

The East West Transport Link, Urban Structure and Victoria's Prosperity

FINAL REPORT

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This Report has been prepared for:



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1 Overview

This paper argues that an East West link could provide a significant boost for Melbourne's future success by:

- developing connectivity to and within the critical central city area;
- promoting a strong 'poly-centric' structure to metropolitan development; and
- facilitating development in the west.

To secure sustainable prosperity, Melbourne must establish itself as a leading city within the innovation economy. Innovation in the post industrial world has taken on a highly networked and organic character. In this context, knowledge intensive or 'advanced' business services are known to play a critical role in technology diffusion and the creation of learning environments.

The pre-eminence of advanced business services in the innovation economy has spatial consequences. Left to their own devices, these services concentrate into few cities nationally and within the cores of those cities. They also tend to work most effectively with local clients, so that their innovation boosting impacts are subject to distant decay.

To ensure that the whole metropolitan area is keyed to the innovation economy and not just the urban core, it is important that the post industrial city features a pronounced 'poly centric' structure with vibrant suburban CBD's operating alongside a powerful urban core. This arrangement is likely to offer greatest advantage in attracting and holding knowledge workers.

A poly centric structure also delivers a range of infrastructure, environmental and housing choice benefits.

Melbourne 2030 generally aims to deliver this poly-centric city. However, there are signs that the metropolis is not moving in this direction. Rather there is evidence of an emergent 'two tone metropolis' characterised by a globally connected inner urban region driven by the export of 'thinking services', surrounded by a client suburban economy where livelihoods are more dependent on household consumption. Within this pattern there is a persistent East – West divide, with the west continuing to display poorer social outcomes in educational attainment, community well-being and incomes.

The possibility that Melbourne's spatial structure may not be particularly well keyed to the innovation economy is of particular concern given that the city appears to lag behind Sydney by a considerable margin in the attraction / generation of advanced business services. Victoria risks becoming a 'client state' within the national economy, notwithstanding the much lauded economic regeneration of Melbourne since the mid 90's.

Achievement of a preferred spatial structure for Melbourne requires much more than sympathetic policy documents such as Melbourne 2030. The city shaping power of major infrastructure investments needs to be harnessed and deployed to help achieve the policy vision.

In appraising the need or otherwise for an East West Link, as much attention needs to be given to its potential to spark preferred adjustments in urban structure as to its capacity to service transport demands projected on the basis of current settlement patterns.

2 Drivers of Sustainable Prosperity

Competitive cost structures in infrastructure services, skills supply and taxes and charges will remain vital to the sustainable prosperity of Melbourne and the wider Victorian economy. But, by itself, a focus on input costs will not be sufficient to maintain improving living standards in the State. To a large extent, ongoing growth in productivity – the engine of community wealth – will depend on the capacity for innovation in the economy.

Richard Florida (2000, p.8), an influential commentator on competitiveness in post – industrial, globally connected regions, has a succinct summary of this proposition...

"The key to success in the old economy was simple – costs. In the mass production era, regions established competitive advantage via advantages in natural resource endowments, transportation access, the cost and productivity of physical labour, and by reducing the overall costs of doing business. Driven to reduce costs, firms selected locations that provided low-cost land, cheap or highly productive physical labour, and a cost-conscious business climate. Regional development strategies typically emphasized the use of so-called business incentives, designed to win over businesses by pushing their costs even lower. The environment and natural amenities were seen as sources of raw materials or as places to dispose wastes. In the new economy, regional advantage comes to places that can quickly mobilize the best people, resources, and capabilities required to turn innovations into new business ideas and commercial products. Leading regions establish competitive advantage through their capabilities. For these reasons, the nexus of competitive advantage shifts to those regions that can generate, retain and attract the best talent."

In this context, a critical feature of the future prosperity drivers for Melbourne relates to the 'unbundling of the value chain' and the emergence of "Advanced Business Services" or "Knowledge Intensive Business Services (KIBS)" as the key agents in innovation.

Value creation is being broken down into a mosaic of quasi independently executed steps involving a growing separation between 'thinking' processes (which are increasingly centralising into strategic cities within advanced economy nations) and 'routine production' processes (which are increasingly being outsourced, sometimes to overseas contractors). We discuss below how, as 'agents for hire' specifically focussed on creative problem solving, Advanced Business Services play a critical role in technology diffusion and the formation of competitive advantage.

While the post war manufacturing boom which powered Melbourne's economy and geography was characterised by vertical integration, exemplified by the great car plants established in Dandenong, Geelong and Broadmeadows, Melbourne's future depends on its capacity to dispense knowledge services in a world characterised by vertical 'dis-integration'. A long time observer of this process, Jeremy Howells (2006) sums up this shift in prosperity drivers as follows....

"..outsourcing has particularly taken hold since the late 1980's and, although initially much attention was focussed on cost savings associated with contracting out low skill activities,

such as catering and cleaning, the focus more recently has been on much higher value added and knowledge intensive activities, such as information technology (IT), R&D and legal services. Here the factors are more about the specialist skills and competencies of service providers, although cost factors still play a part. These more recent outsourcing trends have had a powerful influence on the rise of knowledge intensive service firms in advanced economies.

Companies that decide to outsource are therefore making assessments about their own core capabilities, the internal competencies they have to do various functions and what is available externally by specialist providers. The increasing fragmentation and specialisation of service activities is an important part of this increasing division of labour. Likewise the boundaries of the firm are becoming more open and permeable and external linkages for information and knowledge are becoming important. Knowledge and innovative activities in services is therefore becoming more distributed in nature."

Melbourne is likely to be more reliant on its exports of thinking services, some of which will be embedded in high value added manufactures and in financial products and processes, but much of which will be directly sold to the likes of commodity exporters. Meanwhile, this export driven wealth will continue to be circulated through the consumption economy (house building, retail, personal services) and this will, in turn, create most of the demands for freight movement through the metropolis.

This paper elaborates on the unbundling of value chains and the likely drivers of the Melbourne and Victoria economies, focussing on the nature of innovation in post industrial economies. With this analysis in mind, the issue of what spatial structure Melbourne should aim for if it is to optimise its contributions to a sustainably prosperous Victoria is explored. Given that major transport investments will shift accessibility contours and, over time, 're-shape' the metropolis, the paper moves on to consider what contribution an East West Transport Link might make in supporting a preferred spatial structure for Melbourne.

3 Innovation in Post Industrial Economies

The past 30 years have seen a major shift away from Fordist modes of mass production, or vertical integration. With more global integration of markets, more outsourcing and improved strategies for managing business risk in partnerships and joint ventures, the strategic and creative aspects of value production no longer need to be spatially or corporately co-located with physical production and service delivery.

In this environment, most innovation is now networked and organic, compared to the more traditionally recognised process of commercialising of 'lab ideas'.

Contemporary interpretations of innovation emphasise that it requires much more than quality R&D and an efficient venture capital market. Firms need to be part of 'learning networks' that will often stretch out to include a multiplicity of suppliers and customers, and key advisers from within the business services sector. Kolehmainen's (2004, p.2) explains the shifting nature of innovation as follows...

'Today innovation is increasingly seen as a 'circular' or 'recursive' process instead of the old view of innovation merely as 'commercialised invention based on technological or scientific knowledge'.....(This old view)...represents linear innovation thinking, whereas the 'recursive' innovation model stresses the versatile feedback mechanisms and interactive relationships involving producers (companies), product users, scientific and technical research, development activities and supporting infrastructure. It is also a model of continuous learning, in which the actors in different arenas learn from each other in interactive innovation processes. This means that many actors are involved in a single innovation process, and it can be triggered by many causes. Therefore both explicit inter-organisational innovation networks and social linkages have become crucially important.'

A similar re-conceptualisation of innovation as a networked and recursive process underpins an analysis by the Economist magazine (2007a) of the rise and fall of corporate R&D, particularly in the United States of America. The article in question relates an anecdote featuring John Seely Brown, a former director of Xerox's Palo Alto Research Centre (PARC), once an icon of the American innovation economy, renowned for creating knowledge and patents that would drive several 'strategic leaps' in the parent company's product and service offerings. Brown is quoted as saying:

"When I started out running PARC, I thought 99% of the work was creating the innovation, and then throwing it over the transom for dumb marketers to figure out how to market it....and now I realise that there is at least as much creativity in finding ways to take the idea to market as coming up with the idea in the first place. I would have spent my time differently had I figured this out early on" (p 71).

The Economist (2007a) also reports that modern technology firms are much less vertically integrated. They approach innovation through quite different strategies to those applied in the post war period. They now use "networks of outsourced suppliers and assemblers, which has led

to the splintering of research divisions" (p. 69). American firms spend around \$200 billion on R&D annually¹, with most of the money going into "making small incremental improvements and getting new ideas to market fast" (p. 70). In short, "old fashioned R&D is losing its ampersand" (p. 69).

Approaching the issue from a broader regional development as opposed to business innovation perspective, Baum et al (2007, p.16) identify that contemporary innovation is now much more likely to be of an organic and networked nature.

"It is customary to think of knowledge as being inspired; in the individual, in an instant, in one place – Eureka! As contemporary knowledge has become more specialised, however, the role of the individual has diminished and the production of knowledge has taken on a more co-operative, social dimension."

The innovation strategy practiced by the US high tech corporation Apple, exemplifies this process of learning through networking and the use of external experts. Again, the Economist (2007b) magazine provides an insightful analysis of why Apple routinely tops polls of the world's most innovative companies.

"Apple is widely assumed to be an innovator in the tradition of Thomas Edison or Bell Laboratories, locking its engineers away to cook up new ideas and basing products on their moments of inspiration. In fact, its real skill lies in stitching together its own ideas with technologies from outside and then wrapping the results in elegant software and stylish design. The idea for the iPod, for example, was originally dreamt up by a consultant whom Apple hired to run the project. It was assembled by combining off-the-shelf parts with in-house ingredients such as its distinctive, easily used system of controls. And it was designed to work closely with Apple's iTunes jukebox software, which was also bought in and then overhauled and improved. Apple is, in short, an orchestrator and integrator of technologies, unafraid to bring in ideas from outside but always adding its own twists. This approach, known as "network innovation", is not limited to electronics. It has also been embraced by companies such as Proctor & Gamble, BT and several drug giants, all of which have realised the power of admitting that not all good ideas start at home. Making network innovation work involves cultivating contacts with start-ups and academic researchers, constantly scouting for new ideas and ensuring that engineers do not fall prey to "not invented here" syndrome, which always values in-house ideas over those from outside." (p. 11)

Further evidence of the emergence of "network innovation" is provided in a study by Howard (2005) of the use of IT in the Australian manufacturing sector. Howard's findings are consistent with observations made above, that the prevalence of organic and distributed models of innovation have weakened the relevance of business R&D spending as an indicator of the propensity for innovation in an economy.

"Historically, strong R&D capability in large industrial enterprises provided a barrier to entry in many manufacturing sectors. However, changes in the way R&D is performed, particularly in relation to information and communication technologies, means that internal

¹ Economist (2007b) p. 70

R&D capability is no longer regarded in this way. An emerging model of open innovation is becoming apparent where companies source innovation capability externally through acquisition of technologies developed in research organisations and smaller technology-based companies.” (Howard, 2005, Section 4.1)

“This study provides some evidence to support contemporary management research which suggests that larger corporations that use ICT and other enabling technologies in taking new products and services to market are tending now to invest less in internal R&D and more in scouting and acquiring technology through licensing and investments in spin-off companies. Alternatively, they enter into meaningful strategic alliances with small and medium sized companies whose business model is to increase the value of the technology/discovery and sell it on quickly. This trend may be one of the factors that underlies decreases in the measured R&D in the manufacturing sector in recent years.” (ibid, Section 4.1)

Traditional forms of innovation based on formally protected intellectual property, rely heavily on Advanced Business Services. During the research and business incubation phase extensive involvement is required from patent attorneys, research institutes, business strategy consultants and design engineers or scientists. Later in the innovation cycle, marketing and business development consultants play a major part as the host firm seeks to maximise the commercial advantage from its break-through product or service offering.

In the post industrial environment of organic and networked innovation, Advanced Business Services play an equally critical role. In this case, instead of devising strategies to trap and optimise the monopoly rent attaching to a new discovery, they become carriers of new ideas between businesses.

4 The Spatiality of Innovation

As Advanced Business Services have a pivotal role in the innovation process regardless of the pathway it takes, it is important to appreciate that these types of firms are particularly prone to 'social' models of business transaction. In these models networks of contacts and place specific protocols and customs for making and using these contacts are critical to commercial success (Clark, 2005). This *modus operandi* implies that the quantity and quality of contacts between Advanced Business Services and their clients diminish with increasing distance from the key supply points for these Services. That is, with increasing distance the relevant social networks might be expected to become diluted and/or the transactions in question pass through into new geographic territory where different mores apply. This, in turn, suggests that the propensity for business innovation and sustainable prosperity will also diminish with increasing distance from Advanced Business Service supply points.

