) focusing on „renewal and revival“ to attract people and business, to „smaller local socio-economic centres“ (like Seishinchuou) which „do not necessarily attract people from outside the area“. He thought the terms related to low car usage environments as „people and cars don't interact“ so creating vibrancy was about excluding the car. HU observed that cars „travel point to point... going everywhere“ so high-use car environments encouraged dispersed human movement, whilst high amenity and walkable station developments concentrated movement „creating great socio-economic hubs“.

CKW explained that *machizukuri* in new areas focused on station walkability and the flow of people from nearby larger centres (such as movement from Sannomiya Station to outlying

Seishichuou new town). He observed that the first to be planned was *„the central neighbourhood, attracting residents and commuter for everyday shopping and business activities“*, and then connections to adjacent residential, as well as business and commerce (e.g., industrial parks). He stressed it was not about knowing exactly which *„shops and restaurants will emerge“* or *„how to attract tourists or people for entertainment“* in small neighbourhood developments, but *„about providing residents with the greatest number of amenities for everyday life“*.

CKW noted that *machizukuri* in older developments with existing populations (like Sannomiya and Motomachi) improved aesthetic urban elements creating a *„backdrop to attract people“* and strengthen socio-economic potential. On a regional level, UR commented that clustering lifestyle and business at station developments was part of an *„overall strategy of Japanese urban growth“*, including the provision of *„barrier-free facilities, as well as pedestrian security and safety“*.

MWU took *socio-economic hub* to mean human scale and its broadest sense *degree of walkability*, which in Japan was high due to:

1. Limited parking spaces around key infrastructure.
2. Frequent changes in urban landscape purposely planned to distract pedestrians so they walked further than they realised.
3. Everyday living and essential items spaced in easy walking distance.

MWU noted that these basically traditional planning techniques, employed in the more recent new town of Rokko Island, were different to the previous car-based planning of new towns, like Port Island *„characterised by planned blocks and zones“* on either side of the pedestrian barrier of Port Liner³². She observed that Rokko Island urban core encouraged walkability and human movement by locating *„libraries, cinema, museum, universities“* around the train station and along River Mall. She described the man-made stream of River Mall as running alongside the Rokko Liner³⁹ and down the middle of a pedestrian-only boulevard with various civic spaces. CKUP felt Rokko Island was an example of a successfully constructed socio-economic hub with *„comparatively compact“* commerce and residential. However, MWU spoke of its current degeneration:

After the 1995 earthquake destroyed Rokko Island’s large entertainment facility, the number of people attracted from other areas such as Kobe and Osaka decreased. This damaged other businesses...causing the cinema to go bust and close this year.

³⁹ Light rail

CKUP stated that the car was threatening the vitality of Japanese traditionally planned and walkable neighbourhood train stations as residents *„preferred to go by car to suburban shopping centres’*. He observed that some traditional suburbs, such as Rokkomichi, had benefited from land readjustment and revitalisation after the earthquake. He explained that the Machizukuri process had strengthened industry, university, community and administrative function surrounding the train station, having *„the Government Ward Office for long-term employment stability located beside a large community park built for community enjoyment (with playground) and security (safe zone and water source in case of earthquakes)’*“.

UR commented on the low socio-economic activity in new towns, asserting it was not necessarily *„negative’* in the Kansai Science City case being close to the other major activity centres of Kyoto, Nara and Osaka. He questioned the role amenities played in knowledge-related socio-economic activity, acknowledging the conflict between access to the natural amenity of landscapes and history and to the convenience of built amenity and infrastructure of entertainment and services. He noted that the majority of residential areas within KSC do not integrate work, entertainment and lifestyle, but are largely car-based consistently attracting the same age group and family structure. He suggested that greater diversity in housing and lifestyle product, including more entertainment and leisure facilities, might increase the number of young researchers which were severely under-represented in the resident population.

(d) Balance between car and pedestrian in pedestrian-oriented developments.

Both regions thought the best balance occurred when cars entered on pedestrian terms rather than the reverse, and saw car-based outer suburbs as being imbalanced compared to pedestrian-oriented inner city suburbs. Field observations found Japanese new towns and PNWC had similar car-based planning, though new town train stations were positioned in the urban core and PNWC stations in the freeway reserve or at the edge of suburbs.

The Japanese planning appeared more focused on pedestrian flows from the urban core to surrounding development, for example, using *„sensory’* and/or *„human-scale’* elements to concentrate pedestrian activity and flow. UR noted that this was only true in existing developments, as there was increasingly less Federal Government support for new suburban developments. However, he felt the car/pedestrian balance in new knowledge-based industrial developments, such as Kansai Science City, was not relevant, as industry and cars were the most important for its future (not industry and people). This opinion was not reflected by other respondents.

PNWC respondents agreed that the car could contribute to city vibrancy, but thought obtaining a good car/pedestrian balance was critical. This seemingly unified position most likely emerged through discussions of issues (e.g., social exclusion, pollution, congestion, etc) arising from its strong car-based planning approach to date.

Statement *d* revealed that both regions had mutually valuable lessons and insight to offer each other.

Perth's Northwest Corridor

TBB believed safety concerns in WA overruled good pedestrian design outcomes, citing the sinking of Subiaco rail when the delivery of *„a nice square“* was compromised in favour of *„an open chasm for rail guards to stand at the top and observe the platforms“*. He compared this to the new Woolamaloo station at Bondi Beach, New South Wales, having *„a beautiful mix of old and new, of haves and have nots, of street people...who don't have to cross the street with station entrances opening on both sides like shop fronts, with escalators leading down to the tracks“*.

TBB stated that the car was part of our mentality *„because we have big distances to cover“*, observing that pedestrian crossings are no longer built because they are dangerous to pedestrians and obstruct traffic flows. COW commented that *„overall people just drive to most activity centres or local shopping centres; they are just destination shopping“*. All interviewees stated that the strong car-based planning approach of PNWC was a barrier to good balance between cars and pedestrians. CU felt that Joondalup's large allocation of *„car parking around the shopping centre“* creating *„car park deserts“* were partly driven by consumer demand as people would go elsewhere if they weren't provided.

YSC argued that *„driving was more time efficient and safer in Perth“*, particularly at night when a lack of activity made train stations dangerous, compared to Japan where *„limited land supply“* presented *„no choice for people unable to pay \$200 per day car parking or no time to sit in traffic jams“*. COW and CU agreed, suggesting that better car park pricing and construction, along with more activities around train stations, could switch demand towards public transport. COW added that transport services must increase to readdress the car/pedestrian imbalance of PNWC's current over-burdened system.

TPG, TBB and CU felt that developments should be designed for both cars and pedestrians as cars were part of urban vibrancy. CU observed that *„people like the passing parade“* of cars⁴⁰ and that *„last century“* pedestrian-only malls are being slowly re-converted *„into*

⁴⁰ As found in *„the Leedervilles, the Northbridge, the Mends Street, the Albany Highway, Vic Park, Fremantle and South Terrace“* (CU, 2010).

streets". TPG contended that vibrancy was lost *„if cars are not allowed to drive along a main street"* as drivers may not park and walk down main street.

TBB acknowledged that *„we have a long way to go"* and that the popularity of roundabouts⁴¹ illustrated that *„cars had the right of way"*. He noted that their function to *„keep the traffic flowing"* meant fewer motorists, but more cyclists and pedestrians, had accidents on them. He suggested that building a network based on *„a hierarchy of major roads with roundabouts"* did not align to the *Liveable Neighbourhoods* philosophy as much as if *„traffic was shared...by a network of connected streets with no strong hierarchy, like in Fremantle"*. CU argued that planning needed to *„prioritise pedestrians over cars"*, such that *„cars enter pedestrian environments on pedestrian terms as opposed to cars entering pedestrian environments on car terms"*. He thought good examples were found in many European cities where *„cars are allowed no faster than a pedestrian can walk"*. He suggested that this encouraged only those cars interacting with surrounding activity, *„such as looking for a car park so people access the activity centre, trade vehicles servicing the activity centre and so on"*.

TPG felt that vibrant street life blended activity at the side and in the middle of the street by having:

1. *„A slow moving street in a purpose-designed road system"* with *„cars parking on both sides"* and *„buses stopping right in the street"* rather than a bus easement which *„takes up 4 or 5 car parking bays"*.
2. No wider than 18 metres or *„streets bleed"*, particularly if lined by *„single storey as it will resemble a car park"*.
3. Bike paths which go right up to, but not into, a short walkable main street - the *„destination"* where *„people either park their bike or ride with the traffic"*.

YSC, TBB and CU were both optimistic that future developments could successfully create a good balance; *„it is not about throwing the car out but about making it work better"* (TBB, 2010) by *„making sure that residents are well connected to their workplace"* (YSC) and other amenities. TBB summarised with:

It is ensuring jobs are local, keeping travel distances as short as humanly possible... (such that residents can) most efficiently conduct daily life and business with minimum travel - to trade, enjoy life, go down to the coffee shop or buy goods (etc). It is all about mixed use, compactness, compatibility and sustainability; the car is part of this.

⁴¹ Or ringroad.

Kansai Region

CKW stated that the well organised road network of outer new towns made them car-based and bus reliant. As such, he noted that public transport accessibility to central cities was low with bus services in some areas running only 3 or 4 times per day and others financially unviable and in danger of shutting down⁴².

CKUP emphasised the greater land allocation of car parks in outer suburbs compared to urban centres with numerous rail lines and limited parking (primarily underground). MWU felt that many outlying Kansai new town centres did not encourage walking, stating *„it feels like there are more unwalkable than walkable neighbourhoods“*. She indicated that these areas were a product of a time *„when there was a shortage of housing“*, and were incapable of adapting to the changing demographic needs of aging and less mobile residents. CKW described new town walkability:

New towns are planned as a series of compact and highly walkable neighbourhoods centred on a subway station and connected via major car-oriented highways. Residents walk to their neighbourhood station along pedestrian-oriented streets; the balance between pedestrians and cars is only good in neighbourhood centres.

In general, both HU and UR thought cars had priority over people in urban areas. HU added that even pedestrian-oriented areas were imbalanced having *„little continuum or flow (in pedestrian movement) between the station and the surrounding neighbourhood“* as stations were constructed to facilitate easy car access. He noted that there had been moves to *„totally stop cars from entering the station area to create pedestrian-safe environments“*, such that *„the immediate train station vicinity would be completely car-free and filled in to create an emotional or feeling zone and encourage the flow of people“*. He asserted that shop owners of traditional 商店街 (shotengai or shopping streets) voted against the move as they believed that *„cars brought people and, therefore, business“*. He argued that this was not necessarily true as *„there are examples where the 商店街 has disappeared, despite lots of people“*.

CKW felt pedestrian-only streets were unviable and it was about *„a balance“*, as business even in Sannomiya central city *„required delivery vehicle access“*. Nevertheless, he noted that efforts to increase walkability of Sannomiya central city had fuelled debate on the car/pedestrian balance. He observed that *„the concept of pedestrian conduits emerged“* during Kobe central waterfront development discussions to better understand *„how to get people to walk...(and) migrate from the city centre and between the two sides of the*

⁴² CKW noted that City of Kobe was trying to increase bus travel through active campaigning.

harbour". He suggested that future planning would be about „creating fun pedestrian neighbourhoods" by thinking of „the city in 3D or stereo".

MWU commented, „it feels like people are deciding that spaces should not be dominated by cars... but made compact... (which) implies also compacting towns, cities and even regions". CKUP stated „it is not about making roads easier for the travel of cars; it is about changing roads for the passage of people". He argued that delineation between cars and pedestrians in cities was related to industry transport demands and the ownership of large cars. He suggested that industry changes towards the knowledge economy, relative spatial convenience of most things and ownership of more compact cars were reducing the need for wide roads in Japan. He observed that this was affecting city planning and in places, like Shin Nagata, „car parks are hardly used" with most residents „riding bikes around the neighbourhood as they don't own a car". He claimed this was freeing up space in the city allowing more human scale neighbourhoods to be constructed where „places are created for humans to sit and do things". He asserted that as Kobe moved towards this type of city, it would become a better city.

In contrast, UR's view that new developments were decreasingly less pedestrian-oriented most likely reflected the industrial-focus of Kansai Science Park and Japan's declining need for new residential development. As, UR observed the „pedestrian-oriented neighbourhood developments of the prior cluster plan have disappeared with each successive development" as „prioritising industry means more car-based development as opposed to prioritising lifestyle where pedestrians are the top consideration". He added that „when land is cheap there is capacity to over-indulge in development, but there is less and less capacity with Japan's sky-rocketing land prices ... (so) residential land and pedestrian-oriented areas are sacrificed". He reasoned that planners were constrained in how they planned neighbourhoods „in Japan's current economic climate" as the „National Government has decreased new suburban development support (policy and funding), such that new development now occurs with as little as possible infrastructure provision".

(e) Urban form in the suburbs maximising pedestrian movement and accessibility.

Despite different planning approaches, respondents of both regions stated that pedestrian movement and accessibility were integral to good neighbourhood planning. Field observations found Japanese suburbs to be more successful at generating these outcomes than those in PNWC.

In general, Kansai participants thought urban form should facilitate human flow, noting that neighbourhoods were planned by constructing flow lines of increasing human concentration from residential houses, along retail-lined streets to a public transport hub. Nonetheless, field observations found new towns to be similar to PNWC car-based developments with residential developments of limited amenity and connectivity to adjacent employment areas.

As a result of social exclusion and lack of vibrancy issues generated by largely car-based planning, PNWC participants thought better mixes of infrastructure and amenity generated more vibrant neighbourhoods and centres. There was limited discussion regarding how pedestrian movement or flows might be encouraged between developments.

Perth's Northwest Corridor

TPG stated that planning in outlying areas was outlined in *Liveable Neighbourhoods* which advocated „walkable catchments around centres, interconnected streets and removal of cul-de-sacs“. He described some PNWC suburbs as badly planned with „heartless“ and „illogical“ streets. He stressed that „streets need to be legible“, giving the example of Old Quinns⁴³ where undulating streets made it „organic and gave it more character and soul than some of the newer suburbs which were flattened“. YSC agreed, observing that residents of Perth's older suburbs were more active and lived a „more pedestrian-oriented“ lifestyle than those in outer metro areas where it was difficult to get people out of cars. MAP echoed this, adding that outer suburbs planned in the last five years had better accessibility to and integrated with surrounding development than those planned before this.

TPG thought the *liveable neighbourhood* concept had improved, such that each successive development was a „product of its time“ representing a specific point in the neighbourhood planning learning curve. Referring to a study conducted at UWA comparing liveable neighbourhoods and conventional sub-divisions, TPG noted:

Liveable connected streets haven't had a huge impact on pedestrian journeys...New suburbs still don't have places people want to walk to, like a transit stop or coffee shop, which are found in older suburbs not built for the car, like Subiaco and Claremont. Such suburbs provide „a place“ such as tree-lined streets with short blocks connected to destinations or centres; we got it very wrong in some of the suburbs built in the 1970's.

CU noted that PNWC was primarily car-based and still too „young“ to undergo redevelopment or a retro-fit, for example, the „very manufactured“ (TPG) suburbs of Mindarie and Butler (less than 20 and 10 years old respectively). MAP and TPG described

⁴³ Suburb in Wanneroo.

Mindarie³³ as having poor accessibility, limited mixed-use and pedestrian movement. TPG found the high investment in Butler's man-made lake ludicrous given it is „surrounded by single residential“. CU commented on the potential of future developments, such as the coastal suburb of Jindalee, as „pedestrian spaces and environments seem to be given careful consideration, unlike many existing suburbs which are designed on assumption that everyone has access to a car“.

CU concluded that the movement of people in PNWC was better addressed in more recent developments, adding that „providing a transport hub“ with „activated land use...flow(ing) into surrounding areas“ was crucial to avoid „an endlessly sprawling city of dormitory suburbs“. TBB stressed the importance of infrastructure and amenity in initial development stages, stating „Perth rail is population-driven with 30,000 people needed for each station, so for 20 years people are attracted to an area under the wrong type of urbanism. When the train finally arrives, they are already used to driving their car“. He suggested that „this paradigm needs to be broken“ with planning promoting „the intrinsic link between land use and transport“ as „good land use outcomes (such as mixed use) can't be designed without transport (train and interconnected bus networks)“. He contended that light rail and trains should replace „a fixed route public transport network“ of train and buses „as a development grows and matures“. He noted that light rail „linking activity centres“ by running through activity corridors could extend the Network City model to suburbia. He added that this was critical for „compressed, compact, compatible (and) sustainable development“ as well as the success of Wanneroo's SmartGrowth Policy.

TBB suggested that *Directions 2031* should not focus solely on activity centres, but encourage the development of activity corridors to influence pedestrian movement and accessibility to suburbs. He stated that current statutory regulations and guidelines meant planning often became „just about pushing lines around and changing the colours“ overruling the „delivery of great amenity and great place“. Using the example of Yanchep:

Tokyu took the foreshore reserve out to get zoning passed though Council more easily as (this) elevates land value... they will have to buy this land back (if they) decide to build a Marina. This happened with the railway and Marmion Avenue which Tokyu realised were in the wrong location 15 years after zoning, so a region scheme amendment was filed to buy back the old reserve and give up the new reserve (TBB).

