# *AUCKLAND'S COMPETITIVE ADVANTAGE AND DISTINCTIVENESS*

FINAL INDICATOR REPORT
April 2011

market economics
environment • spatial

market economics limited t +64 9 915 5510 e info@marketeconomics.co.nz
level 5 507 lake road po box 331297 takapuna 0740 auckland new zealand
www.marketeconomics.co.nz

## Acknowledgements

This report has been prepared with funding from the Ministry of Science and Innovation's Cross Departmental Research Pool fund secured and administered by the Ministry of Economic Development, New Zealand Government – Auckland Policy Office.

## Disclaimer

## *EXECUTIVE SUMMARY*

This report assesses the relative position of the Auckland economy with respect to six other cities, three in Australia, one in Canada, one in the United States of America and one in Europe. It attempts to identify factors that are distinctive about the Auckland economy, seen in broad terms, as an inter-connected city-region. This city-region is built upon networks of interaction, from a micro-level of connection between physical attributes and features, to macro and global interaction in the form of business relations and global trade, as captured in the flow of goods and services. The report attempts to present a comprehensive set of indicators relating to many aspects of the Auckland economy and draws out some salient 'distinctive' features. It then hones in on key economic sectors that were selected in terms of their competitive advantage, and characterised by high export value and export growth. These constitute the competitive firms and businesses that produce the region's economic surplus. Indicators for the relative performance of these sectors are presented, and the intention is to query the link between city-region distinctiveness and competitive economic outcomes. This study was undertaken through data mining existing sources and models, to populate a conceptual framework that articulated the complexity of economic activity on a city-region level. The study clearly points to further research that includes sector level engagement, further primary research, and investigating city-region competitiveness from an agent-based perspective.

In terms of overall economic performance, Auckland was ranked 84$^{th}$ out of 116 metropolitan regions with respect to Gross Domestic Product (GDP) per capita. This placed Auckland sixth out of the seven cities selected for comparison in this study, with a GDP per capita of $US_{2005}$$35,300 in 2005. Overall, Auckland has consistently higher GDP per capita values than the New Zealand average. There are signs of convergence within New Zealand and the gap between Auckland and New Zealand appears to be decreasing.

***Main Findings – City-region performance***

- There is a lack of officially published regional productivity data in New Zealand, yet it is a crucial area of interest for economic performance. Changes in multifactor productivity, labour productivity and capital productivity were examined both at a national level, and international level using OECD data. New Zealand had the highest differential between growth in unit labour costs and labour productivity growth, implying wage growth, without accompanying increases in labour productivity.

- Within New Zealand, both Auckland and Wellington have maintained a consistent wage premium over the rest of the country particularly in the last decade. Auckland also has a higher proportion of employees in high-wage industries. However, Auckland's average weekly household incomes are low by international standards. Copenhagen had average household incomes approximately double that of Auckland. In terms of income distribution across society, New Zealand's incomes were more equally distributed (as measured by the Gini-coefficient) than the United States, but more unequally distributed than the other countries, Australia, Canada, Denmark. For New Zealand, income disparity has increased over the last twenty years, and Auckland has even higher income inequity than the national average.

- Auckland utilises its labour at a similar rate to those in the comparator cities, ranging between 62 and 65 per cent. The unemployment rate in Auckland was the highest of the comparator cities. Youth unemployment is a significant problem in Auckland.

- New Zealand specific research on agglomeration and its influence on productivity is not as advanced as it is in other parts of the world. Auckland's key economic sectors tended to fall into industries that have comparatively large agglomeration elasticities, implying that a portion of their productivity results from agglomeration effects.

***Main Findings – Distinctiveness***

Distinctiveness, that which sets a city-region apart from others, occurs at many levels. This study attempts to show some of the characteristics and spark discussion about what sets Auckland apart from other city-regions. The question still remains unanswered as to how distinctiveness manifests in economic activity, whether it influences the structuration of industry and business activities. This requires further analysis, and requires input from/interviews with Auckland's industry representatives. This would facilitate a critical understanding of geographical location and the existence/nature of the economic connections between Auckland's distinctive features and economic performance.

- Auckland is a desirable place to live, and international quality of life indicators rank Auckland consistently high, the fourth best city in the world to live.
- Auckland is a migrant city, with 37 per cent of its population born overseas. Thus its sense of identity changes with the changing population, and perhaps means that the city is still in a process of self-identification. Only Vancouver had higher rates of overseas born residents.
- Auckland has a young population, particularly as it attracts foreign students, but also due to the proportions of Pacific and Māori peoples living in the region, who have higher fertility rates.
- The age of the city is relatively young and the built environment is expanding in response to the waves of population growth and change. The built environment emerged initially around the ports and harbours of former times, and has extended along the transport networks.
- On an international level of brand awareness, Auckland is seen to provide the 'basics'. Auckland does not stand out internationally particularly in terms of brand image. This could mean that the city's unique features are not communicated to the wider international audience. Yet Auckland is seen to have a strong brand in New Zealand.
- Auckland has the highest usage of the private motor vehicle as a means of travel to work. It accounts for 90 per cent of journeys to work. By international standards, congestion is not as bad as in the comparator city-regions.
- Auckland's ports play a pivotal role in terms of global connectivity, facilitating the flow of goods and people from New Zealand to the rest of the world. However, it is relatively isolated in a global context – especially in comparison to the comparator cities in the study. In terms of electronic connectivity, Auckland has improved in recent years, and now compares relatively well to other city regions.
- New Zealand performs moderately when compared with other English speaking nations in terms of literacy and numeracy. However, a substantial literacy and numeracy skill gap exists within Auckland. This impacts on workforce quality, and it was found that 56 per cent of the people in Auckland region with low literacy or numeracy are already in work, implying that intervention in the workforce is required to raise levels, rather than relying on the schooling system.
- Overall formal qualification levels for the Auckland region as a whole are higher than the New Zealand average. There is, however, evidence of extremities: concentrations of highly qualified people, along with concentrations of non-qualified and low-literate people.

- Auckland University ranks 61st in the top world universities. Melbourne has its two universities within the top fifty ranked world universities. Auckland and Melbourne had lower patent activity in comparison to Copenhagen and Seattle.
- Auckland has distinctive natural amenities. The climatic conditions are favourable in terms of hours of sunshine and rainfall. Auckland has the highest levels of access to public spaces/parks of all the international comparator cities: In terms of an eco-city ranking of the comparator cities, Auckland was on par with Vancouver, but both were behind Adelaide and Copenhagen. However Auckland was ahead of Brisbane and Melbourne. Auckland has excellent air quality in comparison to the other cities.
- In terms of hosting major international events there are questions as to whether Auckland is losing ground and falling short of its potential and whether there are certain inhibitors, including inadequate infrastructure, adversely affecting tourism.
- Creative industry employment is concentrated in Auckland and the city-region has a greater share of creative industry workers than for New Zealand as a whole. Auckland had a similar amount of people working in creative industries as the Australian comparator cities – but Melbourne had higher rates than Adelaide and Brisbane.
- The comparator city-regions in this study have relatively low population densities. Only Copenhagen has a higher density than Auckland.
- New Zealand was identified as one of the nations with a 'severely unaffordable' housing market – and Auckland has the least affordable housing market of New Zealand cities.
- Overall it appears that Auckland is a safe city with low crime rates. Auckland has similar levels of health care provision to the other comparison city-regions.