Some evidence of the strength of these 'local' business affiliations is provided in a survey of approximately 100 Advanced Business Service firms undertaken in Melbourne in 2005 (Spiller, 2007). All of these firms maintained a healthy client list in interstate and international markets. However, they spent the great bulk of their time (and therefore, presumably, had their greatest innovation impact) on local clients.

Figure 1 Source of Fees Earned, Melbourne Advanced Business Service Firms, November / December 2005

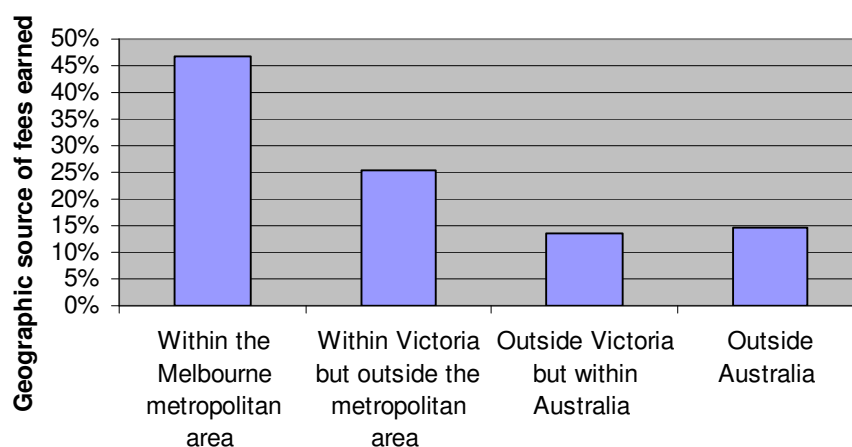
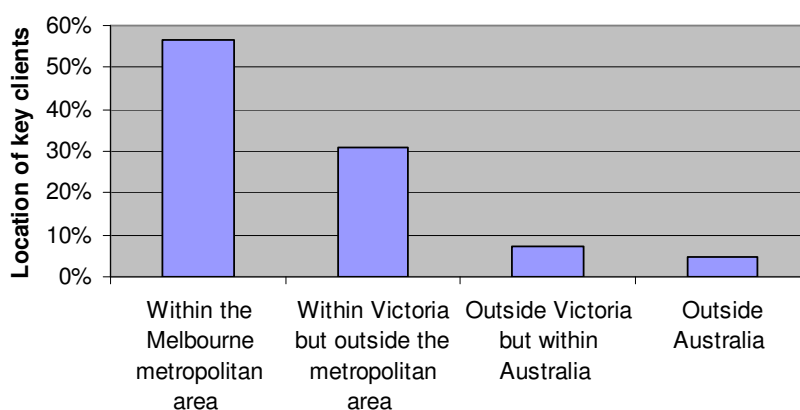


Figure 2 Distribution of Key Clients, Melbourne Advanced Business Service Firms, November / December 2005



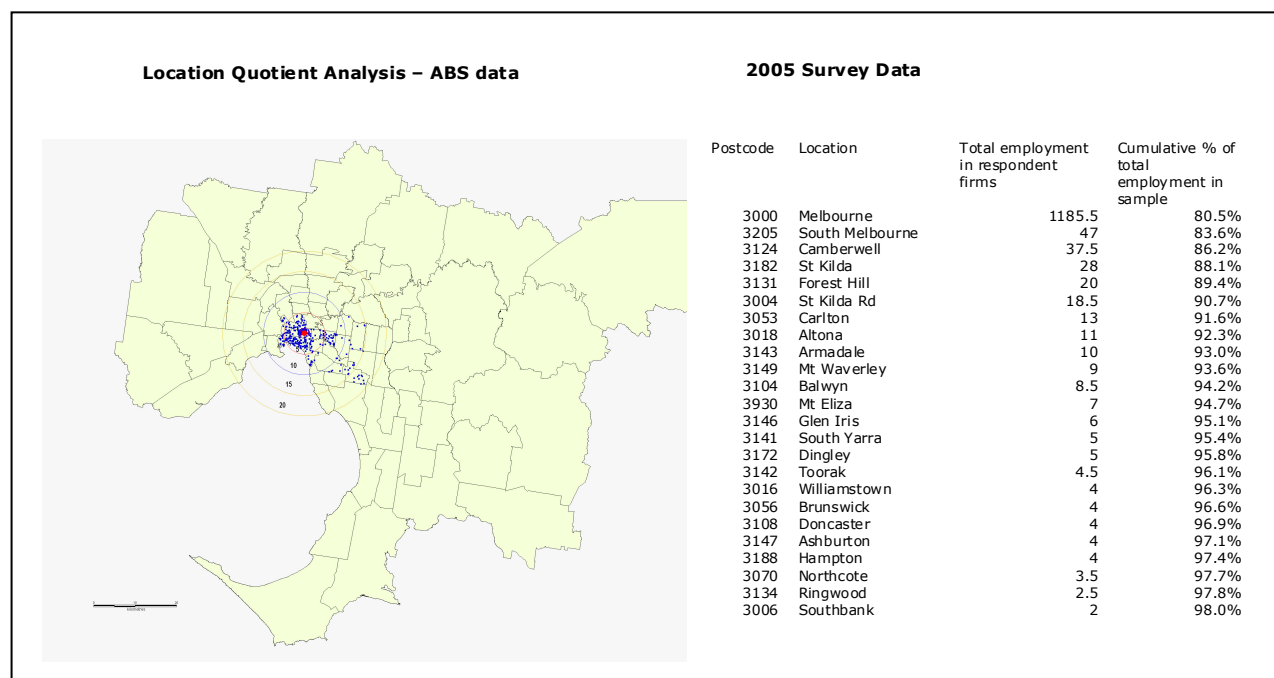
The 'localism' which characterises the operation of these Advanced Business Service firms is further highlighted by the finding that 78% of the Victorian clients of the surveyed firms were located no further than 20 kilometres from the respondent's office. Indeed, 37% of Victorian clients were located within a mere 5 kilometres of the service provider's site.

Because of this 'distance decay' in the innovation impact of Advanced Business Services, the spatiality of these firms is important to the propensity for innovation across an economy.

The natural tendency of these Services in Australia is to concentrate into relatively few cities, and within the cores of these cities. The respondents to the 2005 survey quoted above were strongly concentrated in inner Melbourne, revealing a pattern consistent with an estimation of the

distribution of Advanced Business Services based on location quotient analysis, as shown in Figure 3.

Figure 3 Spatial Distribution of Advanced Business Services in Metropolitan Melbourne



Cities across the world appear to be dividing into those with a pre-eminent role in the distribution of thinking services, and those that might be characterised as 'client' regions. As noted, the general pattern is for Advanced Business Services to concentrate in very few cities per national economy. In a comprehensive analysis of the distribution of employment in knowledge intensive business services across Europe, Simmie and Strambach (2006) observe strong and persistent patterns of spatial concentration, despite significant differences in the social and economic profiles of the countries in question.

There appears to be a broad consensus in the literature that this tendency towards concentration is driven by supply side agglomeration economies. Specialised business services benefit if they operate in a milieu which supports rapid formation of multi-disciplinary teams to meet diverse and unpredictable client needs. They also gain valuable commercial information from such collaborations. As Simmie and Strambach (2006) note..

"One common trend (in the distribution of knowledge intensive business services) is the large interregional disparities and the strong concentration of KIBS² in core metropolitan regions. Although European countries have different economic structures and different institutional contexts, the KIBS sector has this same kind of spatial organisation pattern. For knowledge intensive firms that operate in competitive markets, spatial concentration

² Knowledge Intensive Business Services, a term interchangeable with Advanced Business Services.

offers significant advantages that are connected with the production and diffusion of knowledge and with individual and collective learning processes. Spatial and socio-cultural proximity make access to information and knowledge easier. The exchange of implicit knowledge is fostered by the numerous opportunities for personal communication and knowledge spillovers are furthered by spatial proximity” p33

This internationally observed tendency for Advanced Business Services to concentrate in a handful of cities appears to be borne out in Australia. A measure of this concentration can be generated by enumerating the difference between the level of Advanced Business Services employment in a given metropolitan area with the level of employment required in this sector to give the metropolitan area in question a Location Quotient of 1.00. The 'surplus' of jobs beyond the point where the proportion of workers in business services is in line with the city's general share of Australian employment can be thought of as 'export oriented' jobs; that is, these 'surplus jobs' are supported by a customer base beyond the confines of the host metropolitan area.

This form of analysis must be treated with caution, as it can only provide very crude indications of the strength of particular sectors across the cities in question. A city returning a Location Quotient of less than 1.00 would be portrayed as having zero exporter firms, which is clearly not necessarily the case. By the same token, counting only 'surplus' jobs understates the export propensity in those cities with Location Quotient's greater than one, as some of the firms making up quotient 'parity' will also be involved in exporting.

Bearing these limitations in mind, Table 1 suggests that Sydney has a dominant role in Advanced Business Service exports. Sydney hosts almost half the 'export supported' jobs in this sector, a proportion well above that city's share of national employment (22%). Melbourne also holds an outsize share of export jobs in Advanced Business Service compared to the share of all jobs (28% versus 19%), but the position is by no means as exaggerated as in the case of the NSW capital.

This analysis suggests that Melbourne's role as a pre-eminent dispenser of thinking services to the nation and globally cannot be taken for granted. Indeed, it is vital that Melbourne's role in this area be reinforced, as any slide in this area will ultimately be reflected in a structural lag in living standards in Victoria.

Table 1 Estimated Inter-regional 'Export Jobs' in Advanced Business Services – Australian Metropolitan Areas - 2001

	Export oriented Advanced Business Service jobs	Share of Advanced Business Service export jobs	Share of all jobs nationally
Sydney	65,147	49.93%	21.89%
Melbourne	36,978	28.34%	18.61%
Canberra	9,336	7.15%	1.94%
Brisbane	7,964	6.10%	8.92%
Perth	7,755	5.94%	7.31%
Adelaide	2,200	1.69%	5.63%
Hobart	756	0.58%	0.96%
Darwin	350	0.27%	0.63%

Source: Australian Bureau of Statistics Census, special tabulations.

5 The Shape of the Sustainably Prosperous Metropolis

There is now a reasonable body of literature exploring the nexus between urban form and economic performance. This is reviewed in Appendix A. Broadly speaking, this literature focuses on the benefits of the 'compact city'. Typically, these analyses are concerned with the logistical and inventory advantages offered by urban consolidation policies. Several studies show that higher density and contiguous urban development, as opposed to fragmented, low density development (so called 'sprawl'), generates fewer vehicle kilometres of travel and saves on infrastructure costs because of improved utilisation of standing capacity. These cost savings ultimately translate to improved competitiveness and economic growth, other things being equal.

These arguments are well illustrated by recent SGS cost benefit analyses of metropolitan strategies for Melbourne and Sydney. Utilising basic input output modelling techniques, these studies have shown that consolidation strategies can generate a State-wide GDP boost of up to 3.0%. More recent analyses by SGS using partial equilibrium modelling³ and focussing on a relatively small set of benefits from compact cities (travel cost savings, greenhouse gas emissions savings and housing construction cost savings) suggest that more compact capital cities across Australia could eventually boost GDP by around 1.5%.

While these studies offer useful insights to the economic advantage which can be gained from 'smarter' spatial structures, their focus on readily measured costs confines them to a narrow perspective on competitive advantage. As we have noted, cost efficiency is a necessary but by no means sufficient condition for competitiveness in the modern, globally exposed, regional economy. The capacity to expand the value added margin through creative content (better design, better packaging, better substantive technology etc) is more likely to secure prosperous futures for regions, than attempting to compete on cost alone. This line of reasoning calls attention to whether urban form and quality of place can make a difference to a region's *propensity for innovation*.

In grappling with this question, a logical place to start is to contemplate what shape the city would take if market forces were simply left to play out in the context of the value chain unbundling and innovation processes outlined above.

One potential outcome, evident in Australian cities at least, is the creation of '*two tone metropolitan economies*'. These are characterised by a strong urban core built around knowledge intensive and trade focussed services, surrounded by a 'client' suburban economy which is dependent on less robust economic drivers linked to domestic consumption, which are more prone to cyclical fluctuation. We illustrate this below by reference to the changing nature of Australian manufacturing.

³ In particular the Commonwealth Treasury Macro-economic Model (TRYM)

Because of the unbundling process, manufacturing in advanced economies is no longer dominated by what happens in the factory. Much more happens off-site, even though planners and policy makers continue to see factories, industrial precincts and freight movements as the essence of manufacturing activity. As Heather Ridout, CEO of the Australian Industry Group puts it...