Instead, he felt urban design should be based on leveraging natural assets to create spaces people are attracted to which, in PNWCs case, was its coast with:

...great estuarine and water-based potential: sea pools, beaches for kids, boating activity, etc. Ocean Reef will be bigger than Hillarys and Alkimos smaller because the water is shallower (which is great for) offshore reef for diving. Each Marine development offers something slightly different - a whole new playground (TBB).

MAP and COW contended that increasing human movement within a suburb required greater diversity in amenities to extend its activity base beyond the current 9am-5pm model. COW added that attitude changes to walking, more density and 24/7 vibrancy were also important.

YSC noted that Japanese planning was based on *„understanding pedestrian networks; how people move between residential areas and the station“*, where *„this line of movement becomes the main street“*. He stated that Yanchep town centre was planned using this same principle where mixed-use activity nodes *„create destinations to encourage walking“*; that is, *„a university or other higher education facility is not built next to the station as this kills retail which is, instead, positioned to form activity corridors of pedestrian movement“*. He argued that many PNWC suburbs lack diversity in the type of person (i.e., attracting residents of similar age, income level and stage of life), such that *„even if you provide good accessibility to activity nodes “* residents will still drive in places like Mindarie as most are families on relatively good incomes. He compared this to Japan which is broadening population mix and diversity by *„attracting families and young people to areas of aging populations“* activating outer metropolitan areas.

Kansai Region

CKUP reported that traditional Japanese *„neighbourhoods had no cars but narrow pedestrian streets running between residential, shops and industry“*. He noted this changed when *„cars entered the city“* and places, like Sannomiya and ShinNagata, built pedestrian networks of connected underground and above ground passages. HU stressed the renewed importance of walkability and accessibility under Japan’s increasing poverty, declining and aging population, with traditional human-scale compact mixed-use planning seen as a means to revitalise centres.

MWU argued that walking and accessibility was about *„making the city smaller“* and human-scale, for example, by constructing more narrow roads, more interesting spaces and moving pedestrians through changing environments. She stated that though car-based new towns did not focus on such environments, pedestrian accessibility to and limited parking around public transport hubs were still key considerations. CKW observed that basic walkable catchments had bus stops every 300 metres and subway/train stations every 1 kilometre. He advocated that different services should be planned for different level centres:

Residential estates focus on residents and amenities, not the attraction of tourists. People engage in shopping and fun in areas, like Sannomiya, Motomachi and the waterfront, which concentrate tourist activity and commercial facilities.

MWU disagreed, noting that new town areas zoned only residential and inhibiting retail or other functions hindered the creation of compact towns. CKUP conceded that *„cars had become most important“*, noting *„we try to tie cars and people together but planning revolves on cars using roads and people pedestrian overpasses“*. He acknowledged the compromise in land-use planning between *„wide roads being best for residential environments and narrow lively ones being better for retail“*, noting that *„people are attracted to places where other people go and a beautiful street will fail to attract crowds like a narrow street lined with interesting places“*. He contended that the changing relationship between people and cars was *„altering city planning“*, where *„suburbs are being livened up and apartments put in the city centre amongst the offices“*. He asserted that increasing central city residential was positive in that it decreased the number of cars, and negative as it created office space deficiency in a largely commercially zoned area. CKUP summarised the importance of the city:

Changes in the urban core essentially focus on the connection of people who can meet through the computer or physically in the city. Attracting different people to a space is the function of the city; cars are a part of the capacity of places to facilitate the meeting of people.

CKUP observed that the rising attraction of the urban core was detrimental to suburbs, making neighbourhood planning increasingly important. He felt that suburbs must focus on the function of place to *„create a purpose for people to be out“*, enriching spaces to become tourism destinations or venues for special events (e.g., Tetsujin 28 in Shin Nagata). CKW stated that this could also be done by constructing pedestrian environments with appropriate width *„pedestrian paths dotted with points of interest such as sculptures and trees especially along roads identified as key pedestrian passages“*. CKW suggested that the Machizukuri process also encouraged resident use, accessibility and walkability. He felt that it gave ownership over living environments by allowing residents to make decisions such as *„where roads go during land readjustment“* or whether to create a stream flowing besides a pedestrian path for aesthetic pleasure and practical relief (in case of fire or disasters).

CKW advocated the concentration of amenities and infrastructure around an urban core rather dispersed throughout suburbs. He felt this meant *„establishing controls to restrict large shopping centres“* whose car-based shopping convenience worked against clustered amenities and infrastructure destroying the identity and place of *„traditional local 商店街*

(*shotengai* or *shopping streets*)". HU concurred, noting that the convenience of large shopping centres was endangering *„the inner core of suburban Japan“* as they were not *„contributing to the compactness of neighbourhoods“* and encouraging a *„food desert“* with the disappearance of inner core supermarkets.

UR observed that car-based new towns, such as Kansai Science City, were characterised by lower pedestrian accessibility and movement than Kobe CBD, and therefore provided less opportunities for interaction between researchers. UR noted that land values in Japan were deceptive. He stated that unlike most countries, where high land values are associated with *„higher urban densities of cities which facilitate the construction of walkable neighbourhoods“*, Japan land values were higher in outlying areas. He connected this with the *„cost of providing roads, water and commercial facilities“* to land which was originally mountains and forest.

He asserted that land development was focused on facilitating industrial expansion rather than housing a declining population. He contended that lower *„quality of pedestrian environments and roads“* in new developments were a result of *„national government funding cuts“*. He noted that resources were diverted in favour of soft infrastructure linkages, such as communications, as this was seen as the *„quickest way to attract tenants, and therefore foster the R&D and high-tech environment envisioned as Kansai Science City’s contribution to Japan’s industrial goals“*. UR admitted there was *„little connectivity with adjacent mutual clusters“*, but stressed the existence of strong knowledge linkages between regional activity hubs, such as between Kansai Science City and the Osaka Station North Knowledge Capital project.

9.4 Conclusion

This chapter detailed interview results with key urban planning and economic development informants from Perth’s Northwest Corridor, Western Australia, and Kansai Region, Japan. Based on the literature review and document analysis of previous chapters, interview questions targeted urban planning likely to facilitate human interaction, mobility and connectivity as elements supportive of innovation and knowledge development. The interviews were generally divided into two components. The first looked at attitudes and understandings of connections between urban planning and economic development, and the second at specific planning highly supportive of knowledge economy objectives. This section summarises findings.

The strong Japanese Government national economic vision appeared well-communicated to Kansai participants. All had a good shared understanding of future regional economic

drivers and some knowledge of economic policies guiding urban planning decisions. Answers were globally-oriented and centred on the generation of knowledge and innovation in emerging industries, such as biotech, renewable energy and environment. They portrayed a clear division between local and National government's economic role in the construction of infrastructure and urban planning, and some understanding of the links between urban planning and economic development in the new or knowledge economy.

In contrast, PNWC responses were varied, primarily centring on economic links to the Perth CBD. Some indicated a future competitive strength in knowledge development and innovation in key industry sectors, such as mining and education, while others cited supporting services, such as retail, land development, lifestyle and local tourism. Respondents did not clearly understand whose responsibility it was to provide economic infrastructure, how infrastructure may contribute towards State and National economic objectives or the relationship between regional economic development and urban planning.

Though outer metropolitan areas (or new towns in Japan) had similar low density car-based planning, density and maturity of development were key differences between inner and middle suburbs of the two regions. This generated linguistic and cultural issues in the description of urban form conducive to human connectivity, interaction and mobility. Specifically, the widely-used Western Australia terms of „*socio-economic hub*“ and „*mixed-use*“ were not directly translatable into Japanese and required considerable explanation by the researcher. The Japanese closest equivalent was „*compact city*“. This related to the density and mix of infrastructure and amenities in a neighbourhood or the city as a whole, rather than the Western Australian meaning of vibrancy or mix in a specific development not necessarily linked to the wider neighbourhood or city. This regional difference was cultural being associated with public transport's traditional role in Japanese regional planning strategies and the amount of land available for development.

That is, urban growth boundaries and limited land supply of many Japanese cities make them highly mixed-use and pedestrian-oriented, particularly around train stations. Such that the basic Kansai neighbourhood, even in car-oriented new towns, plans the neighbourhood core as a train station surrounded by a range of commercial, everyday activities and minimal car parks. Its key focus is the efficient use of community infrastructure and amenities to maximise pedestrian accessibility and vibrancy.

In contrast, PNWC neighbourhood planning focused on car access with extensive car parks outside key infrastructure, including specifically planned pedestrian-oriented train stations. Other than Joondalup CBD, train stations were located considerable distance from commercial and everyday activities either at the back of suburbs or in the middle of the

freeway. This planning has generated patterns of dispersed socio-economic activity, resulting in the social isolation and disadvantage of those with limited or no car access. PNWC has attempted to readdress this by promoting greater pedestrian integration and mixed land-use in current and future developments, particularly in light of its booming resource sector and subsequent dual-speed economy.

It was difficult to directly compare attitudes towards the economic value of mixed and single-use zones for two reasons. Firstly, as outlined above, responses were based on very different regional standards of measurement regarding mixed-use. Secondly, responses demonstrated both regions clearly and similarly identified the economic value of single-use in housing regional economic drivers and mitigating conflicts arising from incompatible land-uses, but little or no understanding of the new economy contribution of mixed-use. In addition, PNWC responses reflected wide professional variation in accepted norms and standards of practice in distinguishing between mixed and single-use developments.

Turning to specific planning supportive of innovation and knowledge development, major Kansai urban centres had well-established public transport connections with international and domestic airports as well as surrounding suburbs (with the exception of a few fringe new town developments and Kansai Science City). This was achieved through a highly accessible, comprehensive and efficient network of trains and buses. This led to the conclusion that there was a high degree of mobility and fluidity in both global and local pedestrian flows across Kansai.

Though well-connected by train to each other, neither Perth Capital central city nor PNWC had viable public transport connections to the airport. Connectivity to outer suburbs from PNWC decreased the further areas were from the rail line, with some areas having little or no public transport. The increasing number of residents in these disconnected and low amenity outlying metropolitan areas is likely to exacerbate the divide between the „haves“ and „have nots“, disadvantaging those with limited or no car access. PNWC appears to have low levels of mobility and fluidity of global and local flows across the region.

Despite the different planning approaches outlined in this and previous chapters, participants reported similar overall declines in socio-economic activity as traditional neighbourhoods were replaced by post-war car-based planning. Both regions felt pedestrian movement and accessibility were integral to good neighbourhood planning, and that urban balance occurred when the car entered on pedestrian terms rather than the reverse. Both saw pedestrian-oriented inner city suburbs as having a better balance than car-based outer suburbs (or new towns). Though Japanese suburbs were observed to be generally more successful in achieving this balance, Japanese new towns and PNWC were found to have similar car-

based planning and human movement issues. However, the central neighbourhood position of new town train stations created a wider sphere of human vibrancy and spatial movement than PNWC stations.

Indeed, Kansai participants generally purported that urban form facilitating human movement could be generated by constructing flow lines of increasing human concentration from residential houses, along retail-lined streets to a public transport hub. This key Japanese ideology behind neighbourhood development and revitalisation did not appear to be a consideration in PNWC pedestrian-orientated areas. However, despite this, as in car-based developments of PNWC, Japanese residential new towns were characterised by low connectivity to adjacent employment areas and large car-based retail shopping centres attracting vibrancy away from the limited amenity of the urban core. Both regions felt that better mixes of infrastructure and amenity in the urban core and policy shifts decreasing the dominance of large retail centres would generate more vibrant neighbourhoods and centres.

PNWC respondents generally felt that the car could contribute to city vibrancy with the right car/pedestrian balance. This common belief was most likely a product of discussions emerging from issues (e.g., social exclusion, pollution, congestion, etc) arising from its strong car-based planning approach rather than an outcome of increased innovation or knowledge development priorities.

Acknowledging the role of the car, Kansai participants focused on the significance of greater pedestrian flows around the urban core and into surrounding development. They advocated creating emotional experiences by using „*sensory*“ and/or „*human-scale*“ elements to concentrate pedestrian activity and movement. They noted that Japan’s decreasing and aging population had shifted National priorities towards the consolidation of human movement in existing areas, with decreasing Federal Government financial and policy support for new developments. Surprisingly, the car/pedestrian balance in new knowledge-based industrial developments, such as the highly car-oriented Kansai Science City, was not deemed relevant for industrial success in the new economy. This opinion stood in contrast to the human mobility and connectivity focus of Kansai Science City linking projects like the knowledge capital development at Osaka Station North.

Overall, Kansai’s higher mixed-use and pedestrian movements are likely to be more economically efficient in generating human interaction, mobility and connectivity. Therefore, Kansai cities, such as Kobe and Osaka, are probably more productive and have a greater competitive advantage in innovation and knowledge development. In contrast, the low connectivity and vibrancy of pedestrian-oriented developments of PNWC is unlikely to be efficient in the new or knowledge economy. Such areas will require greater public and

private funding and effort to generate the critical mass of social capital networks needed to produce the same knowledge output for any given population size, *ceteris paribus*. Such a conclusion can also be applied to Japanese knowledge-based industrial developments, such as Kansai Science City, whose emphasis on industrial production inputs of large research facilities in heavily car-based developments seems more geared towards producing and transporting goods than stimulating creativity and developing ideas.

CHAPTER 10: CONCLUSION

10.1 Introduction

Knowledge has frequently been linked to rapid sustainable economic growth, but unprecedented globalisation and technological advancements have made understanding how to drive this relationship more important than ever. Countries, cities and local regions alike are pursuing policies of innovation and knowledge development. Generating such outcomes are not easy as innovation is the outcome of a complex process embedded in a combination of individual and collective human knowledge, experience and space. Many suggest fostering the social capital and creative capacity of local urban environments. Exploring these links in the context of economic theory, this thesis hypothesised that urban planning and city design, as the framework for human interaction, movement and connectivity, can influence the efficiency of knowledge productivity and the innovation process.

It is contended that urban form impeding the interaction of soft infrastructure (social capital) is likely to require more government intervention and resources to overcome inefficiencies of low connectivity, accessibility and urban vibrancy. In contrast, it purported that urban form that enhances social capital tends to have better living and more accessible environments for all residents irrespective of socio-economic standing or aspiration. This thesis proposed that the high human attractiveness and movement of the latter improves the efficiency of knowledge exchange and innovation systems. That is, a regional or national innovation system will be the accumulative sum of all local innovation systems where the actual urban environment can facilitate knowledge production. This chapter summarises research conclusions and significance, as well as key recommendations for future research and inquiry.

10.2 Summary

This thesis presented the results of a four-year cross-national study exploring how urban form can leverage socio-economic aspects of a city for new economy growth. It identified infrastructure types and the importance of urban form in generating an environment which facilitates knowledge development and innovation. It contended that the environment of

certain developments may be more supportive of national innovation and productivity priorities than others. This section briefly reviews the key focus and findings of each chapter.

Chapter one outlined research objectives and significance, as well as general concepts and definitions relating to knowledge, globalisation, outer metropolitan regions and elements of competition in the innovative knowledge-based city. Chapter two provided the conceptual foundations exploring the capacity of hard infrastructure and amenities to influence the socio-economic imprint of urban space. It reviewed the debate between urban density and infrastructure, finding that empirical evidence and economic production theory support the positive contribution of density to urban vibrancy and human connectivity. It noted this positive contribution is constrained by a city's infrastructure and amenity levels. This suggests an optimal density point or city size, *ceteris paribus*, after which higher density and continued economic growth require the support of more infrastructure and amenities. This is supported by economic production theory and the law of diminishing marginal returns.

Noting that economic production efficiency is fundamental to economic competitiveness, chapter two used the production function to understand how human capital's role in the new economy production process has linked productivity to a city's mix and levels of infrastructure and amenities. It proposed that policies supportive of population-driven urban development but with inadequate infrastructure provision may risk diminishing total marginal returns as the negative externalities of density outstrip benefits. This is economically inefficient at any given level of input, and an undesirable in competitive global cities. That is, if the desired output of an economy is knowledge and innovation, then developments with the greatest connectivity, mobility and creativity of quality human capital will have both a competitive and comparative advantage in the generation of knowledge and innovation.

Such developments will likely attract human capital irrespective of socio-economic standing, requiring less government intervention and human resources to address issues of social isolation and disparity. This is most likely to foster a self-perpetuating and organic environment supportive of sustainable innovation and knowledge development. This chapter suggested that improving the efficiency and productivity of local knowledge exchange and innovation systems through urban planning will have accumulative effects at regional and national levels. Through a review of relevant empirical literature on the new economy and cities, chapter two identified and classified five key infrastructure types significant to innovation and knowledge development. These are: 1) connectivity; 2) education and skills; 3) creativity and culture; 4) industrial clustering; and, 5) diversity.