***Main Findings – City region factor endowments***

- It is estimated that there is sufficient residential land available in the Auckland region to meet growth demand until 2026, and that there is enough land to meet business demand out to 2019.
- Auckland people use significantly less water domestically than households in Seattle and Vancouver, but more than the average daily domestic use in Copenhagen. Estimated average daily consumption of combined domestic and industrial water use was much lower in Auckland than the comparator Australian cities.
- Auckland has the largest labour market in the country, and it seems it is relatively robust. The issue of overwork is accentuated outside of Auckland, and the rate of underemployed is greater in the rest of New Zealand.
- Prior to the recession, there was difficulty for employers in finding skilled workers.
- The average skill level of Auckland's migrants was higher than the comparator cities. Auckland is the main entry point for new migrants to New Zealand. There are problems with the long term settlement (retention) in New Zealand of international migrants.
- There is a lack of detailed regional disaggregated data on capital stocks and technology use in New Zealand. From a national survey of businesses, three quarters of New Zealand's core business equipment were within four years of the best available technology. Certain industries show high technology adoption rates including: professional, scientific and technical services; hiring and real estate services; the construction industry; and healthcare and social assistance industry. By comparison, manufacturing firms and firms in transport, posting and warehousing reported that they were behind in the best available technologies for their industries. This is somewhat alarming, given

that transport and warehousing are important for the overall supply chain. Technology benefits at these strategic sectors may improve the functioning of the wider economic system.

- There is a declining rate of foreign direct investment into New Zealand, as a result of the global financial crisis. More than half of New Zealand's foreign direct investment was made in Auckland between 2003 and 2009.
- Key features of Auckland's attractiveness as a destination for FDI were the dominance of investments related to sales and marketing. FDI is aimed at developing a market presence, rather than the more desirable value added activities such as R&D.
- Sectors that benefitted from continued venture capital investment were the health and biosciences, food and beverage and technology industries. Auckland ranked fourth out of the seven comparator city-regions in terms of number of 'deals' expressed according to population size, marginally lower than Melbourne. In terms of the number of deals, Auckland compares well against Vancouver, Brisbane, Adelaide and Seattle, although this does not indicate the value of venture capital deals.
- There was little notable difference between the birth and death rates of businesses in Auckland and New Zealand over the last ten year period. Auckland had a lower rate of working proprietors as a proportion of the working population.
- According to an international study, Auckland is one of the most entrepreneurial cities in the world. Auckland respondents were deemed to have a particularly strong self-belief in their capabilities. Auckland scored lower than the comparator cities in terms of entrepreneur's intentions to grow their business beyond 10 employees, perhaps indicating a need to look at business aspirations and intentions as a contributing factor to entrepreneurship. There is initiative within Auckland people to establish entities of a small size, but barriers exist to their expansion. These barriers may be related to cultural and life-style considerations as well as market characteristics.

***Main findings: Key sectors with competitive advantage***

Auckland's industries with competitive advantage were identified. A filtering process of the performance of existing industries was undertaken. Those with exceptionally high export growth, export size and revealed competitive advantage were detected, at a six digit ANZSIC level. The reason that export growth was considered so important was that it reflects successes in the global market place, and hence is an indicator for competitive advantage. These six digit industries were collated into the following sectors:

| | | |
|---|---|---|
| Business Services | Marine | Food |
| Metals and Metal Products | Health | Transport Services |
| Electronics and Electrical Equipment | Tourism | Paper Products |
| Machinery | Technical Services | |

Most of these sectors have been identified in earlier research. As the study progressed, other sectors of interest emerged e.g. export education and the screen production industry, given the high potential for future growth.

- The key sectors play a central role in Auckland's economy capturing almost a quarter of jobs, with business services becoming increasingly important.

- Most of the key sectors outperformed the wider economy along a range dimensions such as: employment, value added, exports and value added per employee. Several of the key sectors tend to offer high paid jobs and require highly skilled employees.
- The sectors that had the greatest actual dollar value of exports were: Tourism[1] ($4.9bn); Food ($3.5bn); Transport services ($2.9bn); Metals and metal products ($1.3bn); and Electronics and Electrical Equipment ($0.8bn).
- The key sectors value added accounts for around 29 per cent of regional value added
- Going forward, the key sectors are expected to continue to play a central role in Auckland's future growth and are expected to become more important to the regional economy. Around one-fifth of the region's value added and employment is projected to be generated by the key sectors, highlighting the importance of these sectors to Auckland's future economic well-being.

***Main findings - Industry sources of advantage***

- A little explored area of economic analysis is the extent to which physical geography, in this case the city-region, is an input into the production process. This can only be answered by industry players/agents themselves, as an analysis of data and trends, as undertaken in this study, did not reveal this dependency.
- A possible focus area of the sector engagement may be on developing an understanding of the drivers and determinants of industry inputs, and how these are transformed. This however implies that the supply chains (through backward linkages) need to be identified and described.
- Apart from the cost of inputs, firms prefer a low inflation environment. New Zealand offers a favourable macro environment and consistently scores high in indicators that measure the ease of doing business and also scores favourably in surveys on levels of corruption in different countries around the world.
- Detailed data on demand conditions for each key sector is highly limited and proxies were used to provide some indication of the wider conditions influencing demand conditions. Exporting is a key policy area and the demand conditions that exporters experience in foreign markets are a function of the economic climate in the target country. Increasing market penetration and sales into overseas markets is heavily reliant on understanding and responding to 'local conditions'. Most of Auckland's key sectors have grown their exports (a basis on which they were selected) which could be interpreted as successfully reading, interpreting and responding to market signals about demand in overseas markets.
- Sector specific research is required that will clarify micro-decisions taken by firms and agents, in their choice of expanding into offshore markets. Understanding the demand conditions, and using such an understanding to capture an increasing market share, will assist in overcoming barriers (e.g. small scale and distance from key markets) faced by some of Auckland's key sectors.
- Auckland is well placed to capitalise on establishing formal links with firms in foreign markets given the high levels of residents that were born overseas. However, there is significant scope to improve the international relationships of firms.
- The New Zealand Institute for Management's Management Capability Index shows that there has been an overall improvement in business management in recent years. A concerning issue is the weakening of the 'application of technology and knowledge' indicator.

[1] This is a tentative result based on 6 digit ANZSIC coding of tourism industries applied to Auckland. It does not account for the fact that not all of the exports for each of the 6 digit category included are attributable to tourism related activities.

- Based on results from the Business Operations Survey it appears that most of innovation and R&D is concentrated in larger firms. Nationally, R&D budgets and innovation intensity is below par compared against other OECD countries.
- The above two points are of concern in New Zealand, given the over-representation of small businesses in the economy. Further research is required to clarify Auckland's relative performance in terms of management capability and a possible starting point could be the NZIM capability index to determine if it is possible to extract Auckland and sector specific data from the surveys.
- Management skills within the key sectors needs to be quantified as there is little data/information on these at present.
- Auckland is relatively well connected in the New Zealand context. Deepening the knowledge base about industry interconnections and the evolution of these connections will shed light on possible future evidence based interventions. An initial analysis of the interconnections of Auckland's key sectors revealed that most key sectors are becoming less connected to the local economy, implying that they are increasingly integrated into the global economy (this is not surprising, given that exports were a significant factor in identifying the key sectors). Further work on the supply chain of these sectors is recommended, to trace the backward linkages from these industries in order to measure the extent of embeddedness in the regional, national or wider Australasian economies.
- People leadership is one of New Zealand business's strengths (ranked fourth out of nine criteria according to the NZIM Management Capability Index). In a labour constrained market it is critical to use this strength to attract and retain high caliber staff from the domestic and international markets. Having access to a high quality labour force is a key requirement for any productivity growth drive and the match between available skills and demands from each sector will need to be investigated to quantify the labour constraints faced by Auckland's key sectors.
- Firm-level financial data is subject to confidentiality issues, meaning that alternative ways to estimate industry profitability were used. Industry level estimates of operating surplus were used as a proxy for profitability for some of the key sectors. Business services and professional type activities tend to have relatively high gross operating surpluses. This does not reflect the capital structure (and capital intensity) of sectors.
- The underlying profitability of Auckland's key sectors could be estimated by reviewing confidential (IRD and SNZ) data or alternatively by obtaining an overview of each key sector's financial characteristics via the sector engagement process. It is important to remember that profitability is not the only consideration for firms and businesses in operation in Auckland. Firms make decisions based on a variety of factors, of which profitability is only one. Exploring trade-offs should be addressed in a sector engagement process with the key industries.