"We often think only of the production part in manufacturing. However, the value chain is complex and multidimensional. Production, the making bit, is only part of this. Manufacturing also includes research, design and development, logistics, marketing, after sales services, product stewardship and recycling. Manufacturing is more akin to project management these days; lines between manufacturing and services are blurring" (Australian Financial Review, 21/12/2006).

This pulling apart, and reallocation, of value adding steps in the economy is likely to lead to a spatial redistribution of the best jobs, and the associated incomes, in manufacturing, and other export earners. Table 2 below provides an informed hypothesis of how the different phases of contemporary manufacturing might manifest themselves in occupational and metropolitan structure.

This hypothesis anticipates that the familiar 'production' aspects of manufacturing remain anchored in the suburbs. This aspect of the value chain is characterised by lower skill jobs and is more vulnerable to out-sourcing to low wage competitor regions. Meanwhile, the higher income jobs generated by the production economy tend to concentrate in the CBD or the inner urban regions of the major cities. They are less exposed to outsourcing and technology shifts. More importantly, they have greater potential for expansion by winning services contracts with interregional and international clients. They are no longer tightly tied to the local production base; they can tap into manufacturing production chains all over the world.

To the extent that a core-periphery pattern does take hold if the market is 'left to its own devices', some tentative conclusions can be drawn about the implications for metropolitan competitiveness;

- Suburban and peri-urban economies may have a reduced propensity for innovation because of the relatively small local stock of Advanced Business Services and the distance decay involved in accessing central city services;
- As the bulk of the population (and prospective enterprises) resides in (or are likely to spring from) these suburban and peri-urban economies, the overall economic performance of the State / metropolitan area may be dampened, other things being equal.

This prospective outcome argues for the creation of a *poly – centric metropolitan structure*. This has long been favoured in planning policy on environmental and housing choice grounds, but there is now a growing sense that it might contribute directly to a more robust State economy, both in terms of cost containment and the reinforcement of intrinsic innovation potential.

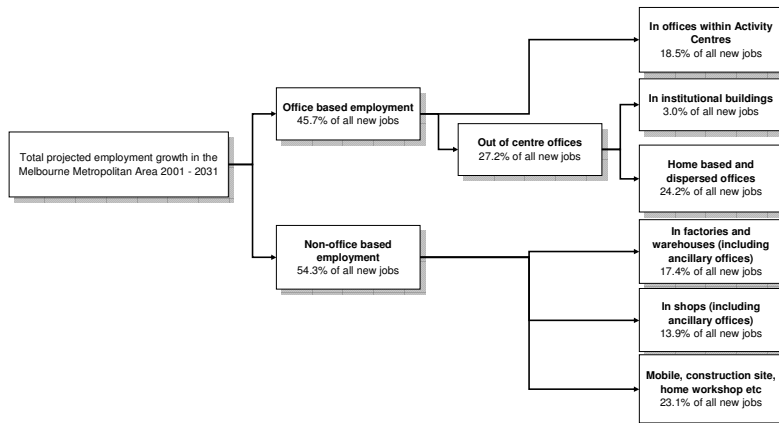
Table 2 Spatial Outworking of Value Chain Unbundling in Manufacturing – Australian Cities

Value Adding Stage in Manufacturing	R&D	Marketing & Market Development	Business Development Strategy	Production	Logistics & Distribution	Sales & Service
Value Adding Functions	Developing product designs; undertaking laboratory / scientific research; lobbying Government; negotiating & establishing research partners	Undertaking research on customer needs, perceptions & trends; analysing the market and competitor environment; designing & implementing advertising & product promotion campaigns	Preparing corporate wide business plans; resolving financial strategies including mergers & acquisitions; negotiating & consolidating strategic alliances; planning & negotiating material sourcing and distribution networks and pathways; aligning corporate H/R & recruitment policies with overall business strategy	Product assembly & packaging; implementing quality assurance systems; trade & production skills development; developing partnerships with component and material suppliers; maintaining statutory workplace compliance; managing industrial relations & workplace agreements; optimising production inventories	Warehousing products; optimising transportation and distribution inventories; product recovery & post sales stewardship of product materials.	Providing after sales service; gathering customer intelligence; administering warranty & loyalty programs
Dominant Occupations in the Value Adding Function	Management consultants; scientists & technicians; engineers (various); industrial designers; policy consultants	Marketing consultants; advertising agents; management consultants; PR consultants; policy consultants	General managers and financial controllers, accountants / financial analysts; merchant bankers / financial brokers; management consultants; patent attorneys; other lawyers; business economists; policy consultants	Production control engineers; plant managers; process / assembly line workers; machinery maintenance technicians; H/R and training specialists	Logistics engineers; drivers; vehicle / machinery maintenance workers; store workers / fork lift drivers; fleet managers	Shop / showroom staff; call centre operatives; ICT support technicians
Occupational Income (weighted average)	Moderate to high	High	High	Low to moderate	Low to moderate	Low
Typical Job Location – Australian Metropolitan Areas	CBD & Inner Urban Region	CBD & Inner Urban Region	CBD	Suburban / non-metro regional	Suburban	Suburban
Vulnerability to Off-shore Outsourcing & Technology Shifts	Moderate	Low	Low	High	Low	Moderate to Low
Scope for Inter-regional and International Export of Value Adding Function	High	High	High	Low	Low	Low

Source, Spiller (2007)

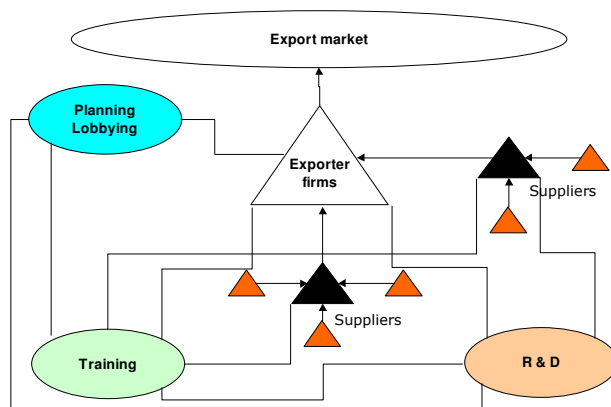
Another important trend emerging from the post industrial economy is the distribution of employment by workplace and the prospect that relatively few jobs will be in centres. SGS has prepared employment projections for Melbourne showing the increase in jobs by the types of workplace; that is, employment in offices versus factories and warehouses, versus shops versus mobile sites etc. Within office based employment, jobs can be located in centres, in institutional buildings or dispersed across other locations. Of the job growth anticipated in Melbourne, 18.5 percent is projected to be located in offices within activity centres (see Figure 4).

These projections of employment types and locations highlight the need for flexible employment zones as well as strong centres to support job growth.

Figure 4 Employment Projections for Melbourne

Source, SGS

The contemporary literature also urges a more nuanced approach to the promotion of 'clusters' as a strategy for enhanced competitiveness. Michael Porter's seminal notion of clusters is, in fact, not particularly well defined in a spatial sense – some 'clusters' like Silicon Valley cover spatial domains of hundreds of kilometres, while others are much more confined, for example, Massachusetts Route 128. Recent evidence suggests that many of the benefits of clustering manifest themselves in **regional** level connections between firms from different sectors bound together by a common interest in a particular export market (Figure 5). Looked at this way, the agglomeration benefits associated with clustering are just as likely to derive from complementary skills and business networking across a metropolitan area as they are from more localised interactions⁴. Regional level clustering is likely to be supported in the poly-centric regional structure as outlined above, rather than prescriptive designation of different parts of the metropolitan geography as suitable for specialisation in particular economic activities / roles.

Figure 5 Industry Cluster Schematic

Source, SGS

⁴ See, in particular, Simmie, J. (2006) Innovation and Clustering in the Globalised International Economy, in Cumbers, A. and MacKinnon, D. (eds) 2006 Clusters in Urban and Regional Development.

We also glean from the literature that the challenge in harnessing the knowledge capital offered by universities and other public sector research institutes is likely to include but range far beyond the commercialisation of university based R&D. Table 3 shows that for Australian firms, the primary sources of innovation ideas are, in fact, internal and market based. Similar patterns are evident from EU innovation surveys⁵. This simply reflects the dominance of organic over strategic leap forms of innovation in these economies.

This urges a more sophisticated approach to the development of technology precincts linked to universities, compared to strategies adopted in the 'first wave' of these policies dating back to the mid 1980's⁶. Technology precincts have a role to play because they can offer an appealing address and a 'university cache', as well as the potential to capture a labour market advantage by virtue of proximity to the university / research institute in question. However, it is vital that these precincts are also planned with strategic access to knowledge intensive business services in mind and, to a lesser extent, production zones (manufacturing and logistics). It is likely that technology precincts will work best when conceptualised as part of a knowledge industry 'corridor' featuring excellent access to CBD services, local executive housing and high quality, vibrant town centres, preferably linked by fast and reliable public transport.

Table 3 Sources of Ideas or Information, 2001-2003 (a), Innovating Businesses by Employment Size

	EMPLOYMENT SIZE(b)			
	5-19	20-99	100 or more	Total
	persons	persons	persons	
	%	%	%	%
.....				
SOURCES(c)				
Internal				
Within this business	78.5	83.2	82.3	80.0
Other parts of a wider enterprise group to which this business belongs	29.3	36.1	52.3	32.7
Market				
Clients or customers	62.5	67.7	70.6	64.5
Suppliers of equipment, materials, components or software	46.5	47.7	49.5	47.0
Consultants (including paid professional advice of all kinds)	^ 26.9	40.5	47.9	32.1
Competitors and other businesses from the same industry	41.9	50.4	43.7	44.4
Institutional				
Universities or other higher education institutes	^ 5.6	^ 11.4	^ 11.0	^ 7.6
Government agencies(d)	^ 8.7	^ 15.0	^ 19.4	^ 11.2
Private non-profit research institutions	** 2.2	* 2.4	* 6.0	* 2.5
Commercial laboratories/research and development enterprises	* 4.9	* 5.0	* 15.5	^ 5.6
Other				
Professional conferences, meetings, fairs and exhibitions	46.7	57.0	61.2	50.5
Web sites, journals	41.7	42.9	49.3	42.5
Other sources of ideas or information	* 3.9	* 3.2	^ 2.1	^ 3.6
.....				
^ estimate has a relative standard error of 10% to less than 25% and should be used with caution * estimate has a relative standard error of 25% to 50% and should be used with caution ** estimate has a relative standard error greater than 50% and is considered too unreliable for general use				
(a) Calendar years. (b) Proportions are of businesses reporting innovation in each employment size category. (c) Businesses could identify more than one source. (d) Includes all levels of government.				

Source ABS 2005

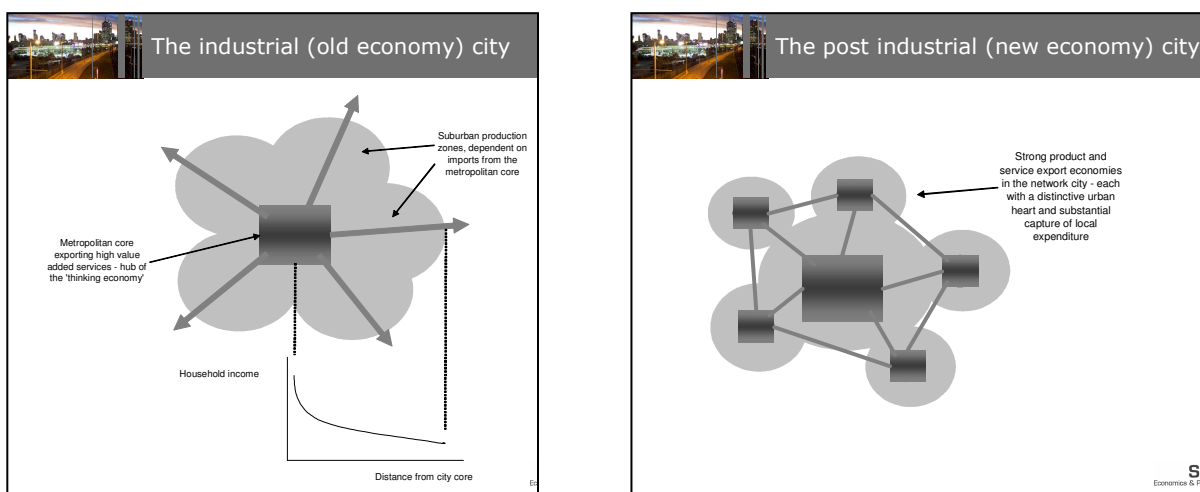
⁵ See Simmie, 2006, Op Cit

⁶ See Blakely, E. (1987) Infrastructure for Technology and Innovation. Department of Industry, Technology and Resources, Victoria, Australia. (Consultancy report prepared in conjunction with Cameron McNamara Pty Ltd)

Bearing in mind both the established findings in the literature regarding the costs of different urban forms, and the emergent conclusions regarding urban form and the propensity for innovation, what would be the 'ideal' spatial structure for a post industrial city like Melbourne?