Examining local spatial characteristics of infrastructure conducive to innovation, chapter three briefly reviewed networking and community-based urban planning models focusing on global knowledge flows and human-scale environments. It noted that while network city models target the local-global connection and neighbourhood-based models strengthening local vibrancy and community, neither adequately addresses global socio-economic interaction and human flows. This chapter argued that incorporating the five infrastructure types into planning strategies may better target national priorities of innovation and knowledge development. It mapped the presence, relative density and distribution of infrastructure for innovation (INAM) around major train stations in the highly innovative mid-size cities of Boston, Portland, Stuttgart and Dusseldorf. Several insights emerged from the data.

Firstly, each appeared highly supportive of human flows in and out of the city. Public transport to a central train station directly linked to the international airport was readily accessible throughout the study area. Such an environment was seen to encourage the exchange of ideas, creativity and diversity. Secondly, all five INAM types were found in each study area. Observations of uneven density and distribution were balanced by observations that a significant section of each was highly mixed and had the greatest density of INAM. These sections were also highly walkable with the highest number of intersections presenting the greatest opportunity for human experience, flows and diversity. Such environments are desirable for knowledge development and innovation as they can potentially stimulate creativity, encourage unplanned meeting, strengthen social networks and facilitate the flow of information and ideas. Thirdly, each city had renowned districts of unique human experiences characterised by distinct architecture, street art, food or entertainment, located just outside or within the study area. This adds to the attraction of people to the city as a whole.

Chapter three proposed that these districts were likely to contribute to the local identity as well as attraction, diversity and flow of human capital. Lastly, cities of innovation were found likely to have a critical mass of INAM within the 1km area of key pedestrian infrastructure, such as train stations. Therefore, this chapter proposed that low density and distribution of INAM are not conducive to innovation and knowledge development, and that the critical mass of INAM is likely to depend on the economic significance of the development to the city as a whole. That is, key inner city socio-economic infrastructure will require more INAM for innovation than local socio-economic hubs. Chapter three concluded that the significance of key local infrastructure (such as train stations) should not be discounted but rather understood in terms of its contribution to the innovation system as whole. It suggested that better integration of human movement and connectivity between

local developments, surrounding neighbourhood and strategic centres by incorporating infrastructure for innovation is likely to be increasingly important for cities of innovation.

Chapter four outlined the research inquiry paradigm for case studies in Western Australia, Australia, and Kansai, Japan, the results of which are given in following chapters. Chapter five explored human attraction to urban space under the presumption that vibrant interactive socio-economic spaces can facilitate regional knowledge transfer mechanisms and flows. It reviewed literature of innovation systems and the relevance of urban space. Based on conclusions of chapter two, it asserted that the capacity of urban space to attract human capital can contribute to regional economic vitality and enhance national innovation, competitiveness and knowledge productivity. It hypothesised that some spaces may be better able to do so than others, and that those spaces are likely to be adjacent to key public infrastructure such as train stations. It proposed that developing these spaces for human interaction, vibrancy and connectivity can strengthen regional innovative flows, with successful spaces accumulated on national or regional levels enhancing national innovation systems and knowledge productivity. It presented 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.

Despite lack of aesthetic qualities, the study space appeared to have a unique atmosphere of humanity and culture reminiscent of busy street-side café acting as a magnet for people irrespective of age or status. It appeared to play a large part in local identity and social amenity, and, as such, capable of strengthening and sustaining local social capital and potential for regional flows of human capital, knowledge and information. With an extraordinary capacity to cluster knowledge by offering opportunities for human interaction, connection and vibrancy, it was concluded that the space itself formed part of the Kobe regional innovation system.

Chapter six explored national and state-level economic development and urban planning policy and strategies in Kansai, Japan, and Perth's Northwest Corridor, Western Australia. It concluded that urban planning and economic development (outside of retail) are largely dealt with separately in WA, though more recent proposals demonstrated an ideological shift in urban planning's role for National, State and regional sustainable new economy development. Unlike the WA case, Japan does not clearly distinguish between industrial and urban planning policy, with urban planning used as a tool for National economic and social objectives. Urban areas have been systematically restructured to redistribute wealth and promote sustainable economic development. However, as in WA, policy and other documents to date only vaguely acknowledge a local neighbourhood's contribution to innovation and knowledge development.

Chapter seven examined economic development and urban planning at a regional level for the case studies. It found that though both study regions made new economy shift at similar times, Kansai appears to have adapted more quickly than PNWC.

Analysis of PNWC documents indicated a strong drive to support new economy industries by promoting knowledge development and innovation. Many of its urban planning policies and initiatives advocate greater vibrancy and higher pedestrian accessibility, and appear highly supportive of new economy needs. However, to date, there have been only weak links connecting new economy policies and strategies to the planning of cities and neighbourhoods. Economic development policy itself appears to have no clear role outside of a retail strategy in PNWC.

Kansai was found to have better integrated urban planning and economic development policies. It appeared to leverage the connectivity and mobility of people to develop and support industrial and innovation growth. More recently, Japan's compounding population issues and post-war car-based planning techniques have created visible socio-economic disadvantage between the residents of outer metropolitan and those of mid and inner metropolitan areas. Kansai (along with the rest of Japan) has focussed on the attraction of human capital through bottom-up development approaches (*machizukuri*) to revitalise communities and create more liveable and vibrant neighbourhoods.

Chapter eight analysed the capacity of train stations in the case study sites to support knowledge development and innovation using methodology of chapter three. The results suggested that the stations studied have different capacities for human movement and interaction. Train station developments in car-dominated PNWC appeared to have low levels of the infrastructure and amenities, human flows and vibrancy. It is likely that such urban form facilitates the quick dispersal of people to adjoining transport or buildings, decreasing opportunities to leverage soft infrastructure assets (people attracted to the development) for vibrancy and interaction. Conversely, TODs in pedestrian-oriented Kobe appeared to have greater levels of the infrastructure and longer, more vibrant human flow lines. Retail and commerce streets appeared to naturally reticulate human movement towards major destination points, such as business, education, tourism, and shopping. This chapter concluded that the human flow, interaction and vibrancy elements of Kobe TODs are more likely to strengthen local social capital stimulate creativity facilitate the flow of information and ideas. Such developments are more likely to support new economy policy objectives.

Chapter nine detailed the results of fieldwork observations, document analysis and a series of elite interviews conducted for each case study. Kansai participants appeared to understand future regional economic drivers and have some knowledge of economic policies guiding

urban planning decisions. Answers were globally-oriented and centred on the generation of knowledge and innovation in emerging industries, such as biotech, renewable energy and environment. They portrayed a clear division between local and National government's economic role in the construction of infrastructure and urban planning, and some understanding of the links between urban planning and economic development in the new or knowledge economy. There was a high degree of mobility and fluidity in both global and local pedestrian flows across Kansai.

In contrast, PNWC responses were varied, primarily centring on economic links to the Perth CBD. Respondents did not demonstrate a strong economic vision nor clearly understand whose responsibility it was to provide economic infrastructure, how infrastructure may contribute towards State and National new economy objectives or the relationship between regional economic development and urban planning. PNWC had low levels of mobility and fluidity of global and local flows across the region.

Both regions reported similar overall declines in socio-economic activity as traditional neighbourhoods were replaced by post-war car-based planning. Both felt pedestrian movement and accessibility were integral to good neighbourhood planning, and that urban balance occurred when the car entered on pedestrian terms rather than the reverse. Both acknowledged that better mixes of infrastructure and amenity in central neighbourhoods, as well as policy shifts decreasing the dominance of large retail centres, would generate more vibrant neighbourhoods and centres. Both saw pedestrian-oriented inner city suburbs as having a better balance than car-based outer suburbs.

Indeed, PNWC respondents generally felt that the car could contribute to city vibrancy with the right car/pedestrian balance. This common belief was most likely a product of discussions emerging from issues (e.g., social exclusion, pollution, congestion, etc) arising from its strong car-based planning approach rather than an outcome of increased innovation or knowledge development priorities. Kansai participants focused on the significance of greater pedestrian flows around the urban core and into surrounding development stressing the need to create stimulating and sensory experiences to concentrate pedestrian activity and movement. They generally felt that urban form facilitating human movement could be generated by constructing flow lines of increasing human concentration from residential houses, along retail-lined streets to a public transport hub. As such, though Kansai outer suburbs had similar car-based planning and human movement issues to PNWC, they had a better car-pedestrian balance. This was attributed to the central neighbourhood position of train stations creating a wider sphere of human vibrancy and spatial movement than was achievable in poorly-positioned PNWC stations. This basic Japanese neighbourhood

development and revitalisation philosophy did not appear to be a consideration in PNWC pedestrian-orientated areas.

Overall, Kansai's higher mixed-use and pedestrian movements are likely to be more economically efficient in generating human interaction, mobility and connectivity. If the core hypothesis of this thesis holds true then, such areas are probably more productive and have a greater competitive advantage in innovation and knowledge development. In contrast, the low connectivity and vibrancy of PNWC developments are unlikely to be efficient in the new or knowledge economy.

10.3 Research significance

This research has focused on understanding the contribution of urban space and networks towards new economy priorities. It has done so by exploring urban planning and city design within the framework of economic production theory, and how they might influence knowledge productivity and innovation. This research finds that different urban planning approaches generate different local hard infrastructure frameworks, placing spatial limitations on soft infrastructure components, such as social capital, human movement and access to knowledge/information. It hypothesises that a development's spatial mix and level of infrastructure creates a unique socio-economic imprint which contributes to regional and national capacity for knowledge development and innovation. It finds that cities of innovation should be viewed as flows and connections of human capital rather than networks of roads and destinations, as the built environment affects human movement and related aspects of urban vibrancy, human interaction and connectivity.

Such findings emphasise the capacity of the local urban environment, including those in outer metropolitan areas, to influence the efficiency and mobility of regional innovation inputs by acting as facilitators of formal and informal global human connectivity. Hard infrastructure creates urban spaces with a unique socio-economic imprint of human flows, vibrancy and interaction. Urban form which incorporates key elements for innovation (connectivity, education and skills, creativity and culture, business clustering and diversity) broadens the scope of social capital building and knowledge transfer which can enhance a region's innovative potential.

This thesis views local nodes of human connectivity, creativity, diversity, interaction and vibrancy as logical places to facilitate global socio-economic linkages and the regional flow of information and knowledge. It states that the planning of some urban spaces makes them more conducive to knowledge development than others. Such spaces will require less public and private funding and effort to generate the critical mass of social capital networks needed

to produce the same knowledge output for any given population size, *ceteris paribus*. Dispersing such spaces throughout a city ensures sustainability and efficiency in new economy production and contributes to the regional innovation system. This will offer accumulative effects at the regional or national levels for any given urban system. Therefore, understanding how to leverage and consolidate the human aspects of spaces will provide critical infrastructure for cities of knowledge and innovation. Urban planning not sensitive to the new economy contribution of local neighbourhoods is likely to place unnecessary barriers into the innovation process.

Though unable to absolutely state that new economy success is linked to urban design, this research aims to understand how urban form may influence adaptability to and support for new economy priorities. The conclusions of this research can be broadly applied across a wide range of urban planning, social and economic policies and initiatives, particularly for traditionally and ever-increasingly disadvantaged outer-urban areas.

This thesis hypothesises that urban development, whether in the central city or local neighbourhoods, can either contribute to or detract from the productivity of a region's overall innovation system and capacity. That is, human movement, interaction and vibrancy generated by the INAM surrounding Kobe TODs are more likely to strengthen local social capital, spillovers and spark creativity. This will better facilitate policy objectives of high knowledge productivity and innovation. Integrating INAM supportive of knowledge development and innovation into all levels of government urban development policy and initiatives may better hone in on new economy and innovation priority targets. This suggests that new economy-based cities should incorporate INAM specific for innovation and knowledge development into neighbourhood and strategic centres, as well as overall city and regional development strategies.

By understanding the knowledge development capacity and implications of well-constructed urban spaces, urban planning and city design can enhance the efficiency of innovative and knowledge productivity. More research is needed to understand the economic benefits of investing in such urban infrastructure and amenities, and how this can enhance Australian national innovation and productivity agendas.

REFERENCES

- 2thinknow. (2007). *Innovation cities ranking 2007*. Retrieved March 10, 2010, from <http://www.innovation-cities.com/city-rankings-2007/>
- 2thinknow. (2009). *Innovative cities index 2009 city rankings*. Retrieved February 20, 2010, from <http://www.innovation-cities.com/reference/index/innovation-cities-index-2009/>
- ABS. (2011). *Western Australian statistical indicators 201, ABS cat. no. 1367.5*. Canberra: ABS.
- Ács, Z., Anselin, L., & Varga, A. (2002). Patents and innovation counts as measures of regional production of new knowledge. *Research Policy, 31*(7), 1069-1085.
- Ács, Z., de Groot, H., & Nijkamp, P. (2002). Knowledge, innovation and regional development. In Z. Ács, H. de Groot & P. Nijkamp (Eds.), *The emergence of the knowledge economy: a regional perspective* (pp. 1-14). New York: Springer.
- Adams, T. (2010). Taming an urban frontier? Urban expansion and metropolitan spatial plans in Perth 1970-2005. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 33-47). Fremantle: Fremantle Press.
- Adamson, D., Clark, D., & Partridge, M. (2004). Do urban agglomeration effects and household amenities have a skill bias?. *Journal of Regional Science, 44*(2), 201-224.
- Alexander, I., & Grieve, S. (2010). Metropolitan development in Perth: Strategic planning or strategic spin?. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 48-65). Fremantle: Fremantle Press.
- Alexander, I., Grieve, S., & Hedgcock, D. (2010). Introduction. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 11-23). Fremantle: Fremantle Press.
- America for the Arts. (2008). *Creative industries 2008: the 50 cities report*. Washington: Americans for the Arts.
- Amin, A., & Roberts, J. (2008). Knowing in action: beyond communities of practice. *Research Policy, 37*, 353-369.
- APEC. (2000). *Towards knowledge-based economies in APEC*. Singapore: APEC Secretariat.
- APEC. (2002). *The new economy in APEC: innovations, digital divide and policy*. Singapore: APEC Secretariat.
- APEC. (2003). *The drivers of new economy in APEC: innovation and organizational practices*. Singapore: APEC Secretariat.
- APEC. (2004). *Realising innovation and human capital potential in APEC*. Singapore: APEC Secretariat.
- Appleyard, B. (2005). Liveable streets for school children. *NCBW Forum 3-7-05*.
- Appleyard, D. (1981). *Livable Streets*. Berkeley, CA: University of California Press.
- Archibugi, D., Howells, J., & Michie, J. (1998). Innovation systems in a global economy. *CRIC discussion paper no.18*. Manchester: University of Manchester, Centre for Research on Innovation and Competition.

- Armstrong, H. (2005). *Post-urban/suburban landscapes: design and planning the centre, edge and in-between*. Paper presented at Post-Suburban Sydney: the City in Transformation Conference, 22-23 November, Parramatta, Sydney.
- Arndt, M. (2009). Cities that yield the most valuable patents. *Businessweek: Bloomberg*. Retrieved February 20, 2010, from http://images.businessweek.com/ss/09/04/0422_inventive_cities/1.htm
- Arndt, O. (2003). *Economic growth by fostering technological innovation: benchmarking German high-tech regions* [Keynote speech]. Paper presented at International Conference on Entrepreneurship and Business Incubation, 15-17 October, Bremen, Germany.
- Arnold, L. (2006). The dynamics of the Jones R & D growth model. *Review of Economic Dynamics*, 9, 143-152.
- Arnott, R. (2004). Does the Henry George Theorem provide a practical guide to optimal city size?. *American Journal of Economics and Sociology*, 63(5), 1057-1090.
- Atkinson, R., & Court, R. (1998). The new economy index: understanding America's economic transformation. *Progressive Policy Institute Report, November 18*. Washington DC: Progressive Policy Institute.
- Audretsch, D. (2003). Knowledge, globalisation and regions: an economist's perspective. In J. H. Dunning (Ed.), *Regions, globalization and the knowledge-based economy* (pp. 63-81). Oxford: Oxford University Press.
- Australian APEC Study Centre. (2002). *Globalisation guide*. Melbourne: Monash University.
- Australian Department of Innovation Science Industry and Research. (2010). *Australian Innovation System Report 2010*. Canberra: Commonwealth of Australia.
- Baker, B. (2009). *German and Nordic cities perform well in European economic report*. Retrieved February 20, 2010, from <http://www.citymayors.com/economics/europe-growth-cities.html>
- Baldwin, J., Beckstead, D., Brown, W., & Rigby, D. (2007). Urban Economies and Productivity. *Economic Analysis Research Paper Series*, June. Ottawa: Statistics Canada.
- Banerjee, T. (2007). The future of public space: beyond invented streets and reinvented spaces. In M. Carmon & S. Tiesdell (Eds.), *Urban design reader* (pp. 153-162). Oxford, UK: Architectural Press.
- Barrett, C., & Cason, J. (1997). *Overseas research: a practical guide*. Baltimore: The Johns Hopkins University Press.
- Batten, D. (1995). Network cities: creative urban agglomerations for the 21st Century. *Urban Studies*, 32(2), 313-328.
- Baum, S. (2005). *Socio-economic disadvantage in post-fordist cities*. Paper presented at the 2nd State of Australian Cities, 30 November-2 December, Griffith University, Brisbane.
- Baum, S., Mullins, P., Stimson, R., & O'Connor, K. (2002). Communities of the post-industrial city. *Urban Affairs Review*, 37(2), 322-357.
- Bauman, C. (1996). *Challenge of land use planning after urban earthquakes: observations from the Great Hanshin Earthquake of 1995*. Pennsylvania: DIANE Publishing.
- Beaverstock, J., Taylor, P., & Smith, R. (1999). A roster of world cities. *Cities*, 16(6), 445-458.
- Begg, I. (2002). Introduction. In I. Begg (Ed.), *Urban competitiveness: Policies for dynamic cities* (pp. 1-10). Bristol: The Policy Press.
- Behrens, K., & Murata, Y. (2009). City size and the Henry George Theorem under monopolistic competition. *Journal of Urban Economics*, 65(2), 228-235.