# TABLE OF CONTENTS

# LIST OF TABLES

## LIST OF FIGURES

## LIST OF APPENDICES

# 1 INTRODUCTION

It is widely recognised that cities have become key actors in the global economy, forming hubs or agglomerations of economic activity, within an increasingly connected global economy. As stated by Kofi Annan (UN, 2000),

> 'We have entered the urban millennium. At their best, cities are engines of growth and incubators of civilization. They are cross-roads of ideas, places of great intellectual ferment and innovation'.

Importantly, Auckland is one of a group of cities around the world, like London, Paris or Bangkok, which accounts for a very high proportion of its national income. These cities produce economic surpluses, of benefit to the nation. Auckland provides specialised business, financial and distribution services that are utilised all over the country. It is also the country's major international gateway and transport centre, and with its large population base, provides the countries' most significant domestic market.

It is without question that the prosperity of New Zealand as a whole is tied closely to the performance of this principal city. Also in the highly competitive global economy, Auckland's success as an international city both now and into the future is strongly dependant on its ability to attract skilled people, investment and high-value economic activity.

Given this context, it is important that robust statistical information and tools are made available to policy makers so that it may be possible to track the source and performance of regional competitiveness in Auckland. But in New Zealand, as is the case in many countries (OECD, 2009), such regional-level information is not always readily available.

## 1.1 PURPOSE

Providing an evidence-base in economics is important. Recent focus on the logic of Auckland's economic system in terms of production, consumption, distribution, governance and general functioning led to a greater understanding of the problems and opportunities that Auckland and New Zealand face together.

Such introspection is important, but little is known about the inter-dependencies and features of the economic system that are contributing to Auckland and New Zealand's slide down international ratings of economic growth, standards of living and well-being.

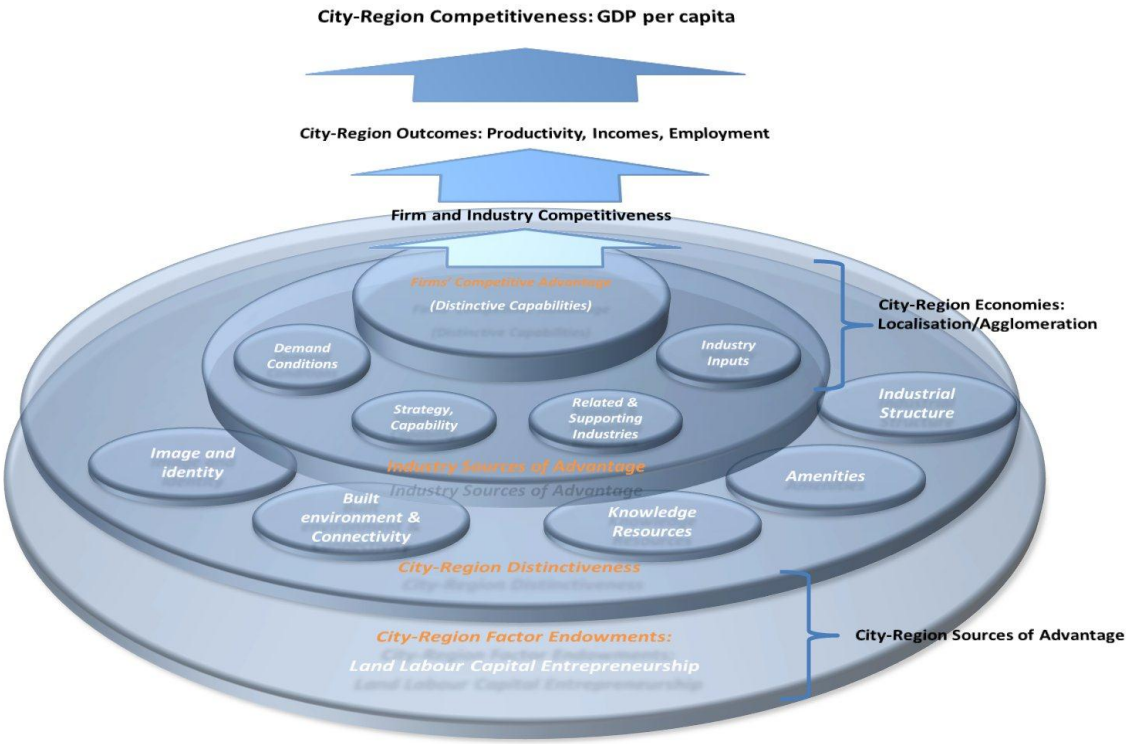
The Ministry of Economic Development (MED) identified international comparator city-regions, which have some similarities to Auckland in terms of size, composition and relative position in their regional/state contexts. MED sought to develop a robust monitoring framework that could measure the relative competitive advantage of these city-regions, while uncovering the distinctiveness of these areas. This work provides the first step in a bench-marking process, enabling the comparison of Auckland, as a city-region, with others internationally. It was clear that traditional statistics were not sufficient to analyse fully the concept of city-region competitiveness, and they needed to be supplemented by and combined with other indicators. The clear grounding, or place-specific element of city-regions was recognised as crucial for understanding city-region competitiveness. Thus the concept of distinctiveness of a city-region was thought to be a powerful explanatory factor for economic outcomes. This required a re-expression of how city-region competitiveness is conceived – or the development of a more holistic conceptual framework. This

indicator report is nested within a logical framework developed while unpicking the components of competitive advantage.

## 1.2 A CONCEPTUAL FRAMEWORK FOR THE ANALYSIS AND DEVELOPMENT OF COMPETITIVE ADVANTAGE INDICATORS

MED monitors the overall economic outcomes for New Zealand, and is concerned with the notion of city-regional competitiveness as a contributing factor to economic well-being. The complexities of the interplay between individual agents and overall economic outcomes were explicitly recognised and explored, and a conceptual framework, developed to articulate some of these connections, was produced by MED in collaboration with Market Economics Ltd (Figure 1.1).

Figure 1.1: Framework for city-region competitiveness




The framework assesses overall city-region competitiveness in terms of GDP per capita, which results from productivity growth within firms and industries. Between the firm level and the city-region level, lies an array of factors that influence this productivity and competitiveness. The agglomeration effect of firms in urban areas is one such factor. Industry sources of advantage, city region distinctiveness and city-region factor endowments were identified as concepts that affect competitiveness. After conceptualising the important factors, the next step was how to measure these broad and bold concepts, and identify what indicators were relevant for this process.

The process of indicator selection is not a trivial task, and leads to careful consideration of the economic method employed. Within the economic discipline, as with any other system that is characterised by complex inter-relationships and inter-dependencies, there is the danger that the theoretical work at a conceptual level is not aligned with the observable evidence, or that the observable evidence drives the conceptual framework. Furthermore, given the problems acknowledged by bounded rationality (Simon, 1957), key inter-relationships associated with economic performance may get lost in the expression of indicators. Attempts were made to balance this tension in this study by balancing aspiration and pragmatism (see section 1.3), involving dialogue with MED.