As alluded to earlier, the literature at the regional level of analysis clearly points to a metropolitan regional structure characterised by strong sub-regional 'CBD's' to ensure that the whole region is keyed to the knowledge economy, not just the urban core (Figure 6).

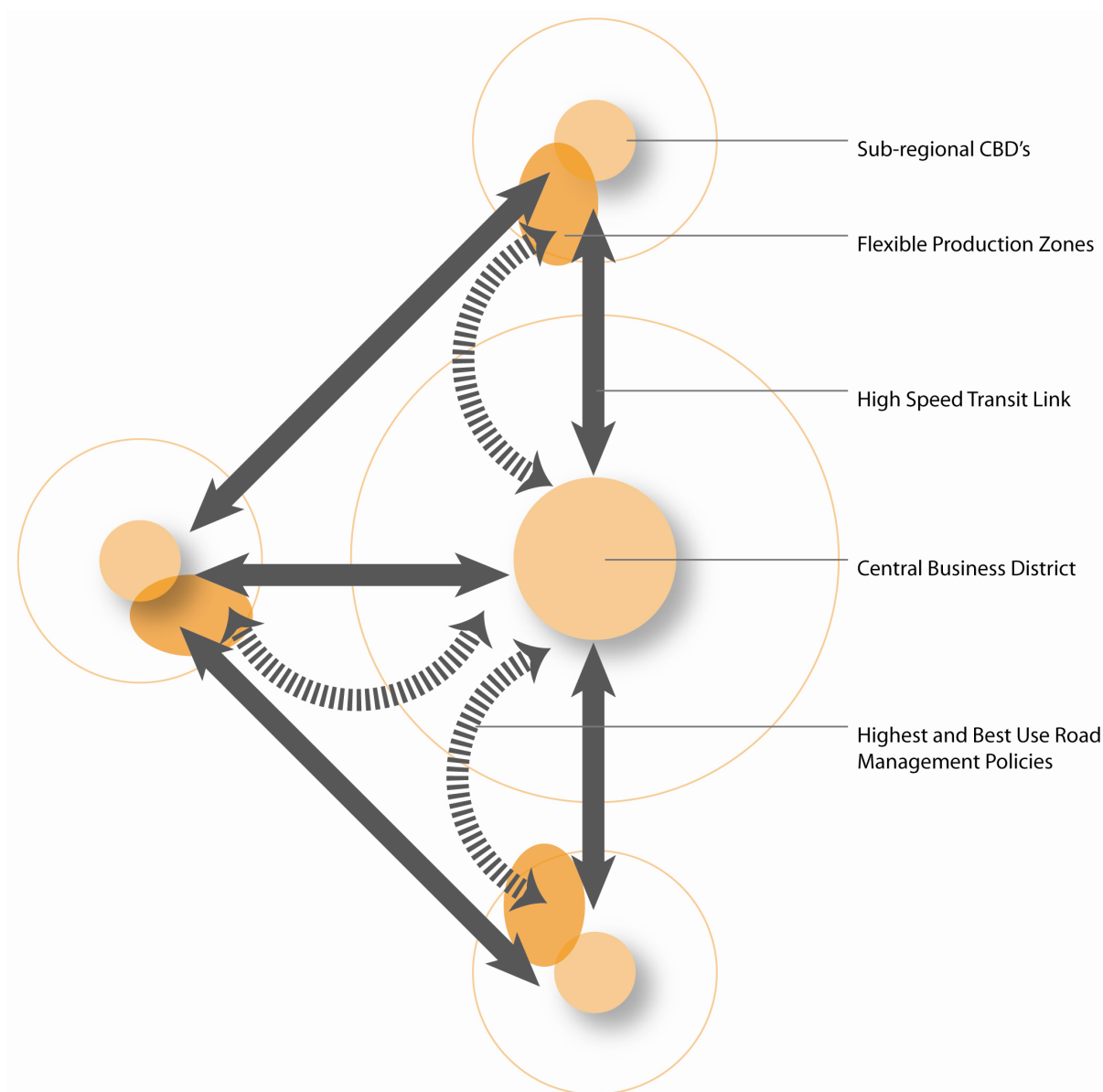
Figure 6 Regional Metropolitan Structure



Source, SGS

Elaborating this broad structure in terms of other messages from the literature, further desirable elements for the spatial structure of the competitive metropolis include:

- The need to link the sub-regional CBD's with quality public transport to ensure that the whole metropolis enjoys maximum accessibility to the regional skills pool;
- The need to optimise road space usage, including through pricing or similar devices to, again, improve access to skills for all points in the Melbourne regional geography, facilitate physical productions flows and contain the exposure of regional businesses to carbon pricing; and
- The need to develop 'employment zones' as opposed to traditional manufacturing, warehousing and commercial typologies which fail to appreciate the unbundling of value chains and the blurring of production and service functions in the economy (see Figure 7).

Figure 7 Elements of Competitive Regional Structure

Source, SGS

Addressing this issue of ideal urban structure from a district or sub-regional perspective, other messages are apparent from the literature:

- The need for a strong metropolitan CBD as an international shopfront for the regional economy and the host for high level cultural and civic institutions and facilities demanded by mobile knowledge workers;
- Strong 'place quality' in suburban activity centres, recognising the growing importance of the public domain – street life and urban character – in the attraction and retention of knowledge workers;

- A diverse housing mix configured to enliven activity centres and to facilitate home based and micro businesses; and
- Strong connectivity to the airport⁷.

⁷ Availability of high capacity broadband could be added to this list, though this is not, strictly speaking an 'urban structure' issue.

6 Is Melbourne Heading in the Right Direction?

To sum up the foregoing analysis, we can postulate a range of 'essential spatial features' of the competitive city, including:

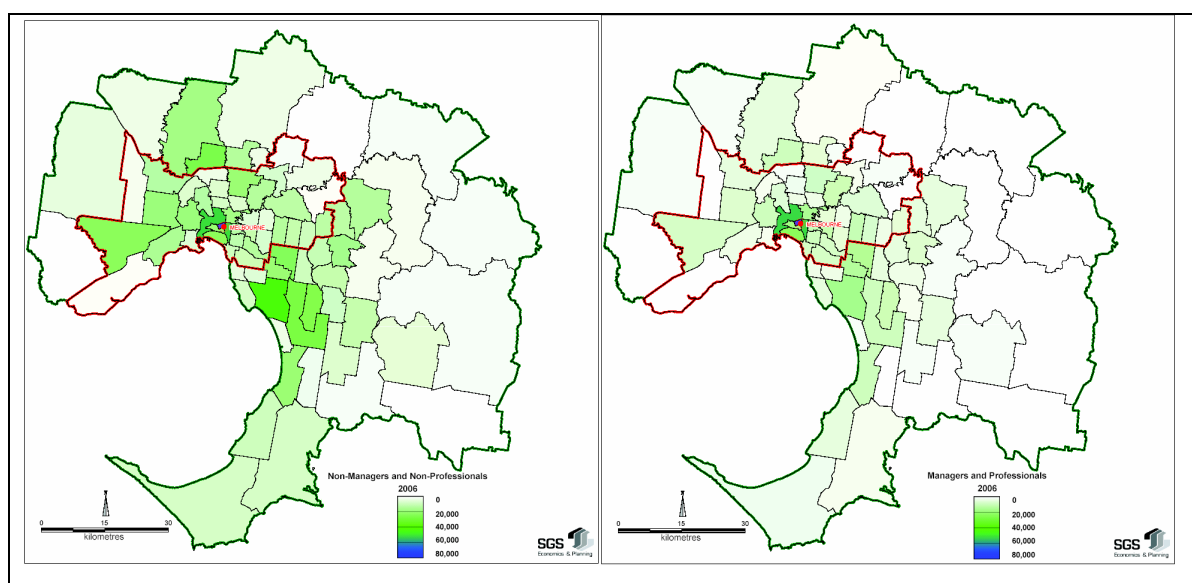
- Strong / vibrant metropolitan CBD
- Strong sub regional CBD's (each servicing populations of approximately 300,000)
- Strong place character in suburban activity centres, supported by mixed use development
- High speed public transport links between CBD's
- Flexible employment zones allowing blending of production, logistics and office uses, but keyed to public transport system
- Employment 'rich' residential areas across the whole metro area, but particular in vicinity of activity centres, to support home based and micro business development
- Efficient use of road capacity through road pricing or similar
- Excellent airport accessibility especially for metro and sub-regional CBD's

We have made a broad brush and an essentially qualitative assessment of how well Melbourne is placed against these parameters versus Sydney and Brisbane (see Table 4). This suggests that all of these cities face challenges in terms of road pricing and the management of 'diffused employment'. The prescriptive approach applied to employment zonings in Melbourne is particularly problematic (and deserving of close attention in the current audit of Melbourne 2030). Airport access is also looming as a longer term issue for Melbourne.

With respect to transforming Melbourne into a strong poly-centric form, there are some signals from the data that the metropolis may not be 'on track'. For example, the occupational structure of jobs in the different parts of Melbourne seems more in line with the emergence of the less than desirable 'two tone city' outlined earlier. Thinking jobs, as proxied by workers in management, administration and professional occupations appear to be tightly clustered in the inner urban region, whilst lower skill jobs dominate in the suburbs (see Figure 8).

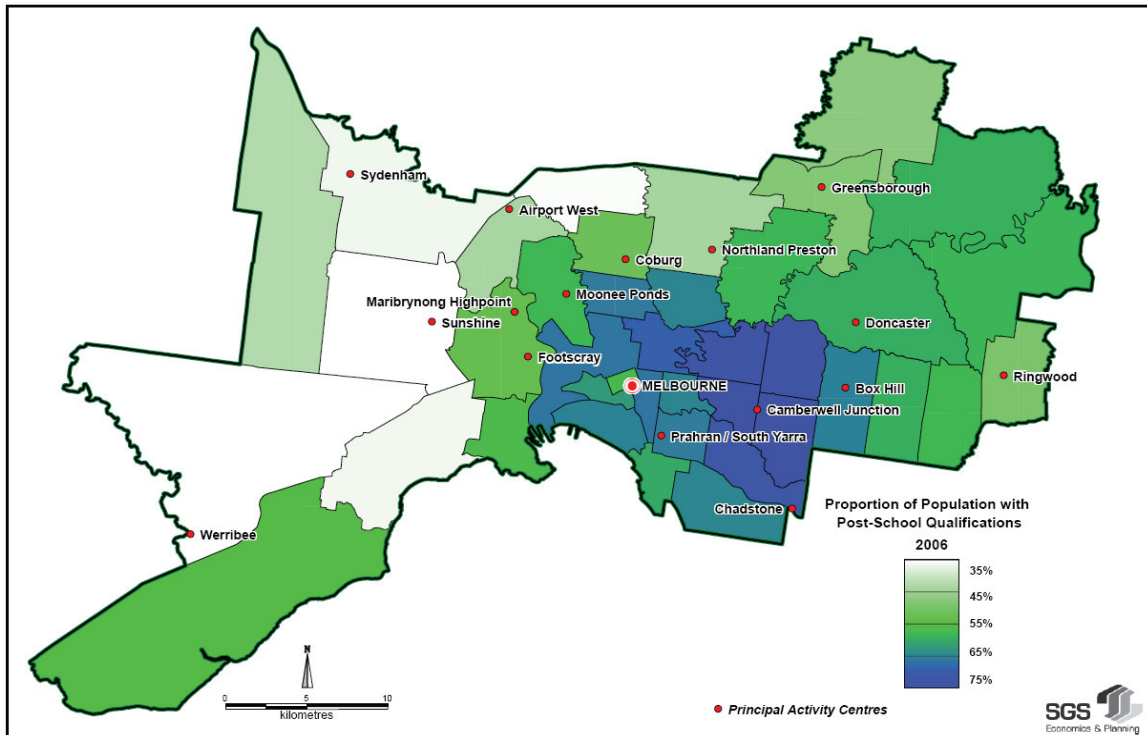
Table 4 Hypothetical Assessment of Selected Australian Cities against the Spatial Pre-requisites for Post Industrial Competitiveness

	Sydney	Melbourne	Brisbane
Strong / vibrant metropolitan CBD	✓✓	✓✓✓	✓
Strong sub regional CBD's (say 1/300,000)	✓✓✓	✓✓	✓
Strong place character in suburban activity centres, supported by mixed use development	✓✓	✓✓✓	✓
High speed public transport links between CBD's	✓✓	✓	✗
Flexible employment zones allowing blending of production, logistics and office uses, but keyed to public transport system	✓✓	✗	✗
Employment rich' residential areas across the whole metro area, but particular in vicinity of activity centres, to support home based and micro business development	✗	✗	✗
Efficient use of road capacity through road pricing or similar	✗	✗	✗
Excellent airport accessibility especially for metro and sub-regional CBD's	✓✓✓	✓	✓✓