- Bell, J. (2005). *Doing your research project: a guide for first-time researchers in education, health and social science* (4th ed.). Berkshire: Open University Press.
- Berg, B. (2004). *Qualitative Research Methods* (5th ed.). Boston: Pearson Education.
- Beriatos, E., & Gospodini, A. (2004). "Glocalising" urban landscapes: Athens and the 2004 Olympics. *Cities*, 21(3), 187-202.
- Berliant, M., Reed, R., & Wang, P. (2006). Knowledge exchange, matching, and agglomeration. *Journal of Urban Economics*, 60, 69-95.
- Bertolini, L. (1999). Spatial development patterns and public transport: the application of an analytical model in the Netherlands. *Planning Practice & Research*, 14(2), 199-210.
- Bertolini, L., & Dijst, M. (2003). Mobility environments and network cities. *Journal of Urban Design*, 8(1), 27-43.
- Bertolini, L., le Clercq, F. & Straatemeier, T. (2008). Urban transportation planning in transition. *Transport Policy*, 15(2), 69-72.
- Betancourth, C. (2002). Living on (multipl)cities of times: the case of the Ranstad-Holland. *GaWC Research Bulletin*, 85.
- Bettencourt, L., Lobo, J., & Strumsky, D. (2007). Invention in the city: increasing returns to patenting as a scaling function of metropolitan size. *Research Policy*, 36(1), 107-120.
- Bill, A. (2005). *Neighbourhood inequality: do small area interactions influence economic outcomes?*. Paper presented at the 2nd State of Australian Cities, 30 November-2 December, Griffith University, Brisbane.
- Birch, K., MacKinnon, D., & Cumbers, A. (2010). Old industrial regions in Europe: A comparative assessment of economic performance. *Regional Studies*, 44(1), 35-53.
- Blackmer, G. (2006). *The City of Portland, Oregon: Auditor's report to residents*. Portland, Oregon: City of Portland.
- Blinder, A. (2006). Offshoring: the next Industrial Revolution?. *Foreign Affairs*, 85(2), 133-128.
- Borjas, G. (2003). The labour demand curve is downward sloping: reexamining the impact of immigration on the labor market. *The Quarterly Journal of Economics*, 118(4), 1335-1374.
- Boschma, R., & Fritsch, M. (2007). Creative class and regional growth: empirical evidence from eight European countries. *Jena Economic Research Paper 2007-066*. Jena: Friedrich-Schiller-University, Max-Planck-Institute of Economics.
- Bradshaw, M., & Stratford, E. (2005). Qualitative research design and rigour. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 67-76). Melbourne: Oxford University Press.
- Brelade, S., & Harman, C. (2007). Understanding the modern knowledge worker. *Knowledge Management Review*, 10(3), 24-29.
- Breschi, S., & Lissoni, F. (2006). Mobility of inventors and the geography of knowledge spillovers: new evidence on US data. *CESPRI Working Papers 184*. Milano: Universita Bocconi.
- Brinkhoff, T. (2008). *Germany: major cities*. Retrieved February 20, 2010, from <http://www.citypopulation.de/Deutschland-Cities.html>
- Broga, C. (2007). The next age of globalization. *Region Focus*, 11(1), 9.

- Bryant, A., & Charmaz, K. (2007). Introduction: grounded theory research: methods and practices. In A. Bryant & K. Charmaz (Eds.), *The Sage handbook of grounded theory* (pp. 1-28). London: Sage.
- Bryman, A. (2004). *Social research methods*. Oxford: Oxford University Press.
- Calthorpe, P. (1993). *The next American metropolis*. NY: Princeton Architectural Press.
- Card, D. (2001). Immigrant inflows, native outflows, and the local labor market impacts of higher immigration. *Journal of Labor Economics*, 19(1), 22-64.
- Carlino, G., Chatterjee, S., & Hunt, R. (2007). Urban density and the rate of invention. *Journal of Urban Economics*, 61(3), 389-419.
- Carlino, G., & Hunt, R. (2007). Innovation across US industries: The effects of local economic characteristics. *Working Paper 07-28*. Philadelphia: Federal Reserve Bank of Philadelphia.
- Carlino, G., & Saiz, A. (2008). City beautiful. *Working Title 08-22*, Philadelphia: Federal Reserve Bank of Philadelphia.
- Carlton, I. (2007). Histories of transit-oriented development: perspectives on the development of the TOD concept. *Working Paper 2009-02*. CA: University of California, Berkeley.
- Carmel, E. (2007). Concepts, context and discourse in a comparative case study. In L. Hantrais & S. Mangan (Eds.), *Cross-national research methodology and practice* (pp. 51-60). London: Routledge.
- Carrillo, F. (2002). Capital systems: implications for a global knowledge agenda. *Journal of Knowledge Management*, 6(4), 379-399.
- Case, K., & Fair, R. (1994). *Principles of economics* (3rd ed.). New Jersey: Prentice Hall.
- Castells, M. (2000). *The rise of the network society, the information age: economy, society and culture, Vol.1* (2nd ed.). Oxford, UK: Blackwell.
- Centre for International Economics. (2009). ITS for WA: government advisory capabilities to meet WA's innovation, technology and science needs. *Prepared for the Minister for Commerce, WA*. Canberra: Centre for International Economics.
- Charmaz, K. (2000). Grounded theory: Objectivist and constructivist methods. In N. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research* (2 ed., pp. 509-536). London: Sage.
- Chen, D., & Kee, H. (2005). A model on knowledge and endogenous growth. *World Bank Policy Research Working Paper 3539*. Washington DC: The World Bank.
- Chernikoff, H. (2008). *San Francisco most walkable U.S. city, website says*. Retrieved March 10, 2010, from <http://www.reuters.com/article/idUSN1666231520080717>
- Christie, L. (2006, August 31). America's smartest cities. *CNNMoney*.
- Chuma, K. (2003). Speech by Senior Vice-Minister of Land, Infrastructure and Transport of Japan. *High Level Meeting*, 25-26 June, Martigny, Switzerland.
- Ciccone, A. (2006). Urban production externalities. *Prepared for New Palgrave: a dictionary of economics*. Barcelona: CREI, Universitat Pompeu Fabra,.
- Ciccone, A., & Hall, R. (1996). Productivity and the density of economic activity. *American Economic Review*, 86(1), 54-70.
- City of Portland. (2006). *Comprehensive plan context: 1980–today*. Retrieved February 20, 2010, from <http://www.portlandonline.com/bps/index.cfm?c=34249>

- City of Portland. (2009). *Portland economic development strategy: a five-year plan for promoting job creation and economic growth*. Portland: City of Portland.
- City of Joondalup. (2002). *Strategic Plan 2003-2008*. Joondalup: City of Joondalup.
- City of Joondalup. (2006a). Attachment 21: terms of reference: joint Cities of Wanneroo & Joondalup North-West Corridor Co-ordinating Committee. *Agenda: Council Meeting City of Joondalup, 12 December 2006*. Joondalup: City of Joondalup.
- City of Joondalup. (2006b). *Lifestyle*. Retrieved June 1, 2007, from http://www.joondalup.wa.gov.au/CMS/templates/coj2_lifestyle_grp.asp?id=40
- City of Joondalup. (2007a). *Community Profile*. Retrieved September 5, 2007, from <http://www.id.com.au/joondalup/commprofile/Default.asp?bhcp=1>
- City of Joondalup. (2007b). A vibrant knowledge & service hub for the region. *Economic Development Strategy 2007-2012*. Joondalup: City of Joondalup.
- City of Joondalup. (2009). *Local planning strategy*. Joondalup: City of Joondalup.
- City of Joondalup. (2010a). *Economic Profile*. Retrieved August 30, 2010, from <http://economy.id.com.au/Default.aspx?id=287&pg=6305>
- City of Joondalup. (2010b). *Joondalup City Centre Structure Plan*. Joondalup: City of Joondalup.
- City of Joondalup. (2010c). *Community profile*. Retrieved August 30, 2010, from <http://profile.id.com.au/Default.aspx?id=287>
- City of Kobe. (1992). *Kobe Harborland*. Kobe: City of Kobe.
- City of Kobe. (1997). *Port Island, Rokko Island*, Kobe: City of Kobe.
- City of Kobe. (2001). *HAT Kobe*. Kobe: City of Kobe.
- City of Kobe. (2005). *Restorative post-earthquake urban redevelopment projects*, 7. Kobe: City of Kobe.
- City of Kobe. (2007). *Urban planning and development projects*. Retrieved August 30, 2010, from <http://www.city.kobe.jp/cityoffice/17/020/en/urbanplan/index.htm>
- City of Kobe. (2007b). 人にやさしい安心のまちづくり：神戸市の再開発事業 [Creating people-friendly neighbourhoods: Kobe City redevelopment projects]. Kobe: City of Kobe.
- City of Kobe. (2008a). *Port of Kobe*. Kobe: City of Kobe.
- City of Kobe. (2008b). *The economic impact of Port of Kobe*. Kobe: City of Kobe.
- City of Kobe. (2008c). *Design City Kobe: a new beginning with design*. Kobe: City of Kobe.
- City of Kobe. (2009a). *Kobe: UNESCO city of design*. Retrieved August 30, 2010, from <http://unesdoc.unesco.org/images/0018/001840/184066E.pdf>
- City of Kobe. (2009b). *Population*. Retrieved August 30, 2010, from http://www.city.kobe.lg.jp/foreign/english/information/information_03.html
- City of Kobe. (2010a). *Urban redevelopment projects: 再開発について* [On redevelopment] [powerpoint]. Kobe: City of Kobe, Urban Planning Bureau.
- City of Kobe. (2010b). *The basic policies to promote 'Design City KOBE'*. Kobe: City of Kobe.
- City of Kyoto. (2004). *City data: people*. Retrieved August 30, 2010, from <http://www.city.kyoto.jp/koho/eng/databox/citydata/people.html>

- City of Osaka. (2010a). *Osaka city*. Retrieved August 30, 2010, from <http://www.osakacity.org/en/cityofOsaka/facts.aspx>
- City of Osaka. (2010b). *Osaka Station North District*. Retrieved August 30, 2010, from <http://www.osaka-saisei.jp/eng/town/kita.html>
- City of Perth & WA Department of Planning. (2009). *The evolving city: an atlas of change in the city of Perth 1990-2007*. Perth: Western Australian Planning Commission.
- City of Wanneroo. (2000). *Centre planning policy*. Wanneroo: City of Wanneroo.
- City of Wanneroo. (2004a). *Wanneroo: open for business 2020: economic development strategy 2004-2007*. Wanneroo: City of Wanneroo.
- City of Wanneroo. (2004b). *Employment Policy*. Wanneroo: City of Wanneroo.
- City of Wanneroo. (2005a). *Local planning policy: smart growth*. Wanneroo: City of Wanneroo.
- City of Wanneroo. (2005b). *Smart growth strategy*. Wanneroo: City of Wanneroo.
- City of Wanneroo. (2010a). *Economic profile*. Retrieved August 30, 2010, from <http://economy.id.com.au/Default.aspx?id=137&pg=6000>
- City of Wanneroo. (2010b). *Population forecasts*. Retrieved October 1, 2010, from <http://forecast2.id.com.au/default.aspx?id=137&pg=5000>
- City of Wanneroo. (2010c). *Industrial and commercial centres*. Retrieved October 1, 2010, from http://www.wanneroo.wa.gov.au/3/159/1/industrial_commercial_centres.pm
- City of Wanneroo & Tokyu Corporation. (2005). *Memorandum of Understanding*. Wanneroo: City of Wanneroo & Tokyu Corporation.
- City of Yokohama. (2010). *Population by age*. Retrieved August 30, 2010, from <http://www.city.yokohama.jp/me/stat/jinko/age/new/age-e.html>
- Clark, T. (Ed). (2004). *The city as an entertainment machine*. UK: Emerald Group Publishing.
- Clark, T., Lloyd, R., Wong, K., & Jain, P. (2002). Amenities drive urban growth. *Journal of Urban Affairs*, 24(5), 493-515.
- COBTH. (2007). *Driving Greater Boston and New England: the impact of Greater Boston's teaching hospitals*. Boston: Conference of Boston Teaching Hospitals.
- Colovic-Lamotte, A., & Tayanagi, E. (2003). *What direction should the cluster policy take, top-down implementation or bottom-up emergence?: the case of Japan*. Paper presented at the Entrepreneurship, Spatial Industrial Clusters and Inter-firm Networks Symposium, June 12-14, Uddevalla, Sweden.
- Commission for Integrated Transport. (2001). *European best practice in the delivery of integrated transport: report on stage 2: case studies*. Retrieved March 10, 2010, from <http://cfit.independent.gov.uk/atoz/24.htm>
- Commonwealth of Australia. (2004). *Home-based business: local opportunities*. Canberra: Commonwealth of Australia.
- Commonwealth of Australia. (2007). *Background paper: drivers of change in Australian industry*. Canberra: Department of Industry Tourism and Resources.
- Cooke, P. (2001). From technopoles to regional innovation systems: the evolution of localised technology development policy. *Canadian Journal of Regional Science*, 24.
- Cope, M. (2005). Coding qualitative data. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 223-233). Melbourne: Oxford University Press.

- Creswell, J. (2009). *Research design: qualitative, quantitative and mixed methods approaches* (3rd ed.). Thousand Oaks: Sage.
- Curtis, C. (2006). Network city: retrofitting the Perth Metropolitan Region to facilitate sustainable travel. *Urban Policy and Research*, 24(2), 159-180.
- Curtis, C. (2010). The network city metropolitan planning strategy: a paradigm shift for sustainable transport?. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp: 258-273). Fremantle: Fremantle Press.
- Curtis, C., & Perkins, T. (2006). Can Network City deliver a sustainable urban future?. *International Journal of Environmental, Cultural, Economic and Social Sustainability*, 2(3), 87-94.
- Dahlman, C., & Aubert, J. (2001). *China and the knowledge economy: seizing the 21st Century*. Washington DC: The World Bank.
- de Goei, B., Burger, M., van Oort, F., & Kitson, M. (2010). Functional polycentrism and urban network development in the Greater South East UK: evidence from commuting patterns, 1981-2001. *Regional Studies*, 44(9), 1149-1170.
- Delaney, B. (2005). Perth: a city on the edge. Retrieved May 30, 2007, from http://creativeclass.com/rfcgdb/articles/Perth_City_on_the_Edge.pdf
- Demographia. (2007). *Gross Domestic Product (GDP-PPP) estimates for metropolitan regions in Western Europe, North America, Japan and Australasia*. Illinois: Wendell Cox Consultancy.
- Department of Innovation Science Industry and Research. (2010). *Australian Innovation System Report 2010*. Canberra, ACT: Commonwealth of Australia.
- Dieleman, F., & Wegener, M. (2004). Compact city and urban sprawl. *Built Environment*, 30(4), 308-323.
- Dietsch, D. (2001). Edge cities: magnets for development. *Building Design & Construction*, 42(9), 26-29.
- Ding, C., & Bingham, D. (2000). Beyond edge cities: job decentralization and urban sprawl. *Urban affairs review*, 35(6), 837.
- Dolman, B., Parham, D., & Zheng, S. (2007). *Can Australia match US productivity performance?*. Melbourne: Australian Government Productivity Commission.
- Dooley, L. (2002). Case study research and theory building. *Advances in Developing Human Resources*, 4(335), 335-353.
- Doteuchi, T. (1999). Metropolitan new town developments undergo transition. *NLI RESEARCH*, 129. Tokyo: NLI Research Institute.
- Dougherty, C. (2009a). Skateboarding capital of the world. *The Wall Street Journal*, July 31.
- Dougherty, C. (2009b). 'Youth magnet' cities hit midlife crisis. *The Wall Street Journal*, May 16.
- Douglass, M. (2000). Mega-urban regions and world city formation: globalisation, the economic crisis and urban policy issues in Pacific Asia. *Urban Studies*, 37(12), 2315-2335.
- Dowling, R. (2005). Power, subjectivity and ethics in qualitative research. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 19-29). Melbourne: Oxford University Press.