The challenge in this study was to use best practice for indicator development which was/is robust enough to adapt and change, should the indicator not fit the conceptual framework. It is an attempt to build evidence-based economics, which is described as:

> '*the conscientious, explicit and judicious use of sound evidence in making decisions about the welfare of societies….The practice of evidence based economics means integrating individual socio-economic expertise with valid external evidence from systematic research relevant for the purpose at stake'* (Reiss, 2007:13).

Comprehensive indicator sets generally aim to create an overall picture of how a nation, region or community is doing, and the interconnectedness of various information areas. Specialised indicator sets aim to provide in-depth information about a particular topic, issue or population group (Statistics New Zealand, 2009).

Indicators are developed to measure what is valued. The choice of indicator is a critical determinant of the behaviour of a system (Meadows, 1998). In general, indicators are assessed with respect to their relevance to the concept under scrutiny, the frequency of measurement and consistency over time, their availability, their comparability (MED, 2005; SNZ, 2009; Meadows, 1998).

## 1.3 METHOD EMPLOYED

In this study, a tandem-approach was adopted in the articulation of the conceptual framework and development of relevant indicators to populate that framework. This enabled iteration between the framework and the indicators, in a process of refinement of the conceptual framework.

A mix of aspiration and pragmatism was employed. A thorough assessment of available indicators was undertaken, both in New Zealand and internationally. Rather than relying on existing indicators, and limiting the conceptual framework to available datasets, a comprehensive set of existing and potential indicators was drawn up for each concept. This enabled an *ex-post* evaluation of the measures that best capture the concepts in question. These were presented in matrix form, which clearly showed the interconnection between indicators and in some cases between concepts. A selection process ensued, populating the framework with the relevant indicators. During this process, gaps and areas for future investigation were identified.

During the final selection of indicators, a template for each indicator was drawn up, looking at:

- Name of the indicator
- Its level in the conceptual framework (as in Figure 1.1)
- Technical definition – what does the indicator measure?
- Purpose of the indicator – why is it important for the concept in the framework?
- What this indicator is about
- Monitoring frequency
- Source of data
- Availability/measurability/issues with the indicator
- City-regional comparability
- Gaps and limitations
- Additional notes that may help with the interpretation of the data, measurement techniques or how the indicator is compiled. Links to other reports or data that provide context or a broader picture.
- Interpretation/summary of what the indicator is showing

In terms of comparability, MED officials had selected six other cities for comparison with Auckland, based on previous work undertaken by MED and various governmental (including local) agencies working within Auckland. It was not possible to get comparable data for all city-regions. A discussion on the rationale for selection is given in 1.4.1, followed by a discussion of the boundaries for each comparable city region in section 1.3.1

### 1.3.1 CHOOSING COMPARATOR CITIES

In order to compare Auckland with international city-regions, a variety of dimensions were considered and a distinction is made as to whether the choice of city-region is for the purpose of just tracking cities that are similar, or whether the comparison is for more aspirational reasons, showing where Auckland could or should be.

Earlier work on performance and competitor benchmarking was completed by NZIER for the Auckland Regional Economic Development Strategy (NZIER, 2002). In that report, Auckland was compared to Sydney, Brisbane, Melbourne, Adelaide, Hobart, San Francisco, San Diego, Seattle, Portland, Vancouver and Singapore. These cities were considered to be 'competitor cities' in that they serve an 'important trade function, and, allowing for contextual differences, achieve aspects of performance we would like Auckland to mimic' (p. 5). It was discussed by NZIER that there is not an ideal match of a city-region for Auckland as it has the 'somewhat uncommon role as the funnel of trade for the rest of the country' (p. 5). The availability of comparable data also limited NZIER's choice of benchmark cities.

At a national level, New Zealand is generally compared against OECD countries. When New Zealand's production structure, distance from main markets and natural resources are taken into account, it is clear that New Zealand is similar to other small, open, advanced economies of the world. Key comparator countries for New Zealand may be narrowed to Finland, Sweden, Norway, Denmark, Iceland, the Netherlands, Canada and Australia (see MED & ARC, 2006; Claus & Li, 2003). These countries may provide guidance as to the cities that would be useful to compare Auckland with.

In MED's Economic Development Indicators 2007 report, Auckland was benchmarked with six cities – Brisbane, Melbourne, Adelaide, Seattle, Vancouver and Copenhagen. This was based on a number of criteria:

- Similarity in size, density, economic make-up and policy
- Competitors for resources (such as skilled workers, businesses and investment)
- In our locality, that is, Australasia
- Cities that set an example for future development.

This study continues from the 2007 work, attempting to compile data which was not so readily available for the comparator cities. Further questions that arose from this initial work and which should be borne in mind are:

- Are these the right set of comparator cities for the future monitoring of Auckland's performance?
- Is there the right balance of European versus North American cities? What about Asian cities?
- Given that Auckland is important in its national context, what other cities play this role?
- Which cities have really transformed? Who has invested heavily recently, and what outcomes have they achieved?

### 1.3.2 COMPARATOR CITY-REGION BOUNDARIES

The geographic areas included in this study's international city-region comparison are as follows:

**Copenhagen**

Region Hovedstaden/Capital Region of Denmark (previously known as Greater Copenhagen Region) established on January 1, 2007 as part of the 2007 Danish Municipal Reform. It consists of Cobenhavns (Copenhagen city), Kobenhavns omegn (Copenhagen suburban), Northzealand and Bornholm (Statistics Denmark, 2007 and 2010).

Source: Statistics Denmark, 2007. Statistical yearbook 2007. Denmark: Statistics Denmark
Statistics Denmark, 2010. Statistical yearbook 2010. Denmark: Statistics Denmark

**Seattle**

The U.S. Census Bureau defines the Seattle metropolitan area as the Seattle–Tacoma–Bellevue, WA Metropolitan Statistical Area, which is made up of Seattle–Bellevue–Everett metropolitan division and Tacoma metropolitan division. (U.S. Census Bureau, 2008)

Source: U.S. Census Bureau, 2008. Population Division Metropolitan Statistical Areas and Components. U.S. Census Bureau: Population Division

**Vancouver (Census Metropolitan Area)**

Vancouver CMA defined by Statistics Canada has perfectly conterminal boundaries with the Greater Vancouver Regional District (also known as Metro Vancouver) (Statistics Canada, 2006).

Sources: Statistics Canada, 2006. Census 2006 Community Profiles. Ontario: Statistics Canada

**Auckland Region**

Auckland Region is one of the sixteen regions of New Zealand. At the time of this research, it consisted of seven territorial authorities, including Auckland City, Manukau City, North Shore City, Waitakere City, Papakura District, Franklin District (parts of) and Rodney District.

Sources: Statistics New Zealand. Census 2006. Auckland Regional Council monitoring data.

**Brisbane, Adelaide and Melbourne**

Brisbane, Adelaide and Melbourne are the statistical divisions used under national regional profile and census by Australia Bureau of Statistics (Australia Bureau of Statistics, 2010).

Sources: Australia Bureau of Statistics, 2010. National Regional Profile.
Belconnen: Australia Bureau of Statistics.

### 1.3.3 CITY REGION ECONOMIES

As can be seen from Figure 1.1 above, firms and industries operate in a city-region, moulding and defining the city-region's economy. The city region economy is a complex web, dependent on the interaction of agents and business models, the prevailing goals and aspirations of the individuals and firms operating therein, and the resources available to them in the production process. Some industries exist to carry out basic functions or services to keep a city-region in operation, and are therefore domestically focussed. This is particularly the case for certain services such as health, government administration, and also for the construction industry, which exists for the purpose of capital formation, a precursor to the production of goods and services. Other industries have extended markets, and serve customers out of the city-region. For a small open economy such as New Zealand, the industries and sectors that export internationally are crucial for the growth of the New Zealand economy overall.