Figure 8 Employment by Location, Selected Occupational Categories 2006

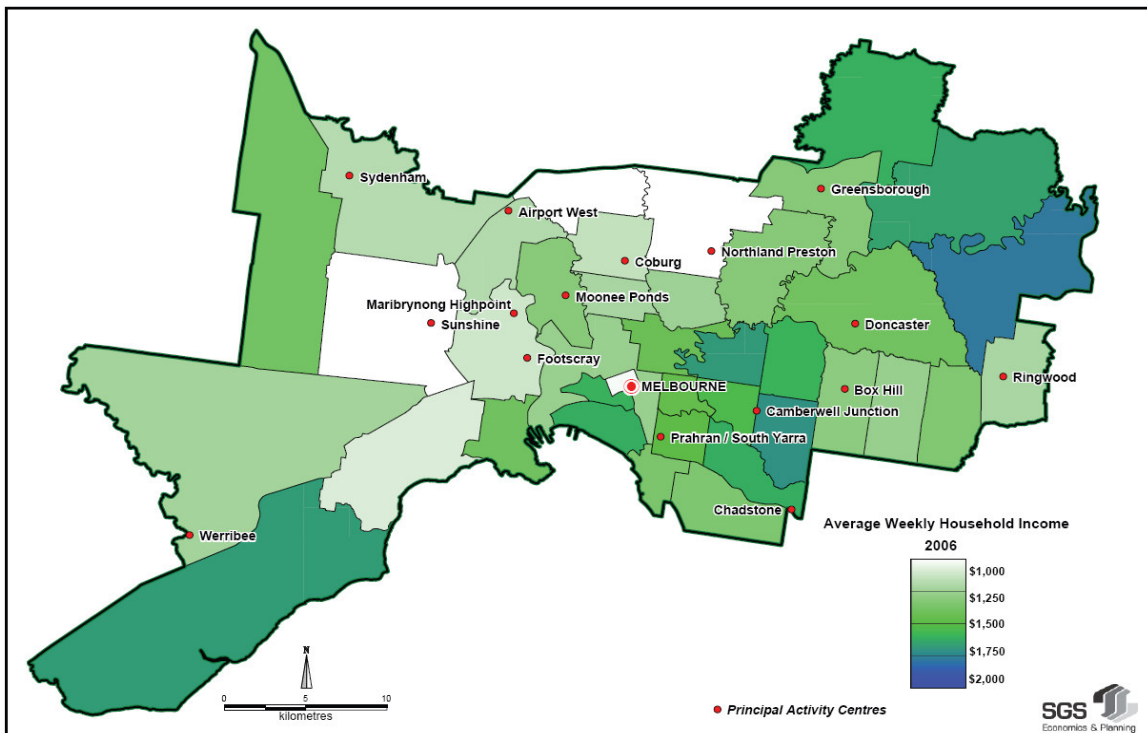
Examining the East West Link 'catchment' more closely, there would also appear to be a persistent divide between eastern and western communities in Melbourne, in terms of educational attainment, income and social advantage/disadvantage as measured by the Australian Bureau of Statistics (see following Figures).

Figure 9 Education Attainment 2006

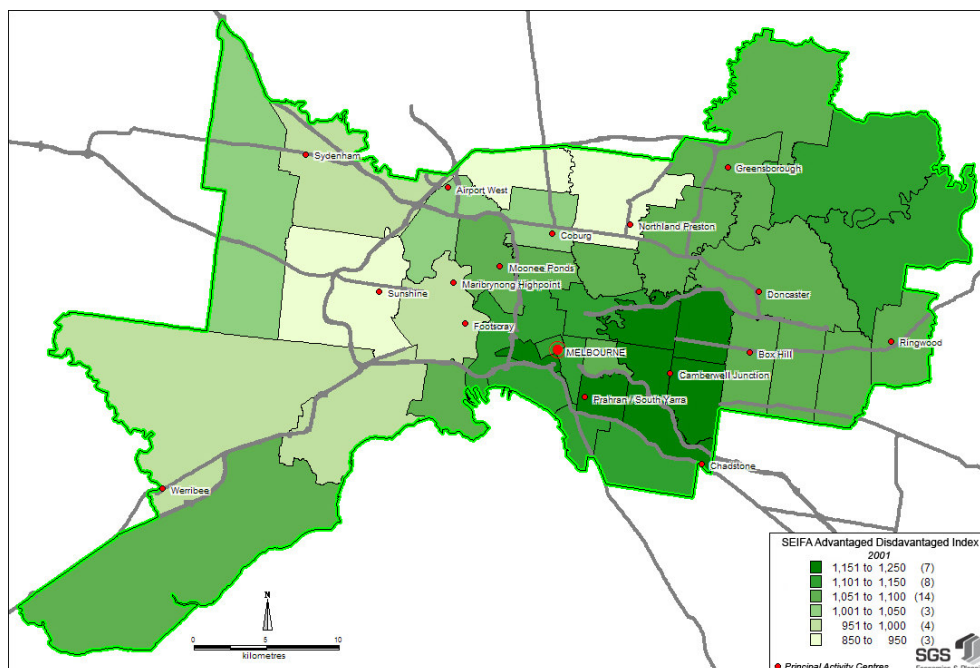


Source: ABS Population and Housing Census (2006)

Figure 10 Weekly Household Income Profile 2006



Source: ABS Population and Housing Census (2006)

Figure 11 Index for Advantage\Disadvantage 2001⁸

Source: ABS SEIFA (2001)

To a large extent Melbourne 2030 aims to deliver an urban structure in keeping with the specification set out in (Table 4). There are, however, some problems with the metropolitan strategy. In zoning details, this planning strategy maintains the traditional separations between office and industrial employment, even though the unbundling of the value chain in the modern economy has blurred these distinctions.

Secondly, it is likely that too many Principal Activity Centres and Transit Cities have been nominated in Melbourne 2030, diluting the capacity to deliver a genuinely poly centric urban form. Available resources and expertise may be spread too thin, though, it must be acknowledged that the Government has appropriately prioritised Dandenong as the 'first among equals' of Transit Cities in eastern Melbourne.

Whilst the policy base for Melbourne's urban structure may be broadly correct, it is clear that delivery of this structure will require further focussed effort, including through the deployment of strategic, city shaping infrastructure.

Figure 12 and Figure 13, which are based on ABS Census data, show the major home to work flow patterns in Melbourne in 2001 and 2006. These point to an emergent poly centric structure in the eastern half of Melbourne. The Government's focus on revitalising Dandenong and the opening of

⁸ At the time of undertaking this report, SEIFA Advantage/ Disadvantage index based on 2006 Census was not available from the ABS.

EastLink will reinforce the 'self-sufficiency' (as distinct from self containment) of this sub-metropolitan Region.

The capacity for such self-sufficiency in the western part of Melbourne is not so evident from these journey to work flows. The region as a whole appears to maintain a strong commuter relationship with the central city. Moreover, it seems that with the exception of Footscray, which realistically forms part of the inner urban economy, the western region lacks major hubs to help articulate a poly centric structure in the same way as Dandenong does in the East.

Figure 12 Melbourne's Movement - 2001

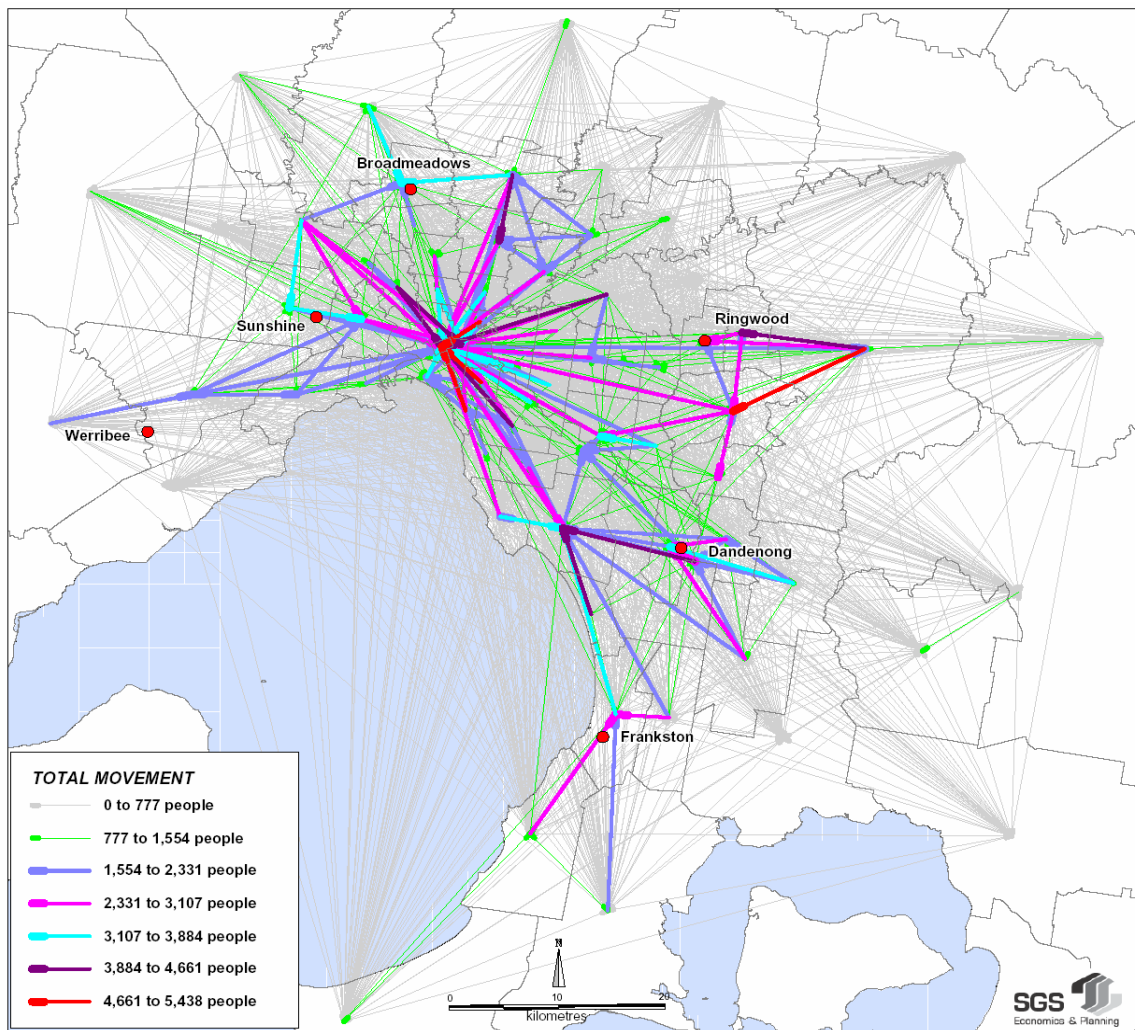
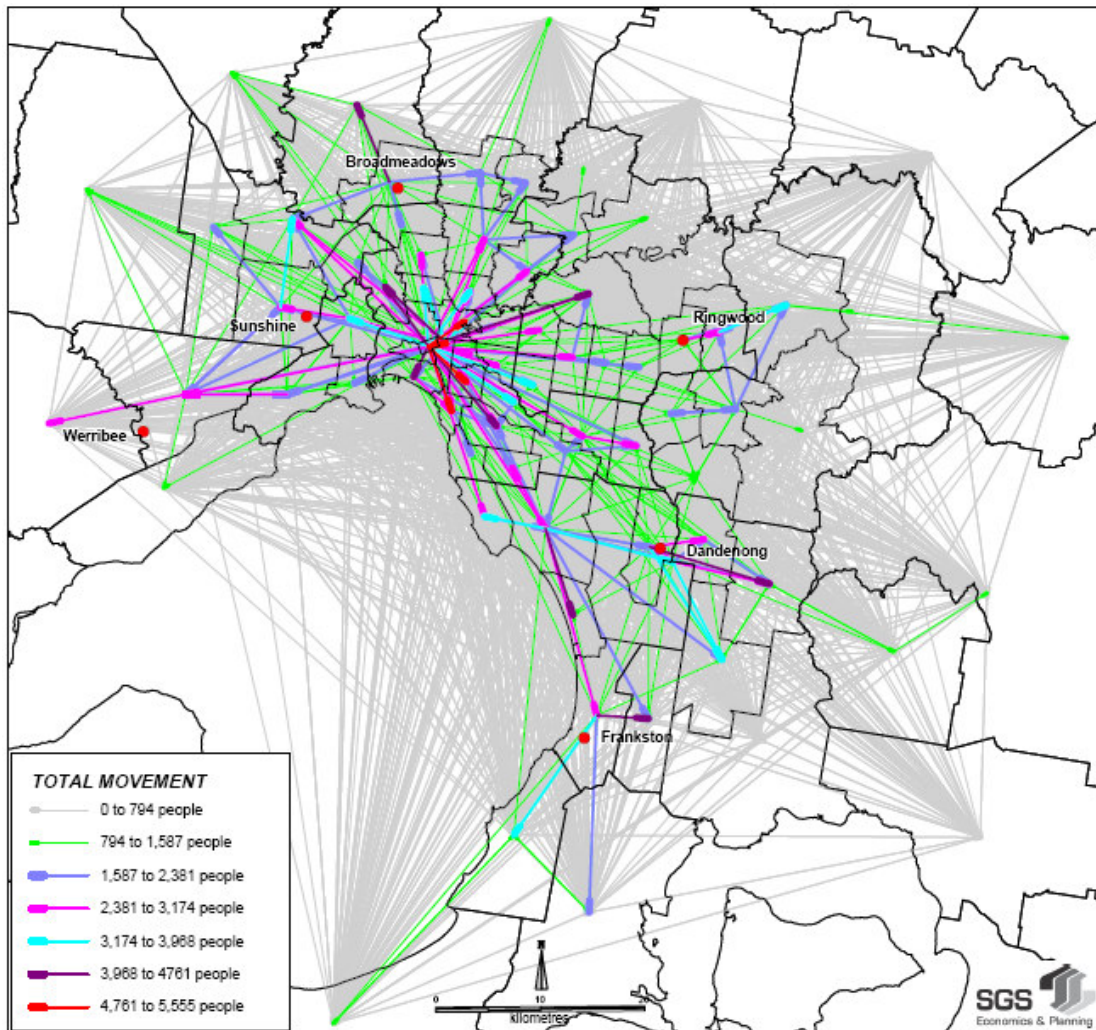