- DPI. (2005). Reconnecting Perth: the cross-portfolio transit-oriented development program. *Planning Institute of Australia Urban Design: plans and ideas award*. Perth, WA: Department of Planning and Infrastructure.
- DPI. (2008). *Annual report 2007-08*. Perth: Government of Western Australia.
- Drew, C., Richardson, C., & Vaze, P. (2001). *International Comparisons of Productivity: an update on developments*. London: Department for Trade and Industry.
- Ducom, E. (2008). *Tama new town, west of Tokyo: Analysis of a shrinking suburb*. Retrieved October, 10, 2010, from <http://halshs.archives-ouvertes.fr/docs/00/20/31/07/PDF/LaUP-DUCOM.pdf>
- Dunn, K. (2005). Interviewing. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 79-105). Melbourne: Oxford University Press.
- Dunning, J. (2003). Globalization and the knowledge economy. In J. Dunning (Ed.), *Regions, globalization and the knowledge-based economy* (pp. 7-42). Oxford: Oxford University Press.
- Duranton, G., & Puga, D. (2001). Nursery cities: urban diversity, process innovation and the life cycle of products. *American Economic Review*, 91(5), 1454-1477.
- Dvir, R., & Pasher, E. (2004). Innovation engines for knowledge cities: an innovation ecology perspective. *Journal of Knowledge Management*, 8(5), 16-27.
- Dvir, R., Schwartzberg, Y., Avni, H., Webb, C., & Lettice, F. (2006). The future center as an urban innovation engine. *Journal of Knowledge Management*, 10(5), 110
- Edgington, D. (1994). Chronology of major urban and regional planning legislation in Japan. In P. Shapira, I. Masser & D. Edgington (Eds.), *Planning for cities and regions in Japan* (pp. 184-189). Liverpool: Liverpool University Press.
- Edvinsson, L. (2006). Aspects on the city as a knowledge tool. *Journal of Knowledge Management*, 10(5), 6-13.
- Eggers, A. (2006). *Rabbit hutches: Did land use politics short change Japanese consumers?*. Boston, Mass.: Harvard University.
- Eisenhardt, K., & Graebner, M. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, 50(1), 25-32.
- Ellis, S. (2009). Letter to Phil Manner: Centre for International Economics. *Western Australia's science, technology and innovation advisory bodies: an independent review*. Perth: WA Department of Mines and Petroleum.
- Essex, S., & Brown, G. (1997). The emergence of post-suburban landscapes on the North Coast of New South Wales: a case study of contested space. *International Journal of Urban and Regional Research*, 21(2), 259-285.
- European Commission. (2009b). *R&D in Stuttgart*. Retrieved March 10, 2010, from http://cordis.europa.eu/stuttgart/rd_en.html
- Europeinnova. (2009). *Priority sector report: knowledge intensive business services*. Stockholm: Centre for Strategy and Competitiveness.
- Eurostat. (2004). *Portrait of the Regions: Germany, Dusseldorf: economy*. Retrieved February 20, 2010, from http://circa.europa.eu/irc/dsis/regportraits/info/data/en/deal_eco.htm
- Eurostat. (2009). *Eurostat regional yearbook 2009*. Luxemburg: European Communities.
- Evans, N. (2001). Discourses of urban community and community planning: a comparison between Britain and Japan. *Sheffield Online Papers in Social Research*, 3.

- Evans, N. (2002). Machi-zukuri as a new paradigm in Japanese urban planning: reality or myth?. *Japan Forum*, 14(3), 443-464.
- Fane, G. (1994). *Economic reform and deregulation in Australia*. Paper presented at the Australia and Indonesia towards the 21st Century, July 3-5, Surabaya, Indonesia.
- Feng, X. (2004). *Modelling the spatial pattern of urban fringe: case study Hongshan, Wuhan*. Enschede, The Netherlands: International Institute for Geo-information Science and Earth Observation.
- Fenwick Elliot Grace (2007). *Construction law update no.706: a seachange on coastal views*. Adelaide: Fenwick Elliot Grace.
- Fink, A. (2003). *The survey kit* (2nd ed.). Thousand Oaks: Sage.
- Fink, A. (2006). *How to conduct surveys: a step by step guide*. Thousand Oaks: Sage.
- Fishman, R. (2007). Revolt of the urbs: Robert Moses and his critics. In H. Ballon & K. Jackson (Eds.), *Robert Moses and the modern city: the transformation of New York* (pp. 122-129). New York: Norton & Company.
- Flick, U. (2002). *An introduction to qualitative research* (2nd ed.). London: Sage.
- Florida, R. (2002a). Bohemia and economic geography. *Journal of Economic Geography*, 2(1), 55-71.
- Florida, R. (2002b). *The rise of the creative class*. New York: Basic Books.
- Florida, R. (2002c). The economic geography of talent. *Annals of the Association of American Geographers*, 92(4), 743-755.
- Florida, R. (2004). The great creative class debate: revenge of the squelchers. *The Next American City*, 5, i-viii.
- Florida, R., Mellander, C., & Stolarick, K. (2008). Inside the black box of regional development: human capital, the creative class and tolerance. *Journal of Economic Geography*, 8(5), 615-649.
- Florida, R., & Tinagli, I. (2004). *Europe in the creative age*. Pittsburgh: Carnegie Mellon Software Industry Center.
- Fluchter, W. (2008). *Shrinking cities in Japan: between megalopolises and rural peripheries*. Retrieved October 10, 2010, from <http://www.japanesestudies.org.uk/special/shrinking-regions/Chapter3.pdf>
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219-245.
- FORM. (2007). *Creative capital book series*. Perth, Western Australia: FORM.
- Forster, C. (2006). The challenge of change: Australian cities and urban planning in the new millennium. *Geographical Research*, 44(2), 173-182.
- Foundation of Kansai Science Institute. (2009). *Kansai Science City*. Kyoto: Foundation of Kansai Science Institute.
- Franck, K., & Stevens, Q. (2007). *Loose space possibility and diversity in urban life*. UK: Routledge.
- Freeman, C. (1988). Japan: a new national system of innovation. In G. Dosi, C. Freeman, R. Nelson & L. Soete (Eds.), *Technical change and economic theory* (pp. 330-348). London: Pinter.
- Friedman, K. (1996). *Restructuring the city: thoughts on urban patterns in the information society*. Stockholm: The Swedish Institute for Future Studies.

- Fujii, Y. (2008). Shrinkage in Japan. *Shrinking cities: case study Japan*. Retrieved October 10, 2010, from <http://www.japanesestudies.org.uk/special/shrinking-regions/Chapter3.pdf>
- Fujii, T., Yamashita, H., & Itoh, S. (2006). A comparative study of multi-nucleation of metropolitan areas: suburban centers and commuter flows in the metropolitan areas of Atlanta, USA and Melbourne, Australia. *Applied GIS*, 2(2), 11.11 - 11.17.
- Fujita, M., & Tabuchi, T. (1997). Regional growth in postwar Japan. *Regional Science and Urban Economics*, 27(6), 643-679.
- Garnham, N. (2005). From cultural to creative industries. *International Journal of Cultural Policy*, 11(1), 15-29.
- Garreau, J. (1992). *Edge cities: life on the new frontier*. New York: Random House.
- Garreau, J. (1999). Postcards from the edge city. *Washington Post*, November 8 (pp. A1). Washington DC: Washington Post.
- Garicano, L., & Rossi-Hansberg, E. (2006). The knowledge economy at the turn of the Twentieth Century: the emergence of hierarchies. *Journal of the European Economic Association*, 4(2/3), 396-403.
- GaWC. (2008). *The World According to GaWC 2008*. Loughborough: Globalization and World Cities Research Network.
- GaWC. (2011). *The World According to GaWC 2010*. Loughborough: Globalization and World Cities Research Network.
- Gehl, J. (2007). Three types of outdoor activities. In M. Carmon & S. Tiesdell (Eds), *Urban design reader* (pp. 143-146). Oxford: Architectural Press.
- Glaeser, E. (2003). Mother of reinvention. *CommonWealth*, Fall, 15-20.
- Glaeser, E. (2007). Entrepreneurship and the city. *Harvard Institute of Economic Research Discussion Paper 2140*. Cambridge, MA: National Bureau of Economic Research.
- Glaeser, E., & Gottlieb, J. (2006). Urban resurgence and the consumer city. *Discussion Paper 2109*. Cambridge, MA: Harvard University.
- Glaeser, E., & Gottlieb, J. (2008). The economics of place-making policies. *Harvard Institute of Economic Research Discussion Paper 2166*. Cambridge, MA: National Bureau of Economic Research.
- Glaeser, E., & Kohlhase, J. (2003). Cities, regions and the decline of transport costs. *HIER Discussion Paper 2014*. Cambridge, MA: Harvard University.
- Glaeser, E., Kolko, J., & Saiz, A. (2001). Consumer city. *Journal of Economic Geography*, 1(1), 27-50.
- Glaeser, E., & Saiz, A. (2003). The rise of the skilled city. *Discussion Paper 2025*. Cambridge, MA: Harvard Institute of Economic Research.
- Glasmeier, A. (1988). The Japanese Technopolis programme: high-tech development strategy or industrial policy in disguise?. *International Journal of Urban and Regional Research*, 12(2), 268-284.
- Gibson, C., Murphy, P., & Freestone, R. (2002). Employment and socio-spatial relations in Australia's cultural economy. *Australian Geographer*, 33(2), 173-189.
- Gilman, T. (2001). *No miracles here: fighting urban decline in Japan and the United States*. Albany, NY: SUNY Press.
- Goddard, J. (2007). *The engagement of higher educational institutions in regional development: an overview of the opportunities and challenges*. Paper presented at the

- Globally Competitive, Locally Engaged Higher Education and Regions OECD/IMHE International Conference, 19-21 September, Valencia, Spain.
- Goldberg, M. (2006). Knowledge creation, use and innovation: the role of urban and regional innovation strategies and policies. *European Planning Studies*, 14(5), 641-664.
- Goodman, R. (2005). *Sustainable urban form and the shopping mall: an investigation of retail provision in new housing subdivisions in Melbourne's growth areas*. Paper presented at the 2nd State of Australian Cities Conference, 30th November-2nd December, Brisbane, Australia.
- Goodman, R., & Coote, M. (2007). Sustainable urban form and the shopping centre: an investigation of activity centres in Melbourne's growth areas. *Urban Policy and Research*, 25(1), 39-61.
- Gospodini, A. (2002). European cities in competition and the new „uses“ of urban design. *Journal of Urban Design*, 7(1), 59-73.
- Gospodini, A. (2005). Urban development, redevelopment and regeneration encouraged by transport infrastructure projects: the case study of 12 European cities. *European Planning Studies*, 13(7), 1083-1111.
- Gospodini, A. (2006). Portraying, classifying and understanding the emerging landscapes in the post-industrial city. *Cities*, 23(5), 311-330.
- Gottlieb, P., & Fogarty, M. (2003). Educational attainment and metropolitan growth. *Economic Development Quarterly*, 17(4), 325-336.
- Goulding, C. (2002). *Grounded theory: a practical guide for management, business and market researchers*. London: Sage.
- Government of Japan. (2008). *Innovation 25: Creating the future*. Retrieved October 10, 2010, from <http://www.cao.go.jp/innovation/en/index.html>
- Graham, D. (2007). Transport investment, agglomeration and urban productivity. *Journal of Transport Economics and Policy*, 41(3), 317-343.
- Gray, D. (2004). *Doing research in the real world*. London: Sage.
- Green, N. (2007). Functional polycentricity: a formal definition in terms of social network analysis. *Urban Studies*, 44(11), 2077-2103.
- Greenblatt, A. (2008, November 1). The Stuttgart solution. *Governing*.
- Guba, E., & Lincoln, Y. (1998). Competing paradigms in qualitative research. In N. Denzin & Y. Lincoln (Eds.), *The landscape of qualitative research* (pp. 195-220). Thousand Oaks: Sage.
- Gubrium, J., & Holstein, J. (2000). Analyzing interpretive practice. In N. Denzin & Y. Lincoln (Eds.), *Handbook of Qualitative Research* (2 ed., pp. 487-508). London: Sage.
- Gwyther, G. (2003). *Paradise planned: socio-economic differentiation and the master planned community on Sydney's urban fringe*. Paper presented at the State of Australian Cities National Conference, 3-5 December, Parramatta, Australia.
- Hall, P. (2000). Creative cities and economic development. *Urban Studies*, 37(4), 639-650.
- Hamnett, S., & Freestone, R. (Eds.). (2000). *The Australian metropolis: a planning history*. St Leonards, NSW: Allen & Urwin.
- Hanna, K., Dale, A., & Ling, C. (2009). Social capital and quality of place: reflections on growth and change in a small town. *The International Journal of Justice and Sustainability*, 14(1), 31-44.

- Hannigan, J. (2003). Symposium on branding, the entertainment economy and urban place building: introduction. *International Journal of Urban and Regional Research*, 27(2), 352-360.
- Hansen, H., & Niedomysl, T. (2008). Migration of the creative class: evidence from Sweden. *Journal of Economic Geography*, 8, 1-16.
- Hansen, H., Vang, J., & Asheim, B. (2005). *The creative class and regional growth: towards a knowledge based approach*. Paper presented at the Regional Growth Agenda Conference, May 28-31, Aalborg, Denmark.
- Hardy, R. (2007). *Serious creativity and innovation in local government: ThinkLearn - a pilot project*. Retrieved August 30, 2010, from www.wa.ipaa.org.au/download.php?id=18
- Harris, T., & Ioannides, Y. (2000). *Productivity and metropolitan density*. Medford: Tufts University.
- Harvie, D., Philp, B., Slater, G., & Wheatley, D. (2007). *Economic well-being and British regions: the problem with GDP per capita*. Leicester: University of Leicester, School of Management.
- Haskel, J. (2007). Measuring innovation and productivity in a knowledge-based service economy. *Economic & Labour Market Review*, 1(7), 27-31.
- Hattori, A. (2009). Public policies in Japan. In B. Gann & Y. Lecler (Eds.), *Asian industrial clusters, global competitiveness and new policy initiatives* (pp. 71-106). Singapore: World Scientific Publishing.
- Haug, V. (2009). *The creative industries in the Region of Stuttgart: instruments of governance*. Paper presented at the Creative Industries: Governance of Metropolitan Regions Conference, 12-13 November, Leipzig, Germany.
- Hedgcock, D. (1994). Planning the outward growth of Australian capital cities: Perth. *Urban Policy and Research*, 12(2), 124-133.
- Hedgcock, D., & Yiftachel, O. (1992). *Urban and regional planning in Western Australia: historical and critical perspectives*. Perth: Paradigm Press.
- Heeg, S. (2003). Governance in the Stuttgart metropolitan region. In W. Salet, A. Kreukels & A. Thornley (Eds.), *Metropolitan governance and spatial planning: comparative case studies of European city-regions* (pp. 163-174). New York: Spoon Press.
- Hein, C. (2001). Toshikeikaku and machizukuri in Japanese urban planning: the reconstruction of inner city neighborhoods in Kōbe. *Japanstudien*, 13, 221-252.
- Hill, L. (2005). Guiding Perth's growth: a regional perspective. *Berkeley Planning Journal*, 18, 119-149.
- Hokugo, A., & Matsushita, T. (2007). 大規模災害時における製造業の事業継続マネジメントに関する研究 [A study on managing business continuation in manufacturing after large-scale disasters]. *Report of Research Center for Urban Safety and Security Kobe University*, 11, 113-126.
- Holling, C., & Haslam McKenzie, F. (2010). Integrated transit oriented development: is it appropriate for Perth? In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 274-288). Fremantle: Fremantle Press.
- Holling, C., Haslam-McKenzie, F., & Affleck, F. (2007). *Housing in railway station precincts: some empirical evidence of consumer demand for transit oriented housing in Perth, Western Australia*. Perth: Curtin University, LandCorp & Department of Housing and Works.