To elucidate what is happening in Auckland industry, and to determine the industries that are important from a policy perspective, a selection or filtering process was adopted in this study. This was an attempt to identify the sectors that currently play a vital role in the Auckland economy. The Australian and New Zealand Standard Industrial Classification (ANZSIC), developed jointly by Statistics New Zealand and the Australian Bureau of Statistics, classifies every business in operation according to its predominant activity. There are 477 classes of industry identified in ANZSIC (SNZ, 2004). Market Economics Ltd and the Ministry of Economic Development undertook a multi-criteria selection process of these classes, based on principles of prioritisation (see Appendix 1), for identifying the key industry sectors in Auckland. The first stage (Filter 1) looked at relative size and importance of the 477 classes, identifying growth industries at this, so called, six-digit level of ANZSIC. As the model for the Auckland economy used in this study is an input-output model, these 477 industry classes were aggregated up to the 123 input-output industries (SNZ, 2001). The second stage (Filter 2) was similar to the first, but was conducted at a different level of industry analysis. From this filtering process, key sectors were emerging according to the criteria identified as being important – such as business activity and employment, the relative importance of the industry, basic

economic characteristics and impact ratios. Thus, from beginning with a broad picture of all the industries in Auckland and their relative performance, certain sectors were focussed on. In line with the economic literature on sector development, while also considering the national economic development objectives (under the government's Economic Growth Agenda), three factors were considered crucial for the selection of key-performing industries: 1. the extent to which the industries were growing; 2. their relative size; and 3. the extent of exports. The sector shortlist was then reviewed against previous research, existing national datasets and information on New Zealand's industries of revealed comparative advantage which resulted in further refinements and revisions of the sectors. Export size was a key determinant and only the largest export sectors were included – a threshold of around $20m was set (equal to ±80$^{th}$ percentile). Thus the filter was run again, with these three factors weighted. Thus the 'key sectors' as identified in section 5.5 emerged. During the course of undertaking this work, it was also recognised that certain sectors were seen as sectors of future growth (in line with the national Economic Growth Agenda priorities), and although they did not emerge in the filtering process, they were included for comparative analysis in this report for relative assessment and to give an idea of relative size.

## 1.4 ORGANISATION OF REPORT

The organisation of this report follows the logic of the conceptual framework. Each level in the conceptual framework is given a separate section, with the indicators embodied under each concept discussed. A synthesis of each concept is given after the presentation of the data of each indicator.

Section 2 looks at overall city-region performance, and how performance is measured. Section 3 looks at the economic outcomes of city-regions, and measures such as agglomeration, productivity, income and employment that are indicators for economic outcome. Section 4 turns to measures of distinctiveness for city-regions. It is within this chapter that more qualitative indicators are introduced. Distinctiveness has sub-components, here classified according to image and identity, built environment, connectivity, knowledge resources and amenities. Section 5 looks at factor endowments, economic concepts developed in the early twentieth century for understanding production processes. Endowments are discussed under the sub headings of land, labour, capital, entrepreneurship and industry structure. Section 6 presents indicators on industry sources of advantage. The focus of this Section is specifically on the Auckland city-region and the competitive sectors therein. This Section is broken down into demand conditions, strategy and capability, related and supporting industries, skills and expertise. Section 7 looks at firm and industry competitiveness. Section 8 presents our overall evaluation of the indicators in terms of type, completeness, reliability and availability, relevance and whether more work is required. This is the basis for a gaps analysis in the indicator framework development.

# 2 CITY-REGION PERFORMANCE: GDP PER CAPITA

Gross domestic product (GDP), which measures the income earned by production, is the most widely used indicator of economic activity internationally. It is also one of the main outputs of all countries' National Accounts. As GDP is a measure of production, growth in GDP implies simply that there has been an increase in the market value of all final goods and services made within a year.

For a variety of reasons, one must be very careful in using the GDP measure as an indicator of societies' welfare or standard of living. Importantly, GDP takes no account of the benefit or otherwise of the produced goods and services that are aggregated to calculate the measure. Taking an extreme example, if Auckland were to be subject to a major disaster necessitating the redirection of a significant proportion of normal consumption expenditures and savings towards rebuilding, GDP would actually show an increase, despite the obvious drop in welfare. GDP figures furthermore exclude activities that do not result in a monetised exchange, such as unpaid household work and time given freely by community groups, irrespective of the potential contribution to society. Despite these cautions, GDP remains the standard measure of economic success. Partly this is because GDP possesses a clear and standardised method for calculation (United Nations, 1993), which few other indicators can boast. There is also little consensus on a suitable alternative to the measure.

GDP per capita is often used as a proxy for the average prosperity of a region or nations' people. Although GDP per capita is often positively correlated with standard of living, there are a number of limitations to this measure.[2] In addition to those already described above, as GDP per capita is an average, it does not indicate the distribution of income within the economy (this is addressed in sections 3.2.4 and 4.2.6, in the distribution and equality indicators).

Overall, Auckland has consistently higher GDP per capita values than the New Zealand average. There is convergence within New Zealand however, with the gap between Auckland and the New Zealand average decreasing. However, on an international level, Auckland ranks relatively low, and behind all but one of the comparator cities that were chosen for this study.

[2] See McDonald *et al.* (2009) for a further critique of GDP per capita measures and an alternative measure of well-being.

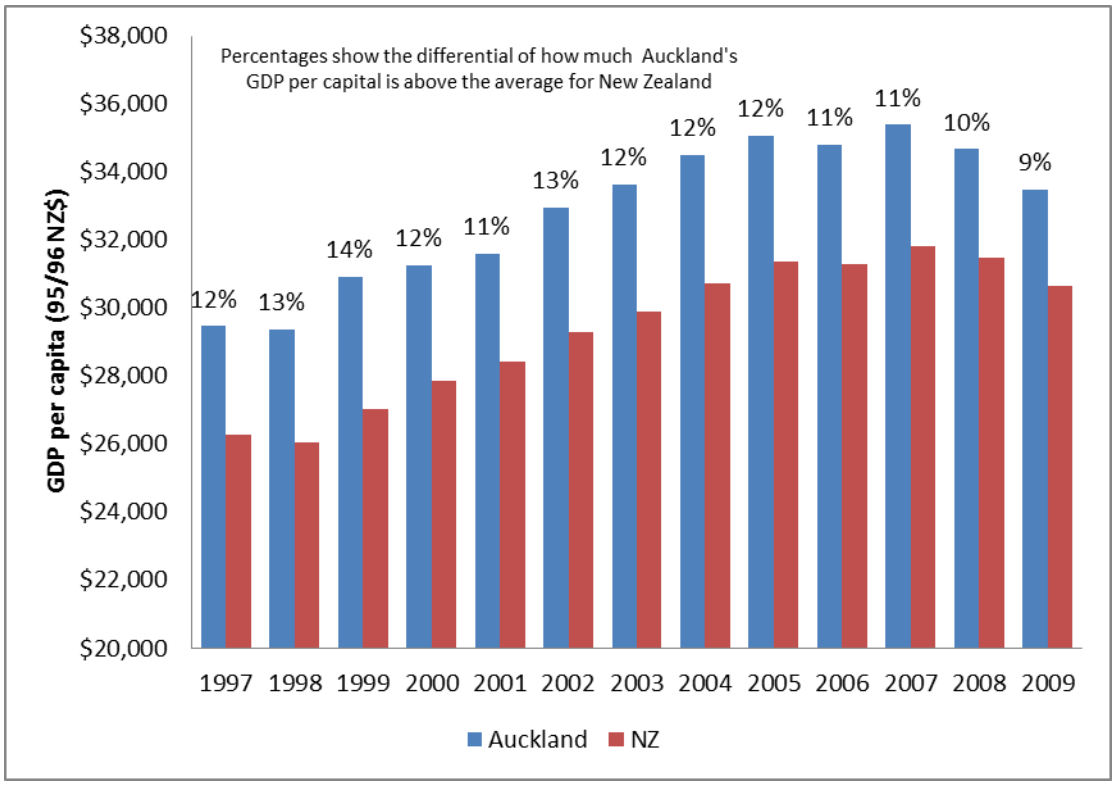
## 2.1 REAL GDP PER CAPITA (AUCKLAND AND NEW ZEALAND)

No official regional GDP figures are produced by Statistics New Zealand. Infometrics Ltd produces quarterly GDP figures for the regions of New Zealand.[3] Their method is based on a *Regionalised Industry Employment Model*, enabling a regional comparison for GDP, which allows for historic time series analysis, and which is also used for projections.