Figure 13 Melbourne's Movement - 2006

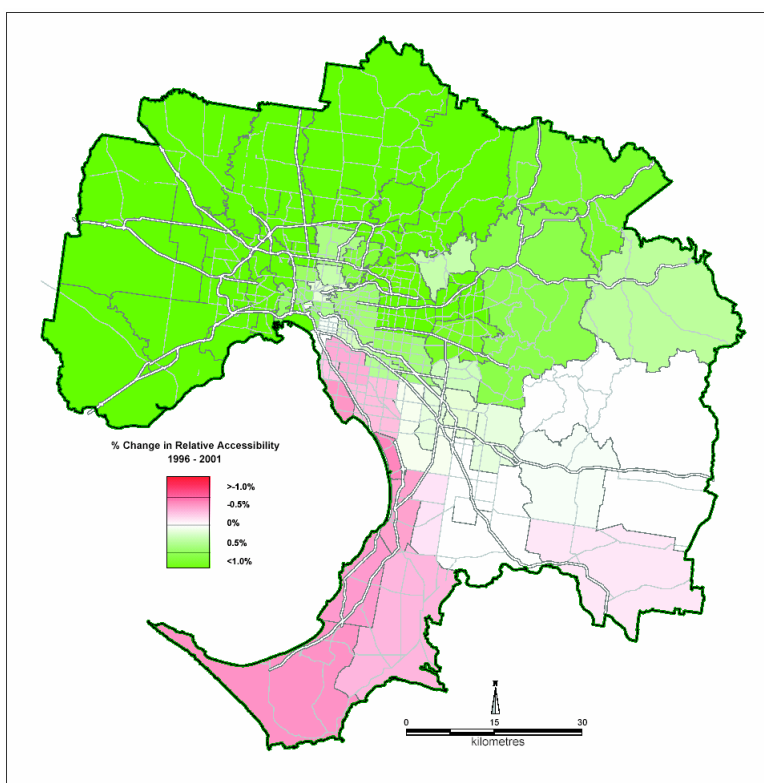
Whilst Melbourne has been a widely reported 'success story' with respect to economic and urban renewal over the past decade, the city is not as well adapted to the post industrial, innovative economy as it might be in a spatial sense. As we have noted, Melbourne is lagging behind Sydney by some margin in Advanced Business Services, and risks the possibility of becoming a 'client state' within the broader national economy. Policies to shore up Melbourne's position as an innovation driven economy require much more than initiatives aimed at technology development and transfer. Appropriate spatial policies are urgently required and must be prosecuted with vigour.

7 'Re-shaping' Metropolitan Melbourne

As discussed in SGS's Phase 1 Report, theory suggests that a city's economic landscape will be reshaped by major transport projects as firms and households move to take advantage of locations offering superior accessibility to skills, production inputs, customers and consumption goods and services. These theoretical predictions are amply borne out by recent experience in Australian cities, particularly with respect to the Western Ring Road, CityLink and Eastlink in Melbourne and Westlink (M7) in Sydney.

SGS has estimated sector specific 'locational elasticity' with respect to changes in the accessibility of a given area. Figure 14 shows the changes in relative accessibility experienced across metropolitan Melbourne between 1996 and 2001, a period during which two major road projects came on stream, namely, the Western Ring Road and CityLink. These investments significantly boosted the relative accessibility of the North Eastern, North Western and Western suburbs, (sparking significant investment in logistics based employment, manufacturing and housing).

Figure 14 Change in Relative Accessibility, %, 1996-01



The results of SGS's analysis of change in employment (and resident population) versus change in accessibility over this period are summarised in Figure 14. The coefficients indicate the magnitude of the effect that each of the independent variables have on the dependent variable. The t-statistics indicate whether the coefficients estimated are statistically significant. The signs of all the coefficients for each of the regression equations are as expected, the examination of the t-statistics suggests that all the variables are statistically significant at 85% level of confidence and

all the regression equations have relatively high adjusted r-squared, indicating that to a large extent the variation in the distribution of employment and housing can be explained by variations in accessibility.

This analysis shows that the sectors which are most sensitive to changes in relative accessibility (or most likely to value improvements in accessibility) are knowledge based industries where 'time is undoubtedly money'. These sectors are led by Property and Business Services.

Table 5 Regression Estimates, Employment by Industry Super Groups and Households

Independent Variable	Dependent Variable	
	Coefficient	T-Statistics
Agriculture, Forestry and Fishing		
Relative Accessibility	-133.877	-2.945
Households	-0.001	-2.155
Adjusted R-Squared	0.856	
Mining		
Relative Accessibility	657.408	22.629
Households	-0.007	-27.636
Adjusted R-Squared	0.788	
Manufacturing		
Relative Accessibility	11,121.740	167.675
Households	0.103	45.432
Adjusted R-Squared	0.971	
Electricity, Gas and Water Supply		
Relative Accessibility	987.991	30.414
Households	-0.008	-29.914
Adjusted R-Squared	0.884	
Construction		
Relative Accessibility	2,192.353	18.183
Households	0.016	9.187
Adjusted R-Squared	0.974	
Wholesale Trade		
Relative Accessibility	6,579.014	17.044
Households	-0.006	-1.222
Adjusted R-Squared	0.787	
Retail Trade		
Relative Accessibility	9,570.861	24.587
Households	0.055	82.751
Adjusted R-Squared	0.959	
Accommodation, Cafes and Restaurants		
Relative Accessibility	14,116.840	8.221
Households	0.097	109.587
Adjusted R-Squared	0.900	

Transport and Storage		
Relative Accessibility	4,509.116	9.913
Households	0.034	276.615
Adjusted R-Squared	0.899	
Communication Services		
Relative Accessibility	-4,610.176	-7.108
Households	0.028	37.521
Adjusted R-Squared	0.799	
Finance and Insurance		
Relative Accessibility	22,349.960	19.005
Households	0.219	21.411
Adjusted R-Squared	0.774	
Property and Business Services		
Relative Accessibility	27,477.650	22.837
Households	0.208	14.834
Adjusted R-Squared	0.908	
Government Administration and Defence		
Relative Accessibility	10,940.970	9.024
Households	-0.105	-7.183
Adjusted R-Squared	0.770	
Education		
Relative Accessibility	26,265.010	15.947
Households	0.090	36.292
Adjusted R-Squared	0.899	
Health and Community Services		
Relative Accessibility	11,112.410	56.792
Households	0.034	18.812
Adjusted R-Squared	0.937	
Cultural and Recreational Services		
Relative Accessibility	4,729.788	27.129
Households	0.034	32.984
Adjusted R-Squared	0.756	
Personal and Other Services		
Relative Accessibility	4,590.718	2.780
Households	0.021	8.488
Adjusted R-Squared	0.998	
Households (Total Occupied Dwellings)		
Relative Accessibility	217,772.200	14.797
Total Employment	0.230	29.516
Adjusted R-Squared	0.900	

Relative accessibility in the analysis is expressed as an index, the value of which ranges from 0 (extreme isolation, a theoretical concept) to 1 (absolute centrality). The regression coefficients therefore provide an indication of the impact that the relative accessibility will have on employment if that Statistical Local Areas (SLAs) accessibility improved from extreme isolation to absolute

centrality. Thus, if a SLA's relative accessibility improves from 0 to 1, employment in Property and Business Services in that SLA for example will increase by around 27,400.

SGS's findings are reinforced by recent UK studies which have focussed on the link between productivity and agglomeration. An analysis by Graham (2007) relates productivity at the firm level to the 'relative density' of the firm's host ward (of which there are some 10,780 in the UK). The 'relative density' index captures both employment concentration within the host ward plus the ward's access, measured in travel distance or generalised travel cost, to employment in all other wards in the country. Thus, agglomeration is appropriately defined in terms of an area's **accessibility** to services, labour and other businesses.

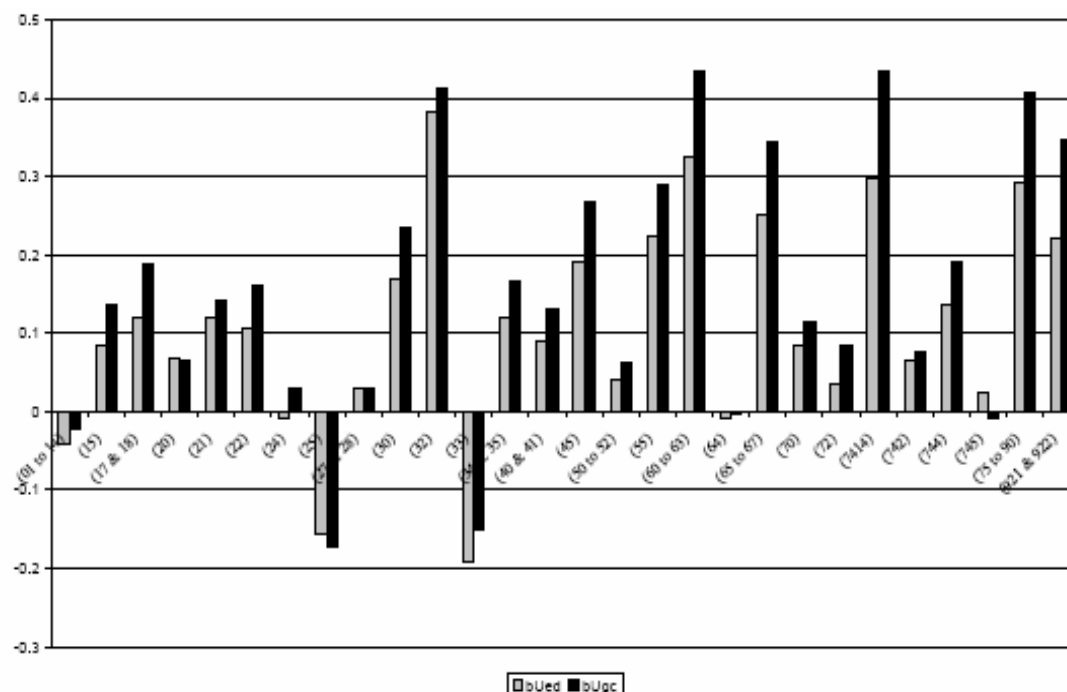
Graham (2007) found that elasticities with respect to agglomeration measured using simple travel distance were strongest for knowledge intensive forms of services and manufacturing (see Table 6). When travel time and operating costs were taken into account in the agglomeration index, this pattern of relatively strong productivity elasticities for knowledge based enterprises was accentuated (Figure 15), an outcome which resonates with SGS's analysis of relative accessibility.