- Hopkins, D. (2010). Planning metropolitan Perth through 'dialogue': participatory democracy or manufactured consent? In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 191-204). Fremantle: Fremantle Press.
- Horwich, G. (2000). Economic lessons of the Kobe earthquake. *Economic Development and Cultural Change*, 48(3), 521-543.
- Howells, J. (2002). Tacit knowledge, innovation and economic geography. *Urban Studies*, 39(5/6), 871-884.
- Houghton, J., & Sheehan, P. (2000). *A primer on the knowledge economy*. Melbourne: Centre for Strategic Economic Studies, Victoria University.
- Huberman, A., & Miles, M. (1994). *Qualitative data analysis: an expanded sourcebook*. London: Sage.
- Hunt, J., & Gauthier-Loiselle, M. (2009). How much does immigration boost innovation?. *IZA Discussion Paper 3921*. Bonn: The Institute for the Study of Labor.
- Hutton, T. (2004). The new economy of the inner city. *Cities*, 21(2), 89-108.
- Huxley, M. (2007). Book review: loose space: possibility and diversity in urban life. *Urban Studies*, 44(12), 2495-2496.
- Innovation Network Corporation of Japan. (2010). *Introduction*. Retrieved October 30, 2010, from <http://www.incj.co.jp/english/>
- Innovation 25 Strategy Council. (2007). *Innovation 25: creating the future, challenging unlimited possibilities*. Tokyo: Government of Japan.
- Isaksen, A. (2004). Knowledge-based clusters and urban location: the clustering of software consultancy in Oslo. *Urban Studies*, 41(5/6), 1157-1174.
- Issarathumnoon, W. (2005). *The machizukuri bottom-up approach to conservation of historic communities: lessons for Thailand*. Retrieved October 30, 2010, from <http://ud.t.u-tokyo.ac.jp/book/2005ajj/wi041112.pdf>
- Jones, A., Williams, L., Lee, N., Coats, D., & Cowling, M. (2006). *Ideopolis: knowledge city-regions*. London: The Work Foundation.
- Jacobs, A. (2002). Integrated development planning, supportive public policies, and corporate commitment: a recipe for thriving major cities in Aichi, Japan. *Journal of Urban Affairs*, 24(2), 175-198.
- Jacobs, J. (1961). *The death and life of great American cities*. NY: Random House.
- Janesick, V. (1998). The dance of qualitative research design: metaphor, methodology, and meaning. In N. Denzin & Y. Lincoln (Eds.), *Strategies of Qualitative Inquiry*. London & New Delhi: Sage.
- Japan chip-makers head for the good life. (1983). *New Scientist*, 24 February, 525.
- Japan Ministry of Education Culture Sports Science and Technology. (2002). *Annual report on the promotion of science and technology: white paper*. Tokyo: Ministry of Education Culture Sports Science and Technology.
- Johnson, J. (2004). The costs and benefits of remote workers. *Network World*, 21(51), 24.
- Jones, C. (2002). Sources of US economic growth in a world of ideas. *The American Economic Review*, 92(1), 220-239.
- Joondalup Learning Precinct. (2008). *About us*. Retrieved October 1, 2010, from <http://www.joondaluplearningprecinct.com/about/>

- Jorm, A., Nakane, Y., Christensen, H., Yoshioka, K., Griffiths, K., & Wata, Y. (2005). Public beliefs about treatment and outcome of mental disorders: a comparison of Australia and Japan. *BMC Medicine*, 3(12), 1-14.
- Kane, M. (2010). Devising public transport systems for 21st century economically productive cities: the proposed knowledge ring for Perth. *Australian Planner*, 47(2), 75-84.
- Kanemoto, Y., Ohkawara, T. and Suzuki, T. (1996). Agglomeration economies and a test for optimal city sizes in Japan. *Journal of the Japanese and International Economies*, 10(4), 379-398.
- Kankeiren. (2008). “*Kansai Vision 2020*”: *dynamic Kansai!* [Provisional translation]. Osaka: Kansai Economic Federation.
- Kankeiren. (2009). *Kansai: an environmentally advanced region*. Osaka: Kankeiren.
- Kankeiren. (2010). *An introduction to the Kansai economy 2010*. Osaka: Kansai Economic Federation.
- Kansai Research Institute. (2009). *Kansai Science City: challenging the future...the new cultural capital, Keihanna*. Kyoto: Foundation of Kansai Research Institute.
- Kansai Research Institute. (2010a). *Kansai Science City* [powerpoint]. Kyoto: Foundation of Kansai Research Institute.
- Kansai Research Institute. (2010b). 全国 41 研究開発拠点の概要 [Overview of 41 research and development centres nationwide][handout] (pp. 1-2). Kyoto: Kansai Research Institute.
- Kantor, S. (2008). *The economic impact of the California high-speed rail in the Sacramento/Central Valley Area*. Merced: University of California.
- Kapur, S. (2001). *Developing countries in the network economy: a blueprint for success*. Paper presented at the International Symposium on Network Economy and Economic Governance, 19-20 April, Beijing, China.
- Karan, P. (1997). The city in Japan. In P. Karan & K. Stapleton (Eds), *The Japanese city* (pp. 12-39). Lexington, Kentucky: The University Press of Kentucky.
- Kaskinen, J., Ahvenainen, M., Rodenhauer, B., Daheim, C., Doren, P., & Ropars, G. (2006). *Rethinking regional performance in the knowledge society: foresight as a tool for European Regions*. Helsinki: Finland Futures Research Centre.
- Kato, Y. (2008a). CED (community economic development) 型都市政策の展開 - ソーシャル・インクルージョン・アプローチによる都市再生 [Development of CED-type city policy: urban regeneration using a social inclusion approach]. *都市政策 [City Policy]*, 132, 4-17.
- Kato, Y. (2008b). グローバル・サーキュレーション時代の地域経済 - ブレイン・ポート兵庫・神戸の形成に向けて [The regional economy in the global security age: towards a Kobe- Hyogo brain port]. *ひょうご経済 [Hyogo Economy]*, 100, 2-8.
- Kearns, R. (2005). Knowing seeing? Undertaking observational research. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 192-206). South Melbourne: Oxford University Press.
- Kelly, E., & O’Hagan, J. (2007). Geographic clustering of economic activity: the case of prominent western visual artists. *Journal of Cultural Economics*, 31, 109-128.
- Kenna, T. (2005). *Exclusive suburban 'villages': master planned estate development and socio-spatial polarisation in Western Sydney*. Paper presented at the 2nd State of Australian Cities, 30 November-2 December, Griffith University, Brisbane.

- Khan, S. (2010). Current policy initiatives to solve the urban transportation problem in Perth: room for optimism?. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp: 245-257). Fremantle: Fremantle Press.
- Kinki Regional Development Bureau MLIT. (2002). What are the duties of the Regional Development Bureaus? Retrieved October 10, 2010, from <http://www.kkr.mlit.go.jp/en/duties.html>
- Kitchin, R., & Tate, N. (2000). *Conducting research into human geography: theory, methodology and practice*. Essex: Pearson Education.
- Knapp, W., Scherhag, D., & Schmitt, P. (2005). *Quantitative analysis of service business connections: RhineRuhr*. UK: Institute of Community Studies, The Young Foundation & Polynet Partners.
- Knight, R. (1995). Knowledge-based development: policy and planning implications for cities. *Urban Studies*, 32(2), 225-260.
- Knox, S. (2006). *Can a high speed rail line in the UK help to close the productivity gap between London & the South East and the Regions, and boost economic growth?*. London: Transport Planning Society,
- Kobe Airport Marine Air. (2009). *新都市整備事業ガイド [Guide to new urban development projects]*. Kobe: City of Kobe.
- Kobe Airport Marine Air. (2010). *神戸空港の概要 [Overview of Kobe Port]*. Kobe: City of Kobe.
- Kobe City Info. (2006). *History*. Retrieved October 10, 2010, from <http://www.kobecityinfo.com/history.html>
- Kobe Medical Industry Development Project Study Group. (2008). *Kobe medical industry development project*. Kobe: City of Kobe.
- Kansai Unity. (2010). *A "Kobe Meister" of the sewing machine shares her skills*. Retrieved October 10, 2010, from <http://www.kippo.or.jp/e/culture/takumi/b11.html>
- Kodama, T. (2007). Industrial cluster policy in Japan: its concept, origins, development and implications [powerpoint]. *Workshop on Japanese approaches to local development, clusters, industry-university linkages and implications for British Columbia UBC, Vancouver*. Retrieved October 10, 2010, from <http://www.iar.ubc.ca/centres/cjr/seminars/locecondev/slides/kodama.pdf>
- Krätke, S. (2007). Metropolisation of the European economic territory as a consequence of increasing specialisation of urban agglomerations in the knowledge economy. *European Planning Studies*, 15(1), 1-27.
- Kruger, D. (2002). Bridging the science and business gap. *Far Eastern Economic Review*, 165(25), 32-35.
- Kueh, C., & Grieve, S. (2010). Navigation issues for seniors in large-scale shopping malls: a planning concern?. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 324-339). Fremantle: Fremantle Press.
- Lambooy, J. (2002). Knowledge and urban economic development: an evolutionary perspective. *Urban Studies*, 39(5/6), 1019-1035.
- Lambooy, J. (2005). Innovation and knowledge: theory and regional policy. *European Planning Studies*, 13(8), 1137-1152.

- Lambregts, B., Meijers, E., Romein, A., & Zonneveld, W. (2002). *Eurbanet: final policy report*. The Netherlands: TU Delft.
- Landry, C. (2002). *Future Perth: can Perth be more creative?*. Perth: WA Planning Commission.
- Landcorp. (2010). *Meridian Park: ED strategy*. Retrieved October 10, 2010, from <http://www.meridianpark.com.au/Ed-Strategy/>
- Lang, R. (2003). *Edgeless cities: exploring the elusive metropolis*. Washington DC: The Brookings Institute.
- Lee, B. (2007). 'Edge' of 'edgeless' cities? Urban spatial structure in U.S. metropolitan areas, 1980 to 2000. *Journal of Regional Science*, 47(3), 479-515.
- Lee, M., & Choi, H. (2008). *Dynamic changes in creative manpower and R&D technology level in the culture industry*. Paper presented at the 26th International Conference of the System Dynamics Society, July 20-24, Athens, Greece.
- Legge, K. (2005). *Human resource management: rhetoric and realities*. Basingstoke: Palgrave/Macmillan.
- Lever, W. (2002a). Correlating the knowledge base of cities with economic growth. *Urban Studies*, 39(5/6), 859-870.
- Lever, W. (2002b). The knowledge base and the competitive city. In I. Begg (Ed.), *Urban competitiveness: policies for dynamic cities* (pp. 11-32). Bristol: The Policy Press.
- Lever, W. (2002c). The knowledge base, innovation and urban economic growth. In Z. Ács, H. de Groot & P. Nijkamp (Eds.), *The emergence of the knowledge economy: a regional perspective* (pp. 107-120). New York & London: Springer.
- Lewis, G., Avault, J., & Vrabel, J. (1999). *History of Boston's economy: growth and transition 1970 - 1998*. Boston: Boston Redevelopment Authority.
- Lewis, J., Kane-Willis, K., Woy, J., & Berlin, P. (2002). *Exploring edge cities: report of a national survey of senior planners*. Chicago: Roosevelt University, Institute for Metropolitan Affairs.
- Ley, D. (2003). Artists, Aestheticisation and the Field of Gentrification. *Urban Studies*, 40(12), 2527-2544.
- Li, C. (2002). Growth and scale effects: the role of knowledge spillovers. *Economics Letters*, 74(2), 177-185.
- Limtanakool, N., Dijst, M., & Schwanen, T. (2007). A theoretical framework and methodology for characterizing national urban systems on the basis of flows of people: empirical evidence for France and Germany. *Urban Studies*, 44(11), 2123 - 2145.
- Limtanakool, N., Schwanen, T. & Dijst, M. (2009). Developments in the Dutch urban system on the basis of flows. *Regional Studies*, 43(2), 179-196.
- Lin, Z. (2007a). From megastructure to megalopolis: formation and transformation of mega-projects in Tokyo Bay. *Journal of Urban Design*, 12(1), 73.
- Lin, Z. (2007b). Urban structure for the expanding metropolis: Kenzo Tange's 1960 plan for Tokyo. *Journal of Architectural Planning and Research*, 24(2), 109-124.
- Liu, Z. (2007). The external returns to education: Evidence from Chinese cities. *Journal of Urban Economics*, 61(3), 542-564.
- Lobo, J., & Strumsky, D. (2008). Metropolitan patenting, inventor agglomeration and social networks: a tale of two effects. *Journal of Urban Economics*, 63(3), 871-884.

- Lopez-Rodriguez, J., Faina, J., & Lopez-Rodriguez, J. (2007). Human capital accumulation and geography: empirical evidence from the European Union. *Regional Studies*, 41(2), 217 - 234.
- Luciani, P. (2006). Creative cities . . . the latest urban economic fad. *AIMS Commentary*, September. Halifax: Atlantic Institute for Market Studies.
- Lundvall, B. (2006). One knowledge base or many knowledge pools?, *DRUID Working Paper No. 06-8*. Aalborg: Danish Research Unit for Industrial Dynamics.
- MacDougall, C., & Fudge, E. (2001). Planning and recruiting the sample for focus groups and in-depth interviews. *Qualitative Health Research*, 11(1), 117-126.
- MacGillis, A. (2007). Fairfax shines in jobs report. *Washington Post*, January 30 (pp. A1). Washington: Washington Post.
- Malecki, E. (2002). Hard and soft networks for urban competitiveness. *Urban Studies*, 39(5), 929-945.
- Mandle, J. (2005). The present as history: globalization and the Asian industrial revolution. *The Journal of The Historical Society*, 5(3), 347-361.
- Mangen, S. (2007). Qualitative research methods in cross-national settings. In L. Hantrais & S. Mangen (Eds.), *Cross-national research methodology and practice* (pp. 19-34). London: Routledge.
- Manzella, J. (2008). Globalization benefits American workers. *World Trade*, 21(1), 8.
- Markusen, A., & King, D. (2003). *The artistic dividend: the arts' hidden contributions to regional development*. Minneapolis: University of Minnesota, Humphrey Institute of Public Affairs.
- Marlet, G., & van Woerkens, C. (2005). Tolerance, aesthetics, amenities or jobs? Dutch city attraction to the creative class. *Discussion Paper Series 05-33*. The Netherlands: Utrecht University, Utrecht School of Economics.
- Marshall, A. (1890). *Principles of economics: an introductory volume*. London: Macmillan.
- Marshall, C., & Rossman, G. (2006). *Designing qualitative research* (4th ed.). New York: Sage.
- Mason, J. (2002). *Qualitative researching* (2nd ed.). London: Sage.
- Marinova, D. (1999). *Japan: a case study in national systems of innovation*. Retrieved September 2, 2010, from http://www.istp.murdoch.edu.au/ISTP/casestudies/Case_Studies_Asia/japan/japan.html
- Martinez-Fernandez, C., Rerceretnam, M., & Sharpe, S. (2006). *Intellectual assets in urban regions: UWS in Western Sydney*. Penrith: UWS Urban Research Centre.
- Martinez-Fernandez, C., & Sharpe, S. (2007). Intelligence for local development: which knowledge is relevant?. Paper presented at the ERSA Local Governance and Sustainable Development Conference, August 29-September 7, Paris, France.
- Martinus, K. (2009). *Infrastructure for knowledge productivity: TOD's in Kansai and Western Australia*. Paper presented at the State of Australian Cities, November 24-27, Perth, Western Australia.
- Martinus, K. (2010a). Planning for production efficiency in knowledge-based developments, *Journal of Knowledge Management*, 14(5), 726-743.
- Martinus, K. (2010b). *Infrastructure characteristics of global innovation cities*. Paper presented at the Knowledge Cities World Summit, 16-19 November, Melbourne, Victoria.