Auckland has had a consistently higher rate of GDP per capita than New Zealand. Auckland's GDP per capita was $NZ_{95/96}$33,400 compared to New Zealand's $NZ_{95/96}$30,600 in 2009. Over the years 1997 to 2005, Auckland's GDP per capita ranged between 11 and 14 per cent higher than New Zealand's. However the gap or differential has been reducing in recent years – and was down to 9 per cent in 2009 (Figure 2.1).

In absolute terms, GDP per capita rose from $NZ_{95/96}$29,500 to $NZ_{95/96}$35,000 between 1998 and 2005 for Auckland. Comparably, the average GDP per capita for New Zealand rose from $NZ_{95/96}$26,000 to just over $NZ_{95/96}$31,000 during this time. Over the last two periods, Auckland's real GDP per capita declined, and was at $NZ_{95/96}$33,500 in 2009 (which were comparable to 2003 GDP per capita levels).

Figure 2.1: Real GDP per capita – Auckland and New Zealand




*Source: Infometrics Ltd and Auckland Regional Council economic monitoring*

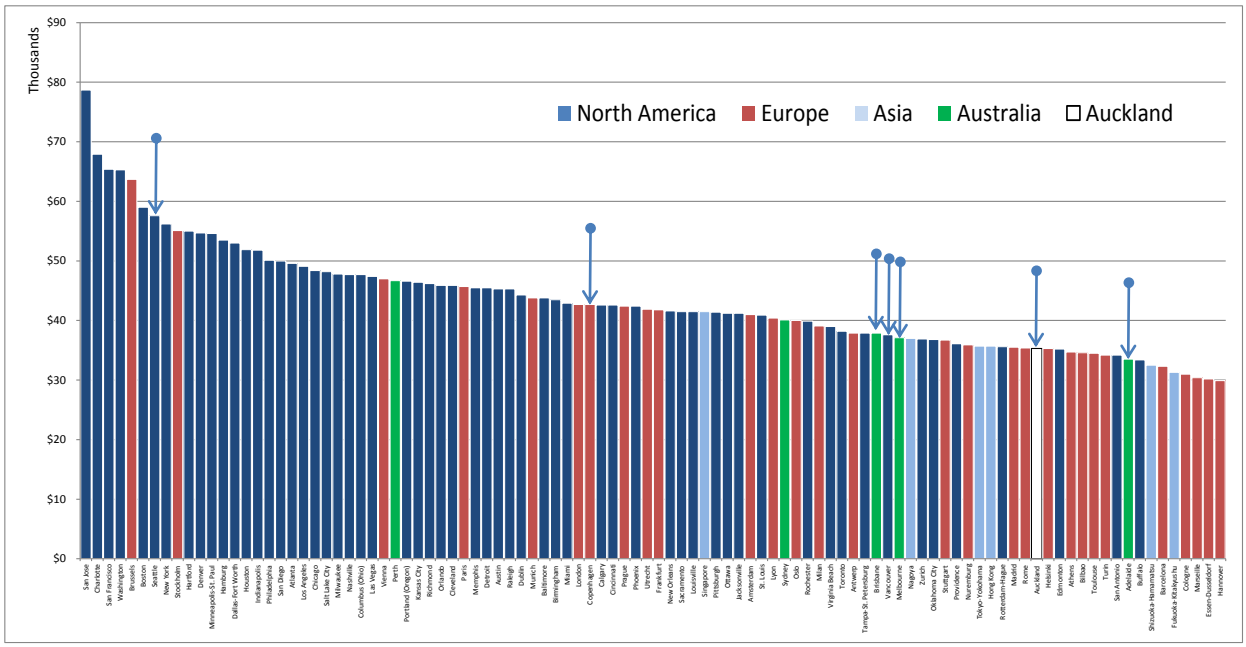
[3] see http://www.infometrics.co.nz/regional.asp. Infometrics GDP figures were used in this section due to the frequency of model updates. The Value Added figures (GDP) used in the sector analysis come from Market Economics in-house models and datasets that offer regionalised data. These datasets do not provide quarterly trends.

## 2.2 COMPARATIVE GDP PER CAPITA FOR SELECTED CITY/REGIONS

The OECD project *Competitive Cities in the Global Economy* focuses on the 78 largest metro regions in the OECD, with Auckland being the smallest (of this OECD study), with 1.4 million inhabitants, and Tokyo the biggest, with 35 million inhabitants. As the OECD project does not include all comparable cities selected for this report – Adelaide, Auckland, Brisbane, Copenhagen, Melbourne, Seattle and Vancouver – an alternative internationally comparable source/study of GDP per capita was used. The Demographia (2009) study extends the analysis in the OECD research, to incorporate a total of 100 metropolitan regions, with populations in excess of 1 million (Figure 2.2). The North American (particularly the US) metropolitan regions (coloured dark blue below) have the highest GDP per capita levels overall. 35 of the first fifty metropolitan regions that have the highest GDP per capita are North American. Brussels has the highest levels of GDP for the European cities, while Perth has the highest Australian level.

Auckland is the only NZ city included in this study, and can be seen in white. Auckland was ranked eighty-fourth out of the 100 metropolitan regions of this study.

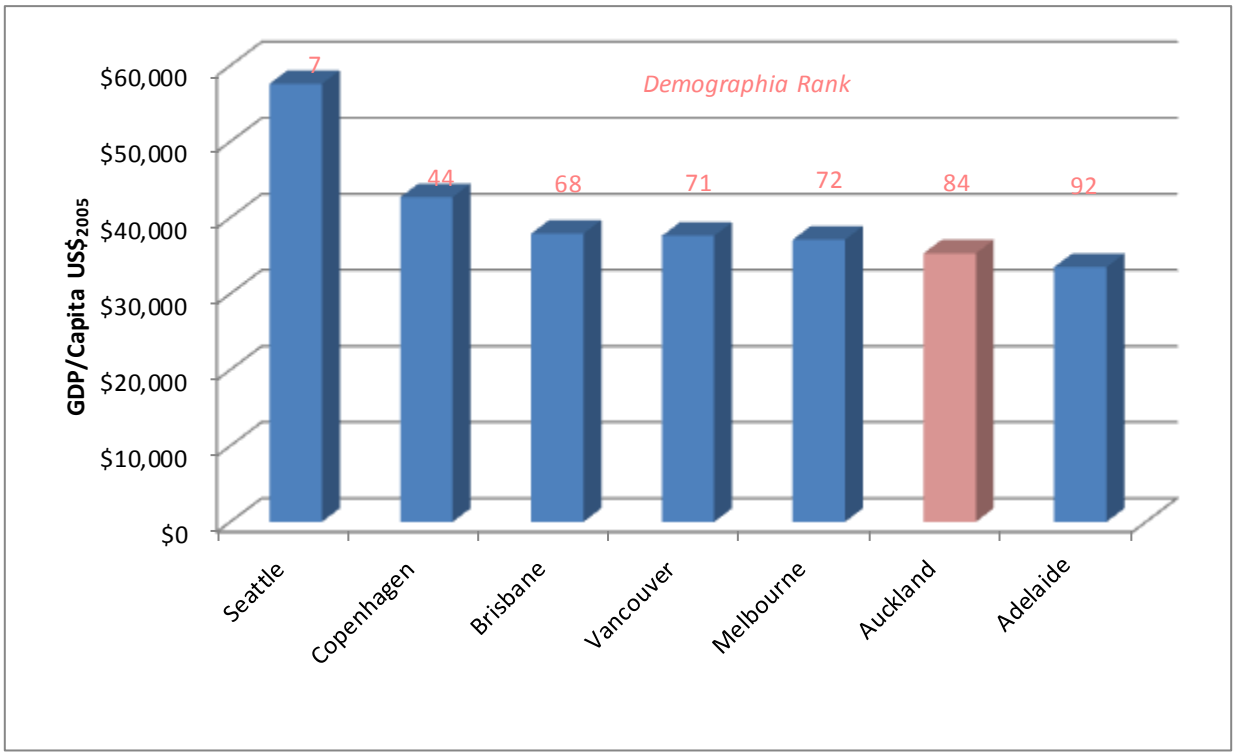
Figure 2.2: GDP per capita ($US) in selected city urban regions, 2005