Table 6 Estimated Elasticities of Productivity with respect to Agglomeration (Graham, 2007)

<i>Industry</i>	<i>SIC codes</i>	<i>elasticity</i>
Primary	SIC 01 to 14	-0.042
Food manufacture	SIC 15	0.084**
Manu. of Textiles	SIC 17 & 18	0.121
Manu. of wood & wood products	SIC 20	0.069*
Manu. of paper & paper products	SIC 21	0.121
Publishing & printing	SIC 22	0.105**
Manu. of chemicals	SIC 24	-0.008
Manu. of rubber & plastics	SIC 25	-0.155**
Manu. of metals & metal products	SIC 27 & 28	0.030
Manu. of office machinery & equip	SIC 30	0.168
Manu. of radio, TV & communications	SIC 32	0.382**
Manu. of medical & precision equip.	SIC 33	-0.191**
Manu. of motor vehicles	SIC 34 & 35	0.121
Electricity, gas and water	SIC 40 & 41	0.090
Construction	SIC 45	0.191**
Wholesale & retail	SIC 50 to 52	0.041**
Hotels & restaurants	SIC 55	0.224**
Transport services	SIC 60 to 63	0.325**
Post & telecommunications	SIC 64	-0.008
Finance & insurance	SIC 65 to 67	0.251**
Real estate	SIC 70	0.084**
IT services	SIC 72	0.034*
Business & management consultancy	SIC 7414	0.298**
Architecture & engineering	SIC 742	0.066**
Advertising	SIC 744	0.137**
Labour recruitment / personnel	SIC 745	0.023
Public admin, education & health	SIC 75 to 90	0.292**
Media services	SIC 921 & 922	0.222**

Note: ** - significant at 0.01, * - significant at 0.05

Figure 15 Comparison of Effective Density Elasticities Based on Distance (BUed) and Generalised Cost (BUgc) – Graham, 2007



1. SICs 01 to 14 – Primary industries - agriculture, hunting, forestry, fishing, mining, and extraction
2. SIC 15 - Manufacture of food products and beverages
3. SICs 17 & 18 - Manufacture of textiles, wearing apparel, dyeing and dressing of fur
4. SIC 20 - Manufacture of wood and wood products
5. SIC 21 - Manufacture of pulp, paper and paper products
6. SIC 22 - Publishing, printing and reproduction of recorded media)
7. SIC 24 - Manufacture of chemical and chemical products
8. SIC 25 - Manufacture of rubber and plastic products
9. SICs 27 & 28 - Manufacture of basic metals and fabricated metal products
10. SIC 30 - Manufacture of office machinery and computers
11. SIC 32 - Manufacture of radio, television and communication equipment
12. SIC 33 - Manufacture of medical, precision & optical instruments, watches & clocks
13. SICs 34 & 35 - Manufacture of motor vehicles and transport equipment
14. SICs 40 & 41 - Electricity, gas and water
15. SIC 45 – construction
16. SICs 50, 51 & 52 – Wholesale and retail trades
17. SIC 55 – Hotels and restaurants
18. SICs 60, 61, 62 & 63 – Land, water, air transport and supporting services
19. SIC 64 – Post and telecommunications
20. SICs 65, 66, 67 - Finance & insurance
21. SIC 70 - Real estate activities
22. SIC 72 - Computer and related activities (IT services)
23. SIC 7414 - Business and management consultancy activities
24. SIC 742 - Architecture and engineering activities
25. SIC 744 - Advertising
26. SIC 745 - Labour recruitment and provision of personnel
27. SICs 75 to 90 – Public administration, education, health, & social work
28. SICs 921 & 922 - Motion picture and video activities, radio and television

Unfortunately, readily accessible data sources in Australia are not sufficient to support direct replication of the Graham (2007) analysis. However, SGS has developed a similar measure of agglomeration/clustering using the following effective density calculation:

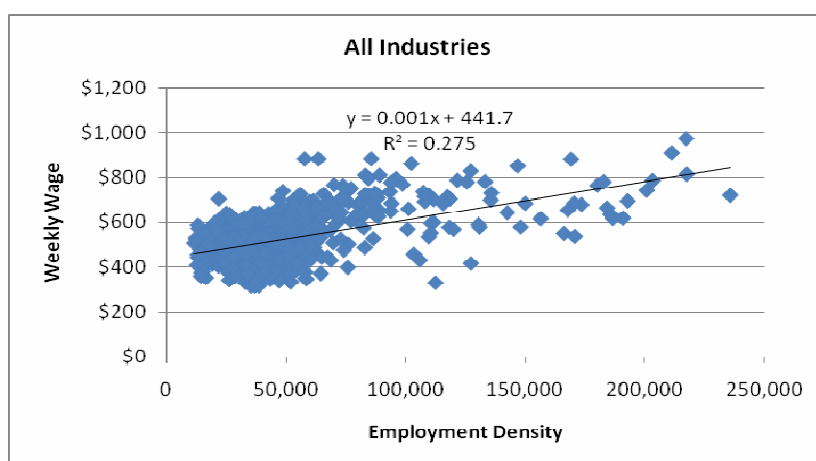
$$U_i = \frac{E_i}{r_i} + \sum_j^{i \neq j} \left[\frac{E_j}{d_{ij}} \right]$$

where E_i is total employment in area i , r_i is an estimate average travel time of trips in that travel zone, E_j is total employment in area j , and d_{ij} is the average travel time between area i and area j .

The relationship between agglomeration/clustering and productivity is depicted in the scatter plot below for the Melbourne Statistical Division (SD). The y axis provides the average wage or labour productivity of residents living in various travel zones in the Melbourne SD, while the x axis details the level of agglomeration/clustering as measured through the area's effective density. Data on jobs, travel times, average wage were obtained from ABS journey to work 2001 data. While jobs data and travel time were available for various travel zones in Melbourne, wage data was not. ABS CCD data was hence necessarily aggregated to form approximate travel zones.

This, admittedly crude, analysis confirms a positive link between agglomeration and productivity.

Figure 16 Agglomeration/Clustering and Productivity



Source: ABS Census 2001, DOI Melbourne Intergrated Transport Model 2006, SGS Calculations

In this context, major infrastructure investments like EastLink can be expected to have a dramatic effect on both urban structure and productivity. This is borne out by anticipated changes in the 'job catchments' of the Transit Cities in the eastern metropolitan area. Using DoI travel time matrices for 2006 and 2011 (the latter being after EastLink opens) and 2001 Census figures for jobs by location, SGS estimates that the number of jobs (a proxy for firms) accessible from Ringwood Transit City within a 30 minute drive will increase by some 67% to almost 350,000, without allowing for any growth in the employment base of eastern Melbourne⁹. Dandenong would enjoy a 75% increase in its jobs catchment, to almost 380,000 jobs (on 2001 Census data).

⁹ To put this in perspective, 350,000 jobs is equivalent to 80% of Adelaide's employment base.

These shifts signify a major lift in defacto agglomeration and therefore productivity potential. Places like Ringwood and Dandenong can be expected to become much more attractive to higher order services and, accordingly, will play a stronger role in boosting wealth creation in their host region.

**Table 7 Job Catchments – 30 Minutes Drive – Melbourne's Transit Cities
2006 and 2011**

	Number of jobs within 30 minutes drive - 2006	Number of jobs within 30 minutes drive - 2011	% change 2006 - 2011
Box Hill	430,602	505,543	17%
Broadmeadows	164,088	168,975	3%
Dandenong	216,532	378,260	75%
Epping	135,057	141,039	4%
Footscray	573,854	654,102	14%
Frankston	72,088	92,617	28%
Ringwood	208,162	347,898	67%
Sydenham	25,007	26,271	5%
Werribee	58,201	47,003	-19%

Source SGS calculations, 2001 Journey to Work data, DoI Travel Time Matrices

8 Role of the East West Link

The analysis in this paper underscores the need for a 'pro-active policy' framework for appraising the need for an East West link, and if it is needed, the form that it should take. This complements the more traditional approach which seeks to 'predict' the future pattern of movement needs and then 'provide' a solution.

The 'pro-active policy' approach enquires as to what sort of transport future Melbourne wants, then probes on the infrastructure investments and other policy initiatives necessary to bring this about. This approach emphasises land use and transport integration as opposed to seeing the transport network as simply 'serving' patterns of land use and economic activity which are driven by exogenous factors.

Under the pro-active policy framework, the key issue is less about where (worthwhile) travel demand might be constrained in the future, necessitating some form of transport solution, and more about where the community might want to create new or stronger travel connections in the interests of a more socially, environmentally and economically sustainable city. This alternative approach may direct research effort towards quite different 'solutions'. For example, the community may want to improve east west links in Melbourne, not because there is evidence that expressed demand, now or in the future, is constrained, but because it anticipates collateral benefits in land use adjustments, economic performance and social functioning.

The Western Ring Road, in part, exemplifies this alternative approach. Arguably, this link was not the highest priority project at the time it was commenced, based on travel desire lines and anticipated congestion levels. Part of the reason why it was elevated in priorities may have simply related to its 'buildability' (availability of a reservation in a largely constraint free environment) rather than its capacity to address urgent or strategic transport needs. However, the construction of this road, together with CityLink, has, arguably, 'reshaped' the pattern of urban growth in Melbourne for the better and established new interactions which are unlikely to have been anticipated at the time the Western Ring Road was being contemplated as an investment opportunity.

In evaluating investments with city shaping power, as an East West Link might potentially have, a 'future making' philosophy needs to be applied. By 'future making' we mean that careful attention needs to be given to how Melbourne (and Victoria) will 'earn a living' over the next 50 years or so. Looking back, one can distinguish distinct eras characterised by shifts in prosperity drivers, be they the Gold Rush, the pastoral boom, protectionist manufacturing and the post War boom. It is important to analyse what the drivers will be going forward and, if there are choices to be made between different drivers, to harness the Melbourne and Victoria economies to those which offer the best prospects of triple bottom line sustainability.

Melbourne's and Victoria's future lies in the innovation economy. This paper has argued that achievement of a knowledge based economy requires a strong spatial policy focus, as well as appropriate industry and technology development initiatives. More specifically, Melbourne's spatial structure needs to be steered towards a network city configuration featuring:

- A strong / vibrant metropolitan CBD
- Strong sub regional CBD's (each servicing populations of approximately 300,000)
- Strong place character in suburban activity centres, supported by mixed use development
- High speed public transport links between CBD's
- Flexible employment zones allowing blending of production, logistics and office uses, but keyed to public transport system
- Employment rich' residential areas across the whole metro area, but particular in vicinity of activity centres, to support home based and micro business development
- Efficient use of road capacity through road pricing or similar
- Excellent airport accessibility especially for metro and sub-regional CBD's

Different options for an East West link could significantly advance (or impede) Melbourne's progress towards these objectives. For example, any option which enables 'traffic calming' in the Alexandra Parade – Princess Street corridor offers the opportunity to remedy a long standing (adverse) legacy of Melbourne's former role as a pre-eminent centre of 'Fordist' production. This was dominated by rapid suburbanisation, auto dependence and the construction of freeway networks. As the portal to the Eastern Freeway, Princes Street / Alexandra Parade continue to divide the inner northern suburbs. These have otherwise witnessed a remarkable transformation over the past 30 years, from slightly down at heel refuges for migrants, students and bohemians, to a key node in the knowledge economy. Removing the traffic sewer running through these suburbs would enable consolidation of this area for mixed use development, drawing on the key advantage of proximity to business services in the CBD and Melbourne's major cluster of universities and research institutions. Merely providing more high amenity housing for knowledge workers in this part of the city would improve competitiveness under the model we have outlined.

Similar points about improving competitiveness by curbing adverse amenity impacts can be made in respect of freight flows through the inner western suburbs to the port.

As a prospective 'poly nucleated' metropolis, it appears that Melbourne currently suffers a significant East West divide and a drift towards a 'two tone' metropolitan structure. Aside from the social justice issues which this raises, the divide harms Victoria's competitiveness through unnecessary segmentation in the labour market and lost opportunities for stronger western Melbourne businesses, due to diminished access to Advanced Business Services in the metropolitan core and inner eastern suburbs. Ideally, an East West Transport Link should both facilitate movements between these two parts of Melbourne and strengthen the relative accessibility of one or two key nodes in the West so that this sub-region may develop a stronger structure of centres to host knowledge based production.

To the extent that the East West transport link offers an opportunity to improve the functionality of metropolitan Melbourne's wider commuter rail system, this should strengthen the relative accessibility of key nodes on that network, including the designated Transit Cities. Based on the profile of the competitive post industrial city, this aspect of the East West Link's potential effects should be given extra weight in the assessment of options.