- Martinus, K. (2010c). *The coffeeless urban cafe: understanding the attraction of urban space*, paper presented at the Knowledge Cities World Summit, 16-19 November, Melbourne, Victoria.
- Martinus, K. (2011b). *Integrating economic development into urban planning: case study of Kansai, Japan, and Western Australia*. Paper to be presented at the World Planning Schools Congress, 4-7 July, Perth, Western Australia.
- Martinus, K. (2012a). Attracting: the coffeeless urban café and the attraction of urban space. In T. Yigitcanlar, K. Metaxiotis, & J. Carrillo (Eds), *Building prosperous knowledge cities: policies, plans and metrics*. UK: Elgar Publishers.
- Martinus, K. (2012b, forthcoming). City infrastructure supporting innovation. *Journal of International Knowledge-Based Development*.
- Maruno, Y. (2001). *Economic and social development: how best can industry contribute to fighting poverty?: a UNIDO approach to fighting poverty*. Paper presented at the Fighting marginalization through sustainable industrial development: Challenges and opportunities in a globalizing world, 3-7 December, Vienna.
- Maskell, P., Bathelt, H., & Malmberg, A. (2006). Building global knowledge pipelines: the role of temporary clusters. *European Planning Studies*, 14(8), 997-1013.
- Maskell, P., & Malmberg, A. (1999). Localised learning and industrial competitiveness. *Cambridge Journal of Economics*, 32(2), 167-185.
- Mattsson, H. (2007). Mobile talent or privileged sites? Making sense of biotech knowledge worker mobility and performance in Sweden. *Social Geography Discussions*, 3, 1-29.
- McCreedy, A. (2004). The 'creativity problem' and the future of the Japanese workforce. *Asia Program Special Report, 121*. Washington: Woodrow Wilson International Centre for Scholars.
- McDonald, F., Huang, Q., Tsagdis, D., & Tuselmann, H. (2007). Is there evidence to support Porter-style cluster policies?. *Regional Studies*, 41(1), 39-49.
- McGuirk, P., & O'Neill, P. (2005). Using questionnaires in qualitative human geography. In I. Hay (Ed.), *Qualitative research methods in human geography* (2nd ed., pp. 147-162). South Melbourne: Oxford University Press.
- Meijers, E. (2005). Polycentric urban regions and the quest for synergy: is a network of cities more than the sum of its parts?. *Urban Studies*, 42(4), 765-781.
- Meijers, E. (2008). Measuring polycentricity and its promises. *European Planning Studies*, 16(9), 1313-1323.
- Mercer Consulting. (2010). *Quality of living worldwide city rankings 2010*. London: Mercer LLC.
- METI. (2004). *Industrial cluster project: what is an industrial cluster?*. Retrieved September 10, 2010, from <http://www.cluster.gr.jp/en/about/index.html>
- METI. (2004b). *Industrial cluster project*. Retrieved October 10, 2010, from <http://www.cluster.gr.jp/en/plan/index.html>
- METI. (2010a). *On the new growth strategy: blueprint for revitalizing Japan*. Tokyo: Japanese Ministry of Economy Trade and Industry.
- METI. (2010b). *Industrial structure vision: the way forward for Japanese industry*. Retrieved October 10, 2010, from <http://www.meti.go.jp/english/policy/economy/industrial.html>
- METI-Kansai. (2004). *What is METI-Kansai?*. Retrieved October 10, 2010, from http://www.kansai.meti.go.jp/english/what_is_metikansai.html

- METI-Kansai. (2007). *Powerful Kansai*. Osaka: Kansai Bureau of Economy Trade and Industry.
- METI-Kanto. (2010). *Promotion of the industrial cluster plan*. Retrieved September 10, 2010, from http://www.kanto.meti.go.jp/english/policy/index_cluster.html
- MEXT. (2006). Challenge for building a future society: the role of science and technology in an aging society with fewer children. *White paper on science and technology 2006*. Tokyo: Japanese Government Ministry of Education, Culture, Sports, Science and Technology.
- MEXT. (2007). *Ministry of Education, Culture, Sports, Science and Technology*. Tokyo: MEXT.
- MEXT. (2009). *Cluster brochure 2009* [English version]. Tokyo: MEXT.
- MEXT. (2010). *Map of knowledge clusters*. Retrieved September 10, 2010, from http://www.mext.go.jp/component/a_menu/science/micro_detail/_icsFiles/afieldfile/2010/02/01/1288448_3.pdf
- McKee, D., & McKee, Y. (2004). Edge cities, urban corridors and beyond. *International Journal of Social Economics*, 31(5/6), 536-543.
- Melotte, Y. (1995). *Economics* (5th ed.). Sydney: Prentice Hall.
- Mercer Consulting. (2009). *Swiss and German cities dominate top places of best cities in the world*. Retrieved March 10, 2010, from http://www.citymayors.com/features/quality_survey.html
- Miller, D. (2008). Tyranny of distance in State design. *The West Australian*, Thursday, June 5, 13.
- Mishra, S. (2007). *A brief history of production functions*. Retrieved September 10, 2010, from <http://ssrn.com/abstract=1020577>
- Mizuno, Y., & Kadono, Y. (2006). Influence on local activities of developer acts for community formation in new town: the case of Rokko Island, Kobe City. *Journal of Architecture and Planning*, 604, 109-114.
- MLIT. (1998a). 三大都市圏の将来ビジョン [Future vision for three large regions]. Retrieved September 30, 2010, from <http://www.mlit.go.jp/kokudokeikaku/vision/>
- MLIT. (1998b). *Grand design for the 21st Century: promotion of regional independence and creation of beautiful national land*. Retrieved September 30, 2010, from <http://www.mlit.go.jp/kokudokeikaku/zs5-e/index.html>
- MLIT. (2000). *Outline of the "Basic development plan for the Kinki Region"* (5th ed.). Retrieved October 10, 2010, from <http://www.mlit.go.jp/kokudokeikaku/vision/kinkei/kinkiregionpdf.pdf>
- MLIT. (2006). *The new national land sustainability plan*. Retrieved September 30, 2010, from http://www.mlit.go.jp/english/2006/b_n_and_r_planning_bureau/01_duties/New_NLSP_060515.pdf
- MLIT. (2010). 国土計画 [National plan]. Retrieved September 30, 2010, from <http://www.kokudokeikaku.go.jp/index.html>
- Mokyr, J. (2000). Knowledge, technology and economic growth during the Industrial Revolution. In B. van Aart, S. Kuipers & G. Kuper (Eds.), *Productivity, technology and economic growth* (pp. 253-292). The Hague: Kluwert.
- Mokyr, J. (2002a). *The gifts of Athena: historical origins of the knowledge economy*. Princeton, New Jersey: Princeton University Press.

- Mokyr, J. (2002b). *Thinking about technology and institutions*. Paper presented at the Prometheus's Bequest: Technology and Change Macalester International College Roundtable, October 10-12, Macalester College, Minnesota.
- Monheim, R. (2001). *The role of pedestrian precincts in the evolution of German city centres from shopping to urban entertainment centres*. Paper presented at the Australia: Walking the 21st Century Conference, 20-22 February, Perth, Western Australia.
- Morris, P. (2002). Peripheral economies in a global knowledge economy. Supporting paper no. 2 for *Directions for Industry Policy in Western Australia within the Global Knowledge Economy* by Sheehan, P., Houghton, J., Jolley, A., Morris, P. and Johnston, R. (2002). Perth: TIAC.
- Morse, J. (2007). Sampling in grounded theory. In A. Bryant & K. Charmaz (Eds.), *The Sage handbook of grounded theory* (pp. 229-244). London: Sage.
- Mumford, L. (1961). *The city in history: its origins, its transformations, and its prospects*. NY: Harcourt.
- Mumford, L., & Turner, B. (1997). *The culture of cities*. London: Routledge.
- Murakami, T. (2007). The reform of spatial planning system and development of national spatial strategy. *CPIJ Newsletter: new directions of regional planning in Japan*, 28. Tokyo: The City Planning Institute of Japan.
- Nakamura, K. (1996). Privatisation and beyond: the JR case. *Japan Railway and Transport Review*, 8, 4-9.
- Neff, G. (2005). The changing place of cultural production: the location of social networks in a digital media industry. *The Annals of the American Academy*, 597(1), 134-152.
- Newman, P. (2001). *Walking in historical and international context: what is the role of walking in cities for 21st Century economies?*. Paper presented at the Australia: Walking the 21st Century Conference, 20-22 February, Perth, Western Australia.
- NGAA. (2011). *Supporting more sustainable growth areas: NGAA 2011/2012 Federal Budget submission*. National Growth Areas Alliance.
- Nishikawa, Y. (2009). Kobe Port Island selected as an ideal infrastructure for research and development. *Hyogo-Kobe Business News*, 8, 1.
- Nishimura, Y. (2005). *From city planning to machizukuri: A Japanese experience of community planning* [unpublished]. Paper presented at the International Community Planning Forum, October 30-November 1, Taipei.
- Nocco, A. (2005). The rise and fall of regional inequalities with technological differences and knowledge spillovers. *Regional Science and Urban Economics*, 35(5), 542-569.
- Nygaard, C., Wood, G., & Stoakes, A. (2005). *A tale of three cities: labour and housing market development in a post-industrial era*. Paper presented at the 2nd State of Australian Cities, 30 November-2 December, Griffith University, Brisbane.
- O'Brien, T. (1999). *Industrial and operations jobs in Boston*. Boston: Boston Redevelopment Authority.
- O'Connor, K., & Healy, E. (2004). Rethinking suburban development in Australia: a Melbourne case study. *European Planning Studies*, 12(1), 27-40.
- O'Connor, K., & Rapson, V. (2003). Employment in city and suburban Melbourne: the changing relationship. *People and Place*, 11(4), 41-52.
- OECD. (1996). *The knowledge-based economy*. Paris: OECD.
- OECD. (2001). *The new economy beyond the hype: the OECD growth project*. Paris: OECD.

- OECD. (2003). *The sources of economic growth in OECD countries*. Paris: OECD.
- OECD. (2007a). *Higher education and regions: globally competitive, locally engaged*. Paris: OECD.
- OECD. (2007b). *OECD science, technology and industry scoreboard*. Retrieved February 13, 2008, from <http://masetto.sourceoecd.org/vl=3730436/cl=15/nw=1/rpsv/sti2007/>
- OECD. (2008). *Compendium of patent statistics*. Paris: OECD.
- OECD. (2009). *OECD science, technology and industry scoreboard 2009*. Paris: OECD.
- Oldenburg, R. (2007). The character of third spaces. In M. Carmon & S. Tiesdell (Eds.), *Urban design reader* (pp. 163-169), Oxford, UK: Architectural Press.
- Ohno, H. (2008). *Fibre city: Tokyo 2050*. Retrieved October 10, 2010, from <http://www.japanesestudies.org.uk/special/shrinking-regions/Chapter6.pdf>
- Olshansky, R., Kobayashi, I., & Ohnishi, K. (2005). The Kobe earthquake: ten years later. *Planning*, 71(9), 36.
- Ono, K. (2008). Challenges for a balanced and sustainable development in Japan. *Informationen zur Raumentwicklung*, 8, 507-514.
- Oosten, W. (2000). *Railway stations and a geography of networks*. Paper presented at the 6th Annual Congress of the Netherlands Research School for Transport, Infrastructure and Logistics, December 12, The Hague.
- Orlando, M., & Verba, M. (2005). Do only big cities innovate?: technological maturity and the location of innovation. *Economic Review, Federal Reserve Bank of Kansas City*, Q (II), 31-57.
- Ortuzar, S. (1988). Japan's integrated residential policy. *Cities*, 5(4), 333-339.
- Osaka Business and Investment Centre. (2007). *Osaka: the dynamic business hub of Japan*. Osaka: Osaka Business and Investment Centre.
- Ottaviano, G., & Peri, G. (2006). The economic value of cultural diversity: evidence from US cities. *Journal of Economic Geography*, 6(1), 9-44.
- Park, S. (2001). Regional innovation strategies in the knowledge-based economy. *GeoJournal*, 53(1), 29-38.
- Patton, M. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Peek, G., Bertolini, L., & de Jonge, H. (2006). Gaining insight in the development potential of station areas: a decade of node-place modelling in The Netherlands. *Planning Practice and Research*, 21(4), 443-462.
- Perakyla, A. (1998). Reliability and validity in research based on tapes and transcripts. In D. Silverman (Ed.), *Qualitative research: theory, method and practice* (pp. 201-220). London: Sage.
- Peri-Urban Regions Platform Europe Regional Policy Subgroup. (2006). *Response to the Commission Staff working paper "Cohesion policy and cities: the urban contribution to growth and jobs in the regions"*. The Netherlands: PURPLE.
- Phelps, A., & Parsons, A. (2003). Edge urban geographies: notes from the margins of Europe's capital cities. *Urban Studies*, 40(9), 1725-1752.
- Phelps, A., Parsons, A., Ballas, A., & Dowling, A. (2006). Business at the margins? Business interests in edge urban politics. *International journal of urban and regional research*, 30(2), 362.

- Pikora, T., Giles-Corti, B., & Donovan, R. (2001). *How far will people walk to facilities in their local neighbourhoods*. Paper presented at the Australia: Walking the 21st Century Conference, 20-22 February, Perth, Western Australia.
- Pink, B. (2007). *Patterns of innovation in Australian business*, ABS cat. no. 8163.0. Canberra: ABS.
- Pinkwart, A. (2007). *From heavy industries to high-tech, knowledge-driven industry: transforming regions in Germany*. Paper presented at the Developing Competitive Knowledge-based Regional Economies Conference, 10-11 October, Kilkenny, Ireland.
- Poole, M., Garnett, P., Quin, R., & Tracey, J. (2005). *Engaging communities through educational precincts*. Paper presented at the International Conference on Engaging Communities, 14-17 August, Brisbane, Australia.
- Porter, M. (2000). Location, competition and economic development: local clusters in a global economy. *Economic Development Quarterly*, 14(1), 15-34.
- Porter, M., & Stern, S. (2001). National innovative capacity. In M. Porter & K. Schwab (Eds.), *The global competitiveness report 2001-2002* (pp. 102-119). New York: Oxford University Press.
- Portland Development Commission. (2002). Appendix 2.2: overview of the Portland economy. *Economic development strategy for the City of Portland*. Portland: City of Portland.
- Portland Development Commission. (2009). *Portland profile: economy and clusters*. Retrieved February 20, 2010, from <http://pdc.us/factbookonline/economy.html>
- Portland State Population Research Centre. (2009). 2009 certified population estimates. *Annual Oregon population report*. Portland: Portland State University.
- Potts, G. (2002). Competitiveness and the social fabric: links and tensions in cities. In I. Begg (Ed.), *Urban competitiveness: policies for dynamic cities* (pp. 55-80). Bristol: The Policy Press.
- Power, D., & Lundmark, M. (2004). Working through knowledge pools: labour market dynamics, the transference of knowledge and ideas, and industrial clusters. *Urban Studies*, 41(5/6), 1025-1044.
- Pracsys. (2007). *Activity centres review draft working paper*. Perth: WA Department of Planning and Infrastructure.
- Praxis Solutions. (2004). *The evolving city: an atlas of change in the City of Perth 1990-2001*. Perth: WA Planning Commission & City of Perth.
- PriceWaterhouseCoopers. (2009). Global city GDP rankings 2008-2025. *Economic Outlook*, November.
- Rappaport, J. (2006). Consumption amenities and city crowdedness. *Research Working Paper 06-10*. Kansas City: Federal Reserve Bank of Kansas City.
- Raspe, O. (2007). *Firm performance in knowledge intensive spatial contexts: a multilevel analysis*. Paper presented at the DRUID-DIME Academy Winter 2007 PhD Conference on Geography, Innovation and Industrial Dynamics, 25-27 January, Aalborg, Denmark.
- Raspe, O., & Van Oort, F. (2006). The knowledge economy and urban economic growth. *European Planning Studies*, 14(9), 1209 - 1234.
- Ren, X. (2004). *Amenities and urban growth: an exploratory analysis*. Paper presented at the Emerging Scholars in Cultural Policy Conference, 21-22 May, Chicago, University of Chicago.

- Renne, J. (2005). *Transit-oriented development in Western Australia: attitudes, obstacles and opportunities*. Perth: Planning and Transport Research Centre.
- Robson, B., Barr, R., Lymperopoulou, K., Rees, J., & Coombes, M. (2006). A framework for city-regions. *Working Paper 1: mapping city-regions*. London: Office of the Deputy Prime Minister.
- Ruef, M. (2002). Strong ties, weak ties and islands: structural and cultural predictors of organizational innovation. *Industrial and Corporate Change*, 11(3), 427-449.
- Rybczynski, W. (1998). Le Corbusier. *TIME* 100, June 8.
- Saint-Paul, G. (2004). The brain drain: some evidence from European expatriates in the United States. *IZA Discussion Paper 1310*. Bonn: The Institute for the Study of Labor.
- Saito, A., & Thornley, A. (2003). Shifts in Tokyo's world city status and the urban planning response. *Urban Studies*, 40(4), 665-685.
- Salingeros, N. (2003). *Connecting the fractal city* [keynote speech]. Paper presented at the 5th Biennial of towns and town planners in Europe, April 10-12, Barcelona.
- Sassen, S. (2001). *The global city: New York, London, Tokyo* (2nd ed.). Princeton: Princeton University Press.
- Saxenian, A. (2002). Silicon Valley's new immigrant high-growth entrepreneurs. *Economic Development Quarterly*, 16(1), 20-31.
- Scheurer, J., Kenworthy, J., & Newman, P. (2005). Most Liveable and Best Connected? The Economic Benefits of Investing in Public Transport in Melbourne. *A policy document for the Metropolitan Transport Forum*. Melbourne: Metropolitan Transport Forum.
- Scholarios, D., & A. Marks (2004). Work-life balance and the software worker. *Human Resource Management Journal*, 14(2), 54-75.
- Schrey-Niemenmaa, K., Rintamäki, T., & Törmälä, P. (2003). Education industry unit in the framework of the learning city. *European Journal of Engineering Education*, 28(2), 161-167.
- Schuller, T. (2005). *Social capital, networks and communities of knowledge*. Paper presented at the NSF/OECD conference on Advancing Knowledge and the Knowledge Economy, 10-11 January, Washington DC.
- Schwandt, T. (1998). Constructivist, interpretivist approaches to human inquiry. In N. Denzin & Y. Lincoln (Eds.), *The landscape of qualitative research* (pp. 221-259). Thousand Oaks: Sage.
- Shapira, P., & Youtie, J. (2008). Learning to innovate: building regional technology development learning networks in midsized cities. *European Planning Studies*, 16(9), 1207-1228.
- Shelton, B. (1999). *Learning from the Japanese city: West meets East in urban design*. NY: Routledge.
- Shklarov, S. (2007). Double vision uncertainty: the bilingual researcher and the ethics of cross-language research. *Qualitative Health Research*, 17(4), 529-538.
- Silverman, D. (2006). Credible qualitative research. In *Interpreting qualitative data* (3rd ed., pp. 271-314). London: Sage.
- Sim, L., Ong, S., Agarwal, A., Parsa A., & Keivani R. (2003). Singapore's competitiveness as a global city: development strategy, institutions and business environment. *Cities*, 20(2), 115-127.
- Simmie, J. (2002). Knowledge spillovers and reasons for the concentration of innovative SMEs. *Urban Studies*, 39(5/6), 885-902.