*Source: Demographia (2009)*

With respect to the comparator cities of this study, Auckland was sixth out of the seven cities, with a GDP per capita of $US_{2005}$35,300 (purchasing power parity) in 2005. Adelaide had a lower value of $US_{2005}$33,500. Brisbane, Vancouver and Melbourne were slightly higher than Auckland, with $US_{2005}$37,900, $US_{2005}$37,600 and $US_{2005}$37,100 respectively. Copenhagen had a value of $US_{2005}$42,700. Seattle had the highest GDP per capita figure of the seven comparator cities, with $US_{2005}$57,600. This is substantially higher (over 60 per cent) than the Auckland figure. These figures are shown in Figure 2.3 with the respective Demographia rank shown in red above the GDP per capita figure for each metropolitan region.

Figure 2.3: GDP per capita $US (2005)




*Source: Demographia (2009)*

This data source is useful as it provides some estimation of relative GDP per capita levels at a metropolitan region level. However, caution is warranted with the precision of the estimates, as the estimates not provided by OECD were scaled from similar data, and are subject to error. In some cases (notably Brisbane, Perth and Adelaide) it was noted that the estimation factors were for areas considerably larger than the metropolitan regions leading to further biases (Demographia, 2009).

## 2.3 SYNTHESIS: CITY-REGION PERFORMANCE

Auckland was ranked 84$^{th}$ out of 100 metropolitan regions worldwide in terms of GDP per capita. With respect to the comparator cities of this study, Auckland was 6$^{th}$ out of the 7 cities, with a GDP per capita of $US_{2005}$$35,300 in 2005.

Overall, Auckland has consistently higher GDP per capita values than the New Zealand average, but the gap between Auckland and the New Zealand average is decreasing. However, on an international level, Auckland ranks relatively low, and behind all but one of the comparator cities that were chosen for this study.

# 3 CITY-REGION ECONOMIC OUTCOMES

Many forces shape the economic outcomes of a city-region. Assessing the economic outcomes enables an understanding of the strengths and weaknesses of the economic system. Using comparative statics and historical trends enables a précis of the differences between economic systems, and may lead to a refinement of how a particular city-region is conceptualised. Monitoring economic activity and its effects can unearth the causal mechanisms underpinning those outcomes. On a pragmatic level, understanding city-region outcomes and the forces that caused them is crucial for planning and decision making processes, and should influence how resources are allocated, deployed and redeployed within the economy. The competitive nature of gaining economic advantage lends itself to comparisons of outcomes, and measuring how competitively city-regions perform. This section looks at three large economic outcomes, and assesses appropriate indicators for their measurement:

1. Productivity which is a technical economic concept that measures efficiency on a macro level;
2. Incomes which show economic outcomes on a personal/household level, and is used as a measure of standard of living; and
3. Employment which is the interface between macro-economic processes and autonomous economic agents who choose to participate in certain processes.

## 3.1 PRODUCTIVITY

Productivity is a measure of the efficiency with which inputs are being used within the economy to produce outputs. Productivity is commonly defined as a ratio of a volume measure of output to a volume measure of input. Growth in productivity means that a nation can produce more output from the same amount of input. Productivity growth is an important contributing factor to a nation's long-term material standard of living. Productivity can be measured as a single or partial statistic (i.e. relating output to a single type of input such as labour or capital), or it can be measured as a ratio of total output to a composite of inputs (multi-factors).

**PRODUCTIVITY MEASUREMENT IN NEW ZEALAND**

The Statistics NZ method of estimating productivity statistics is based on OECD guidelines, as outlined in the OECD (2001) manual. The approach adopted is referred to in the manual as 'the index number approach in a production theoretic framework'. The calculation of productivity statistics begins by postulating a production function of the form:

$$V = A(t) \times f(L,K)$$

Where: V = value-added in constant prices L = real labour inputs K = real capital inputs
f(L,K) = a production function of L and K that defines an expected level of output
A(t) = a parameter that captures disembodied technical shifts over time, i.e. outward shifts of the production function allowing output to increase with a given level of inputs (MFP)

Given the existence of index values for labour volume and value-added, it is possible to calculate labour productivity for the measured sector as:

$$LP = V / L$$

Where LP = an index of labour productivity. This is an index of value-added in constant prices divided by an index of labour inputs.

Similarly, a capital productivity index (KP) is calculated as:

$$KP = V / K$$

### 3.1.1 MULTI-FACTOR PRODUCTIVITY

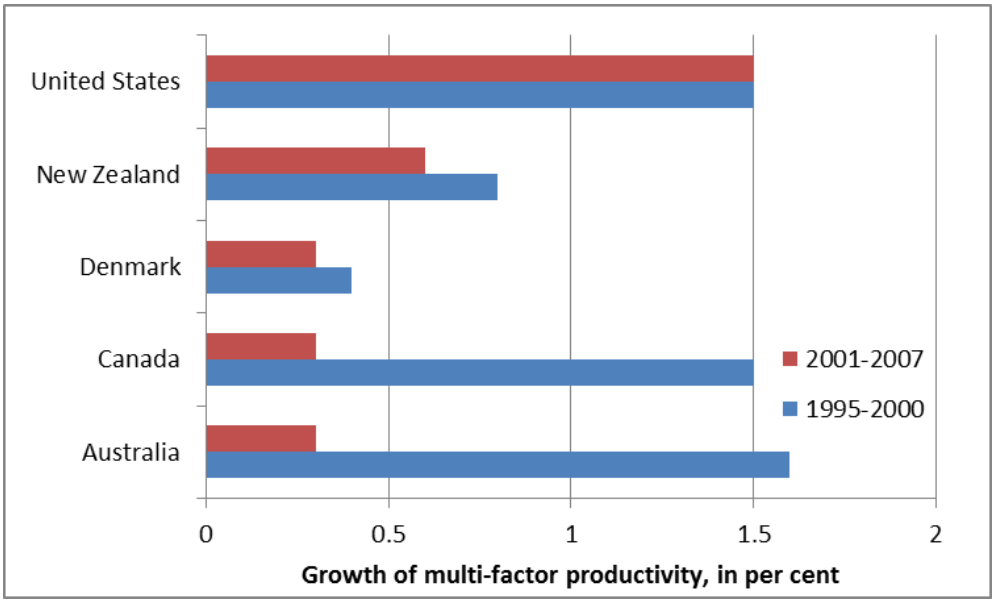
Multi-factor productivity (MFP) is measured as a ratio of output to total inputs (capital, labour, energy, materials etc.). Growth in MFP therefore captures growth in output that cannot be attributed simply to the changes in the volume of input. Changes in MFP can arise out of a variety of effects, including improvements due to economies of scale, growth in managerial skills, new technologies and changes in the way in which production is organised.