The Melbourne 2030 vision is broadly consistent with the prescription for the sustainably prosperous, post industrial city, albeit that some refinements to the policy framework are

warranted. Thus, a key question which must be asked of any East West Link option is '*to what extent does the urban shaping power of the option in question help or hinder the achievement of the Melbourne 2030 vision?*'

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Appendix A: Urban Structure and Economic Performance – A Literature Review

Introduction

Empirically, the relationship between urban form and economic productivity is unclear. In fact, the academic literature does not often attempt to explicitly test the connection. In the past, research has tended to focus on the connection between city size and economic performance, rather than urban form. More recently, researchers have begun to consider the benefits, economic and otherwise, that stem from the various ways of managing and developing the urban form. Research done by Cervero found that 'the urban form and mobility characteristics of metropolitan areas have some bearing on economic performance, as theorised by Prud'homme and others. Specifically, urban size, proximity of co-dependent activities and commuting speeds appear to 'matter'. All else being equal, bigger areas with large labour sheds, good accessibility between jobs and housing, and well functioning transport systems appear to enjoy some economic advantages' (p. 1668).

From this more recent literature several streams of debate are highly relevant, including those that:

- Articulate how autocentric cities waste an enormous amount of resources in their every day operation and growth;
- Examine the links between urban growth management and economic performance;
- benefits of urban containment and contiguous development;
- Describe how congestion costs affect the productivity of firms within cities;
- Describe the effect of inefficient land use patterns;
- Link environmental considerations within cities with their ability to attract and retain knowledge workers and, in doing so, position themselves for global competitiveness; and
- Consider the cost savings related to health and the environment.

Defining Economic Performance

It is important that a definition of economic performance is provided at the outset. The definition adopted depends primarily on the economic space under consideration, as well as the difference between economic growth and productivity. The second of these is straightforward enough; growth describes the production of more output from a given rate of inputs, i.e. assuming the production processes remain unchanged. On the other hand, improved productivity relates to the more efficient use of resources to produce a given quantity of output. The two concepts intercept at the competitiveness of production, i.e. a more productive firm in a competitive market can offer goods and/or services at a lower price and, in doing so, increase its share of the market (output).

Economic space is important to the extent that it reflects the distribution of production activities. For example, all else being equal, if firms shift from the regional area into the city, the region does not experience economic growth. However, the city, as an economic space, does. Furthermore, agglomeration theory suggests that if productive activities concentrate together there are synergies that improve productivity.

Urban Management

Urban growth management is becoming increasingly important as Western cities grow in population terms, whilst striving to improve sustainability, global competition and liveability. Nelson and Peterman (2000) pose the idea that growth management improves economic performance relative to the status quo. They conducted a study that found empirical evidence of the relationship between growth management tools and economic performance from 182 US metropolitan areas, 26 of which had growth management programmes in place since 1982. The authors statistically showed that policies like urban growth boundaries and building caps are positively associated with economic performance. From their regression analysis they find that

'Growth management programs used by one or more local governments within moderate-sized metropolitan areas appear to be having a beneficial impact on the economy of their communities, and future work needs to focus on determining the nature of their impact' (Nelson and Peterman 2000 p. 284).

More importantly they advocate the benefits of incorporating growth management into long term economic development strategies. According to Nelson and Peterman 'This view of growth management is based on the theory that the physical form of a community influences the quality of life in that community' (2000, p. 280). Quality of life, in this sense, refers to how much it costs a person to live there. Some of these costs are direct out-of-pocket expenses to residents: the costs of utilities, their local tax rate, and so forth. Other costs are less directly measurable: the amount of time spent commuting to work, the harm to health from air pollution (Nelson and Peterman, 2000, p. 280).

Using case study analysis the Urban Policy Program (UPP) at Griffith University (2003) also produced several convincing conclusions on the importance of (and benefits associated with) comprehensive metropolitan strategies (compared to continuing trends). For example, in South East Queensland, "Annual savings generated...were calculated at \$20 million in local government roads and water expenditure, \$40 million in state education expenditure, \$70 million from reduced road congestion and \$2 million in direct health costs" (Department of Local Government and Planning 2003, p. 40).

The economic benefits related to various methods of urban growth management are discussed in greater detail in the following sections.

Urban Containment

Methods of urban containment, such as urban growth boundaries, are considered some of the most effective growth management strategies. Frank (1989) demonstrates quite conclusively that contiguous development patterns, combined with facility pricing sensitive to real costs, results in more efficient delivery of publicly provided goods and services. There is also evidence to suggest that urban containment reduces development costs and improves agricultural productivity (Nelson et al, 1995). Furthermore, modelling done by Rickaby (1987) shows that highly compact urban areas consume the least energy.

The UPP (2003) reviewed the Cost of Sprawl study by Burchell et al (2002) from the United States which compared 'controlled growth' versus 'uncontrolled growth' in 3,100 counties, including 2,100 with little or no growth, 750 where 'sprawl' accounted for most growth, and 250 defined as 'urban centres'. The general finding was that the 'controlled growth' scenario was far more cost effective, including: '4 million fewer acres being developed; savings of US \$126.2 billion to local government in terms of infrastructure and service costs; savings of US \$420 billion in real estate development costs; 50 million fewer miles driven; and savings of US \$24 billion in personal travel costs' (UPP 2003, p. 35).

Outward metropolitan expansion requires provision of significant capital works. This includes the expansion of services geographically into new growth areas and linking infrastructure with the established infrastructure network. Such services include roads, rail, water and sewerage, open space and storm water drainage, energy and telecommunications. This network based infrastructure is rolled out with significant excess capacity engineered up-front and urban form will significantly affect delivery costs, as demands from 'infill' development will soak up excess capacity and will avoid network infrastructure extensions necessary from 'greenfield' development.

More compact cities make more efficient use of urban land and leave non-urban land on the fringe of the city to be maintained for other uses, by they agriculture, horticulture, protection and management of areas of environmental, cultural or heritage significance or some other productive usage. Research done by SGS (2006) on the benefits of the Melbourne 2030 metropolitan strategy indicates that the economic value of this land saving can best be measured by the land's current market value.

Auto-Centric Development

- A study by Kenworthy and Laube (1999, p. 632) suggests that cities with sprawling, autocentric landscapes are poor economic performers. In fact, this study found that gross regional product per capita was generally higher in less auto-dependent cities.
- Cervero (2001, p. 1652) postulates that, all else being equal, "large cities that are compact and that enjoy good accessibility matched by efficient transport infrastructure (i.e. good mobility) are among the most productive of all urban settlements".

- Prud'homme and Lee (1999) who found that the elasticity between commuting speeds and labour productivity to be around +0.30. In doing so, this research suggests that spatial planning and good transport infrastructure meaningfully increase the economic output of the city.
- To add to the literature, Cervero (2001) conducted two separate empirical analyses – one at the macro level, based on cross-comparisons among 47 US metropolitan area; and the other at a more micro scale, based on cross-comparisons among 'super-districts' in the San Francisco Bay Area. Cervero (2002, p. 1668) concludes that: '...urban size, proximity of co-dependent activities and commuting speeds appear to 'matter'. All else being equal, bigger areas with large laboursheds, good accessibility between jobs and housing, and well functioning transport systems appear to enjoy some economic advantages. While from a statistical standpoint, the relationships uncovered in this research were not terribly strong; the findings were sufficiently suggestive to warrant more in-depth empirical investigation...'
- Furthermore, in major cities there are strong links between the levels of accessibility to the CBD and levels of unemployment. Poor accessibility and high travel costs are often cited as a barrier to entering full time work and impact on people's ability to earn an income. Residential areas that are located away from the major public transport network, and without direct access to the CBD, have fewer employment opportunities within reasonable travel distances. This results in a labour force that is disconnected from potential employment.
- Efficiency derives from the co-location of housing and employment growth – i.e. the jobs-housing balance – which can lower commuting costs and in turn increase labour productivity (Cervero 1996, Kain 1993). Cervero believes that 'Efficient transport – and, in particular, good integration of regional infrastructure and urban settlements – enhance mobility, which can help to offset the effects of poor accessibility' (p. 1652).

Clustering

Cities are the focal point for industry clusters in emerging industries such as information technology and other digital technologies, especially the multi-media and creative industries. Being part of a cluster allows companies to operate more productively in sourcing inputs; accessing information technology, coordinating with related companies; and measuring and motivating improvements (Cervero 2001). This clustering is important to business and regional competitiveness and has been reinforced by commentators such as Porter (1990) and Florida (2000).

Advanced Business Services are tightly clustered in the inner urban regions of Australia's Capital Cities. This is an outworking of the locational preferences of knowledge workers or the 'creative class' – groups in the labour market who crave the vibrancy and diversity of these regions. Thus, maintaining the liveability, diversity and cultural attractiveness of the inner cities (in other words their 'sustainable development') is not only desirable for its

own sake, it will contribute in profound ways to the ability of the economy to create competitive advantage and build productivity through innovation.

Activity Centres

Activity centre planning stems from the theory of cluster development. Rather than dispersing activity, social, economic and environmental benefits can be realised for the community from greater co-location. These are (important) local benefits. Property networked activity centres can also contribute to the development of regional economic clusters. That is, the mix of businesses, research and training institutions, government agencies, workers and community groups who together (either directly or indirectly) share a common purpose in gaining, holding and expanding the export income.

In Activity centres it is the relationship between residential areas and local employment opportunities, the accessibility of 'advanced business services' to commercial and industrial enterprises and the levels of accessibility (or congestion) on major commuter and freight transportation routes will have significant bearing on commercial connectivity and the 'cost of doing business'.

Further Economic Benefits of Urban Management

Reduced Congestion

In general, congestion delays can affect productivity in three ways: by increasing business costs of current delivery operations, by limiting or reducing business sales through a reduction in effective market size, and by increasing unit costs through loss of opportunities for scale economies in production and delivery processes.

Market scale and accessibility

NCHRP (2001, p. 25) summarises the research into market scale and accessibility costs as follows:

"The importance of this literature is that it implies that congestion along specific routes...can have an important spatial location characteristic insofar as it can affect the size of the market reach for businesses. With better accessibility, businesses can potentially realise economies of scale in serving broader markets. In addition, highway systems [and other transport infrastructure] improvements can also provide businesses with access to a greater variety of specialised labour skills and specialised input products, which can help them become more productive (Evers et al 1988).

Wage rate increments

Congestion raises business costs through increased labour costs demanded by workers in compensation for lengthened commuting times. The most complete empirical analysis that combines information on housing prices, wages and commuting travel times was conducted by Zax (1991). Zax's findings "strongly confirmed that employers paid high wages to compensate for higher commuter travelling times... Zax interpreted the commuting time wage differential as reflecting not only the incremental value of time spent on commuting but also the value of additional out-of-pocket expense, lost leisure time, and added commuting hassle" (NCHRP 2001, p. 26).

A recent Roundtable convened by the European Conference of Ministers of Transport (ECMT) examined some of the benefits of reduced congestion. They concluded that while the relationship between economic development and transport is obviously complex and varies across regions, the relationship between travel speed and urban sprawl is often intertwined. As a result, economic productivity considerations must be informed by analyses of both the impact of transport systems and the spatial organisation of economic activities (ref).

Reduced Environment & Health Costs

Urban living accounts for substantial health costs in Australia. Modest increases in physical activity, from less sedentary lifestyles, where public transport, walking and cycling (active transport) choices encourage incidental activity, can reduce the need for medical treatment in those at risk of diabetes. The way in which cities are structured, along with the infrastructure and services, can impact on the opportunity for people to use active transport.

Other urban health issues include air pollution, water quality and noise pollution. The CSIRO estimates that the human health cost of air pollution is between A \$3 billion and A \$5.3 billion every year, and annual damage to materials, property and buildings is between A \$3 billion and A \$5 billion – one per cent of gross domestic product (GDP). Improved management of urban transport systems and its externalities could have a significant role in containing the future demands on the health system. As a focal point of public transport systems and the pre-eminent locations of cultural and recreational activities, the central cities can act as catalysts for more active lifestyles.

Some commentators believe that environmental protection regulations reduce economic growth; however they tend to ignore the costs imposed by a polluted environment, costs that are not so apparent because they are not directly linked to their cause. For example, having to repaint ones house more often due to pollution or increased medical bills from breathing contaminated air.

Improved Regional Competitiveness

Newman (1995, p. 14) takes the next step of linking metropolitan environments and accessibility arrangements with economic competitiveness by proposing that: 'In a post industrial city, the quality of the environment is critical to a city's success and the role of transport is crucial to this – an overemphasis on road building and an under emphasis on public transport and a pedestrian environment, can spin a city into a decline phase, whether it be Bangkok, Los Angeles or Sydney'.

Conclusion

Cervero contends that 'the physical make up and shape of a city are widely thought to carry with them significant economic costs and benefits. Spread out, auto-oriented cities, for instance are commonly associated with high levels of infrastructure service demands and resource consumption" (2001, p. 1651).

Nelson states that there is 'A growing body of literature seems to be weighing in on the side that inefficient land use patterns – induced by inefficient pricing of publicly provided goods and service, externalities, and perhaps especially by land use regulation promulgated by communities pursuing beggar-thy-neighbour policies – is more costly than alternative, usually more compact development patterns' (Nelson p. 277).