- Simmie, J. (2003). Innovation and urban regions as national and international nodes for the transfer and sharing of knowledge. *Regional Studies*, 37(6/7), 607-620.
- Simmie, J. (2004). Innovation and clustering in the globalized international economy. *Urban Studies*, 41(5/6), 1095-1112.
- Solomon, L. (1980). *Economics* (3rd ed.). Massachusetts: Addison-Wesley.
- Sorensen, A. (2003). Building world city Tokyo: globalization and conflict over urban space. *The Annals of Regional Science*, 37(3), 519-531.
- Sorensen, A. (2004). *The making of urban Japan: cities and planning from EDO to the Twenty First Century*. London: Routledge.
- Sorensen, A. (2005). Rebuilding urban Japan after 1945. *The Journal of Japanese Studies*, 31(2), 493-498.
- Sorensen, A., & Funck, C. (2007). *Living cities in Japan: citizens' movements, machizukuri and local environments*. London: Routledge.
- Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.
- Stuttgart Region Economic Development Corporation. (2002). *The Stuttgart region: the location for growth and innovation*. Stuttgart: Stuttgart Region Economic Development Corporation.
- SustainLane. (2009). *US city rankings*. Retrieved February 20, 2010, from <http://www.sustainlane.com/us-city-rankings/categories/innovation>
- Syme Marmion & Co. (2006). *Submission state infrastructure strategy*. Wanneroo: City of Wanneroo.
- Takafusa, S. (2004). *The role of development planning in Japan*. Paper presented at the International Conference on China's Planning System Reform, 24-25 March, Beijing, China.
- Takeda, T. (2008). *Kansai economy and its challenges in the global era*. Retrieved August 30, 2010, from http://www.slidefinder.net/K/Kansai_Economy_and/its_Challenges_Global/Era/2011357
- Taketoshi, M. (2009). *Overcoming the economic crisis by regional policy and the challenges [powerpoint]*. Retrieved September 30, 2010, from <http://www.oecd.org/dataoecd/39/35/42524086.pdf?contentId=42524090>
- Tanaka, M. (2008). Living cities in Japan: citizens' movements, machizukuri and local environments. *Journal of Planning Education and Research*, 27(3), 374-376.
- Taniyama, T. (2009) 住宅政策からみた高齢者居住支援 [Examining elderly residential support in housing policy]. *Japan National Institute of Public Health*, 58(2), 78-83.
- Tange, K. (1985). Architecture and the city: urban architecture. *UNESCO Courier*. Paris: UNESCO.
- Task Force on the Future of American Innovation. (2005). *The knowledge economy: is the United States losing its competitive edge?* Retrieved May 10, 2011, from <http://www.futureofinnovation.org/PDF/Benchmarks.pdf>
- Telesis Consulting. (2007). *Perth's creative industries: an analysis*. Perth: City of Perth.
- The Boston Foundation. (2002a). *Boston indicators report 2002: economy*. Retrieved February 20, 2010, from <http://www.tbf.org/indicators/economy/indicators.asp?id=1144>
- The Boston Foundation. (2002b). *Boston indicators report 2002: executive summary*. Retrieved February 20, 2010, from <http://www.tbf.org/indicators/summary/index.asp?id=1394>

- The World Bank. (2008). City-regions: emerging lessons from England. *Directions in urban development*.
- Thomas, J., & Darnton, J. (2006). Social diversity and economic development in the metropolis. *Journal of Planning Literature*, 21(2), 153-168.
- Thurow, L. (2005). Why are the fears of globalisation so high?. *Forum Futures 2005*. Cambridge: Massachusetts Institute of Technology, Forum for the Future of Higher Education.
- Tiwari, R., & Curtis, C. (2010). Approaches to arterial road design in Perth: the challenges ahead. In I. Alexander, S. Grieve & D. Hedgcock (Eds.), *Planning perspectives from Western Australia: a reader in theory and practice* (pp. 289-305). Fremantle: Fremantle Press.
- Toakley, A. (2004). Globalization, sustainable development and universities. *Higher Education Policy*, 17(3), 311-324.
- Tokyo Metropolitan Government. (2010). *Overview of Tokyo*. Retrieved August 30, 2010, from <http://www.metro.tokyo.jp/ENGLISH/PROFILE/overview03.htm>
- Tokyu Corporation. (2010a). 東急グループの事業 [Activities of Tokyu Group]. Retrieved October 1, 2010, from <http://www.tokyu.co.jp/group/rinen/outline.html>
- Tokyu Corporation. (2010b). *IDEA project: project intent*. Retrieved June 10, 2007, from http://ideaproject.com.au/cms/index.php?option=com_content&task=view&id=31&Itemid=40
- Tokyu Corporation. (2010c). *Memoranda of Understanding with the City of Wanneroo*. Retrieved October 1, 2010, from http://ideaproject.com.au/cms/index.php?option=com_frontpage&Itemid=1
- Tokyu Land Corporation. (2010a). *Business divisions*. Retrieved October 1, 2010, from <http://www.tokyu-land.co.jp/english/enterprise/structure/index.html>
- Tokyu Land Corporation. (2010b). *The Tokyu Group*. Retrieved October 1, 2010, from http://www.tokyu-land.co.jp/english/company/tokyu_g/index.html
- Tregarthen, T., & Rittenberg, L. (2000). *Economics* (2nd ed.). New York: Worth.
- Trewin, D. (2002). *Measuring a knowledge-based economy and society: an Australian framework*, ABS Cat. No.1375.0. Canberra: ABS.
- Tse, C. (2008). Learning investment and industrial diversity in urban growth. *Review of Economic Dynamics*, 11(2), 413-433.
- Tsutsumi, K. (2008). *Senri New Town*. Retrieved October 10, 2010, from <http://www.japanesestudies.org.uk/special/shrinking-regions/Chapter6.pdf>
- UNESCO. (2008). *Kobe, UNESCO City of Design*. Kobe: City of Design, Kobe.
- UNESCO. (2010). *The creative cities network: Kobe, Japan*. Retrieved August 30, 2010, from http://portal.unesco.org/culture/en/ev.php-URL_ID=39759&URL_DO=DO_TOPIC&URL_SECTION=201.html
- United Cities and Local Governments. (2009a). *UCLG urban mobility*. Retrieved March 10, 2010, from http://www.cities-for-mobility.net/uclg/index.php?option=com_content&view=frontpage&Itemid=1&lang=en
- United Cities and Local Governments. (2009b). *Agenda 21 for urban mobility*. Stuttgart: The City of Stuttgart.
- United Nations. (2001). *Importance of infrastructure to development, poverty reduction stressed at thematic session of Brussels Conference*. Coventry: M2 Presswire.

- UR. (2009). *Profile of UR*. Kanagawa, Japan: Urban Renaissance Agency.
- Urban Audit. (2008). *City profiles*. Retrieved February 20, 2010, from <http://www.urbanaudit.org/CityProfiles.aspx>
- US Census Bureau. (2006). *State and county quick facts*. Retrieved February 20, 2010, from <http://quickfacts.census.gov/qfd/index.html>
- Usai, S. (2008). The geography of inventive activities in OECD regions. *STI working paper 2008/3*. Paris: OECD.
- Vale, M. (2004). Innovation and knowledge driven by a focal corporation: the case of the Autoeuropa supply chain. *European Urban and Regional Studies*, 11(2), 124.
- van Geenhuizen, M. (2002). *The e-economy and the function of cities as nodes in transport and communication: towards a research agenda*. Paper presented at the ICT, innovation and the transport system NSF-ESF workshop, 15-17 January, Washington DC.
- van Winden, W., & van den Berg, L. (2004). *Cities in the knowledge economy: new governance challenges*. The Netherlands: European Institute for Comparative Urban Research.
- Varga, A., & Schalk, H. (2004). Knowledge spillovers, agglomeration and macroeconomic growth: an empirical approach. *Regional Studies*, 38(8), 977-989.
- Venables, A. (2007). Evaluating urban transport improvements: cost-benefit analysis in the presence of agglomeration and income taxation. *Journal of Transport Economics and Policy*, 41(2), 173-188.
- Vintila, P. (2003). Knowledge rich, knowledge poor: the distribution of opportunities for higher learning in metropolitan Perth. *Urban Policy and Research*, 21(4), 449-454.
- WA Department of Commerce. (2009). *InnovateWA policy*. Retrieved August 30, 2010, from http://www.docep.wa.gov.au/ScienceInnovation/Content/ARCHIVE/Innovation/InnovateWA_Policy/index.html
- WA Department of Planning. (2010). *Directions 2031 and beyond*. Perth: WA State Government.
- WA Department of State Development. (2008). *About the Department of State Development*. Retrieved August 30, 2010, from <http://www.dsd.wa.gov.au/278.aspx>
- WA Department of State Development. (2009). *Reasons to invest in Western Australia*. Retrieved August 30, 2010, from <http://www.dsd.wa.gov.au/7159.aspx>
- WA Information and Communications Technology Industry Development Forum. (2006). *Big pipes: Connecting Western Australia to the global knowledge economy*. Perth: WA Information and Communications Technology Industry Development Forum.
- Walk Score. (2010). *Boston's most walkable neighborhoods*. Retrieved March 10, 2010, from <http://www.walkscore.com/rankings/Boston>
- Walker, J. (2009). Time as the fourth dimension in the globalization of higher education. *The Journal of Higher Education*, 80(5), 483-509.
- Wang, X. (2009). *Knowledge-based urban development in Wuhan, China*. Paper presented at the Regional Studies Association Annual Conference, Understanding and Shaping Regions: Spatial, Social and Economic Futures, 6th-8th April, Leuven, Belgium.
- WAPC. (1997). *Liveable neighbourhoods: community design code* (1st ed.). Perth: Western Australia Planning Commission.
- WAPC. (2004a). *Liveable neighbourhoods: a Western Australian Government sustainable cities initiative* (draft version) (3rd ed.). Perth: Western Australia Planning Commission.

- WAPC. (2004b). *Metropolitan development program: urban land release plan 2004/2005 to 2008/2009*. Perth: Western Australia Planning Commission.
- WAPC. (2004c). *Network city: community planning strategy for Perth and Peel*. Perth: Western Australia Planning Commission.
- WAPC. (2006). *Statement of planning policy: network city* (draft version). Perth: Western Australia Planning Commission.
- WAPC & DPI. (2009). *Planning activity centres for communities and economic growth*. Perth: State of Western Australia.
- Warren, C. (2001). Qualitative interviewing. In J. Gubrium & J. Holstein (Eds.), *Handbook of interview research: context and method* (pp. 83-102). London: Sage.
- Wendell Cox Consultancy. (2003). *Urban transport fact book, Tokyo-Yokohama suburban rail summary: commuter rail, regional rail*. Retrieved March 10, 2010, from <http://www.publicpurpose.com/>
- Wenting, R., Atzema, O., & Frenken, K. (2008). Urban amenities or agglomeration economies? Locational behaviour and entrepreneurial success of Dutch fashion designers. *Papers in Evolutionary Economics 08.03*. Utrecht, The Netherlands: Urban and Regional Research Centre.
- Wilkie, J., & Grant, A. (2009). *The importance of evidence for successful economic reform*. Canberra: Australian Treasury, Macroeconomic Policy Division.
- WIPO. (2008). World patent report: a statistical review. *WIPO publication no. 931(E)*. Switzerland: World Intellectual Property Organisation.
- Wojan, T., Lambert, D., & McGranahan, D. (2007). Emoting with their feet: bohemian attraction to creative milieu. *Journal of Economic Geography*, 7, 711-736.
- Wolfe, D., & Gertler, M. (2004). Clusters from the inside and out: local dynamics and global linkages. *Urban Studies*, 41(5/6), 1071-1093.
- Wollner, C. (2008). *Silicon Forest*. Retrieved February 20, 2010, from http://www.oregonencyclopedia.org/entry/view/silicon_forest/
- Wollner, C., Provo, J., & Schablisky, J. (2005). *Brief history of urban renewal in Portland, Oregon*. Retrieved February 20, 2010, from http://www.pdc.us/pdf/about/portland-ura-history_11-05.pdf
- Wong, C., Millar, C., & Choi, C. (2006). Singapore in transition: from technology to culture hub. *Journal of Knowledge Management*, 10(5), 79.
- Wrigley, E. (1988). *Continuity, chance and change: the character of the Industrial Revolution*. New York: Cambridge University Press.
- Wu, W. (2005). Dynamic cities and creative clusters. *World Bank Policy Research Working Paper 3509*. Washington DC: The World Bank.
- Yamaguchi, T. (1986). *National policies and urban system: the Japanese experience*. Retrieved September 30, 2010, from <http://repository.dl.itc.u-tokyo.ac.jp/dspace/handle/2261/28722>
- Yigitcanlar, T. (2007). *The making of urban spaces for the knowledge economy: global practices*. Paper presented at the The 2nd International Symposium on Knowledge Cities, 16-18 July, Kuala Lumpur, Malaysia.
- Yigitcanlar, T., & Martinez-Fernandez, C. (2007). *Making space and place for knowledge production: knowledge precinct developments in Australia*. Paper presented at the State of Australian Cities 2007 National Conference, 28-30 November, Adelaide, Australia.

- Yigitcanlar T., & Velibeyoglu K. (2008). Queensland's smart state initiative: a successful knowledge-based urban development strategy. In T. Yigitcanlar, K. Velibeyoglu & S. Baum (Eds.), *Knowledge-based urban development: planning and applications in the information era*. Hersley, PA: Information Science Reference.
- Yigitcanlar, T., Velibeyoglu, K., & Baum, S. (Eds.). (2008). *Knowledge-based urban development: planning and applications in the information era*. Hershey, PA: Information Science Reference.
- Yin, R. (2003a). *Case study research: design and methods* (3rd ed.). London: Sage.
- Yin, R. (2003b). *Applications of case study research*. Thousand Oaks, CA: Sage.
- Zhang, Y., & Sasaki, K. (2005). Edge city formation and the resulting vacated business district. *The Annual of Regional Science*, 39, 523–540.
- Zulauf, M. (2007). Cross-national qualitative research: accommodating ideals and reality. In L. Hantrais & S. Mangen (Eds.), *Cross-national research methodology and practice* (pp. 69-79). London: Routledge.

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Appendix 1: General survey questions

1) How did you get here? (Check more than one if applicable)

- Train
- Bus
- Car
- Bike
- On foot
- Other – Please describe

2) Where have you come from?

- Work
- Train station
- School/University
- Shopping
- Entertainment
- Meet friends
- Other – Please describe

3) Where are you going immediately after this?

- Work
- Train station
- School/University
- Shopping
- Entertainment
- Meet friends
- Other – Please describe

4) How will you get there? (Check more than one if applicable)

- Train
- Bus
- Car
- Bike
- On foot
- Other – Please describe

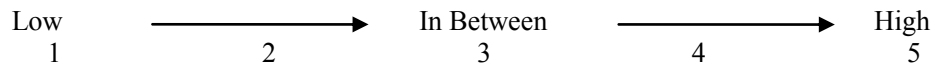
5) Will you do anything else while you are here?

- Work
- Use transport
- School/University
- Shopping
- Entertainment
- Meet friends
- Other – Please describe

6) How often do you come here?

- Every day
- Twice a week
- Once a week
- Once every 2 weeks
- Once a month
- More than once a month - Please indicate

7) Rate the opportunity of meeting people you know when you come here?



8) How would you describe the atmosphere of this location?

9) What makes this space enjoyable?

10) What makes this space unenjoyable?


11) What is your usual occupation?

- Company employee
- Home duties
- Self-employed
- Student
- Retired
- Other (please describe)

Appendix 2: Elite interview questions


1. Which organisation do you work for?
2. How long have you worked for this organisation?
3. What is your role?
4. Which industry/(ies) define the future competitive advantage of your region?
5. What government economic development policies inform urban planning your region?
6. How important are single-use and mixed-use planning zones to the future economic development of your region? Please give examples.
7. On a scale from 1 to 5, how successful has the existing planning in your region been in achieving the following? Please give examples.

a. Public transport links between the international airport and your region.

Not successful  Very successful


1	2	3	4	5
---	---	---	---	---

b. Public transport connectivity and accessibility of those living in the suburbs to your regional CBD.

Not successful  Very successful


1	2	3	4	5
---	---	---	---	---

c. Capacity of suburban pedestrian-oriented developments, in particular around train stations or in the urban core, to be vibrant socio-economic hubs.

Not successful  Very successful


1	2	3	4	5
---	---	---	---	---

e. Balance between the car and pedestrians in suburban pedestrian-oriented developments.

Not successful  Very successful

1	2	3	4	5
---	---	---	---	---

f. Urban form in the suburbs which maximises pedestrian movement and accessibility.

Not successful  Very successful

1	2	3	4	5
---	---	---	---	---