From a theoretical viewpoint, multifactor productivity is the best measure of how effectively resources are being used in a productive way in a particular economy. In practice however, such a concept is difficult to measure. Among the problems are complexities associated with capturing all inputs in production processes, and accounting for quality as well as quantity changes in inputs.

The Statistics New Zealand (SNZ) method of estimating MFP is based predominantly on OECD guidelines[4], but the method is applied only to the 'measured sector' of the economy (public sector e.g. government and education, and property sectors are excluded). There are also some variations in the method applied by SNZ compared with the OECD, which means that productivity measures produced by the two agencies cannot be directly compared. Unfortunately, neither the OECD nor SNZ publish MFP statistics at a regional level. The OECD estimates of MFP are, however, produced for all the OECD countries, which enables comparisons to be made between NZ as a whole and other nations.[5]

OECD comparable growth rates in multifactor productivity are shown in Figure 3.1 for two time periods; 1995 to 2000, and 2001 to 2007. In all countries except the United States, multifactor productivity slowed down in the second time period. Australia and Canada experienced a strong decline to 0.3 per cent in the second period, compared to rates of 1.5 per cent in the first period. In New Zealand, multifactor productivity growth dropped from 0.8 per cent to 0.6 per cent between the two periods.

Figure 3.1: Percentage Growth in Multi-factor Productivity, 1995-2000 and 2001 to2007



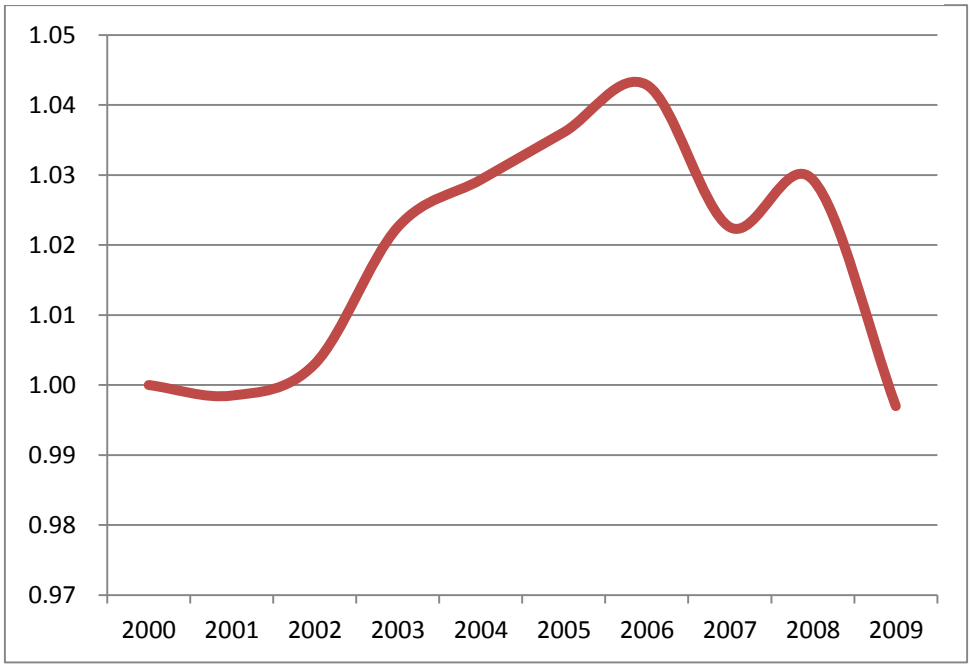

*Source: OECD Compendium of Productivity Indicators, 2008*

[4] OECD (2001) Measuring Productivity. OECD

[5] Under the SNZ method, MFP is the growth in output that cannot be attributed to either capital or labour inputs only. Thus changes in the quantity of other inputs (e.g. materials, energy) are included in the measure of MFP.

More detailed recent trends in NZ's MFP, based on the SNZ data, are shown in Figure 3.2. In the year to March 2009, MFP declined 3.1 per cent and according to SNZ this was due to an increase in total inputs (+1.0 per cent) while output decreased (-2.2 per cent). From 2006–09, MFP has declined for the first time across a cycle in the wider series, with an average decrease of 1.5 percent annually. Output rose 0.5 percent on an average annual basis, while total inputs rose 2.0 percent. The main contributor to growth in total inputs was capital input. Caution should be exercised in this comparison as the 2006–09 period is not a complete cycle.

Figure 3.2: New Zealand MFP Index (Base Year = 2000)



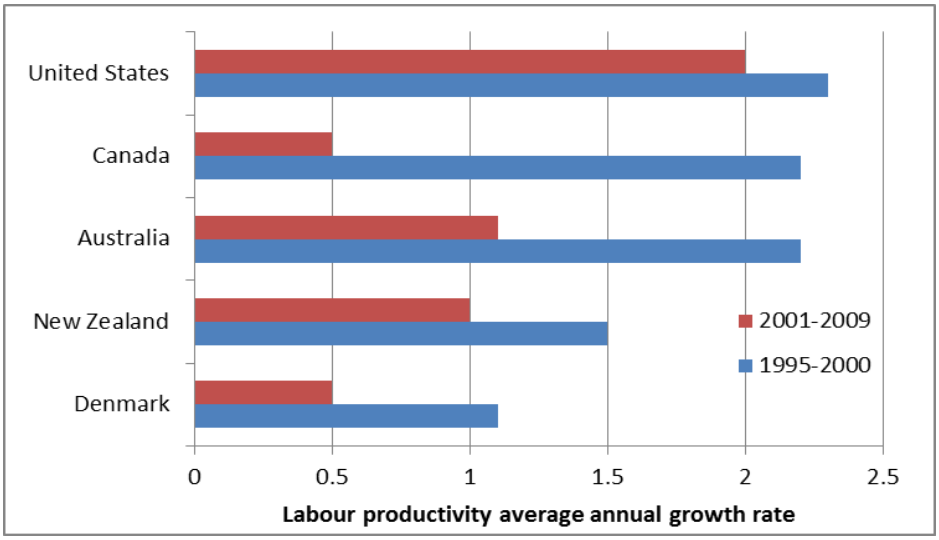

*Source: SNZ, 2010*

### 3.1.2 LABOUR AND CAPITAL PRODUCTIVITY

Labour and capital productivity are single (or partial) factor productivity measures, recording the level of output per unit of a particular input. Thus labour productivity is typically measured as the quantity of output (or value added) produced by a unit of labour (typically expressed on a per hour worked basis). It is important to note that while labour productivity does reflect the personal capacities of workers and the intensity of their efforts, a productivity change shown in this index may also be due to a change in the mix of total inputs. For example, if additional machinery (capital input) is used to assist in production, less labour input may be required to produce the same level of output. This will increase labour productivity, simply because the mix of inputs has altered. By comparison, multifactor productivity takes into account substitution between labour and capital inputs, and is therefore not directly affected by a change in the mix of total inputs.

Growth in labour productivity for NZ and selected OECD countries are shown in Figure 3.3. For the period 1995-2000, NZ outperformed Denmark but lagged Australia, Canada and the United States. For the latter period, 2001-2009, the results are slightly better with NZ outperforming Canada as well as Denmark and moving into closer alignment with Australia.

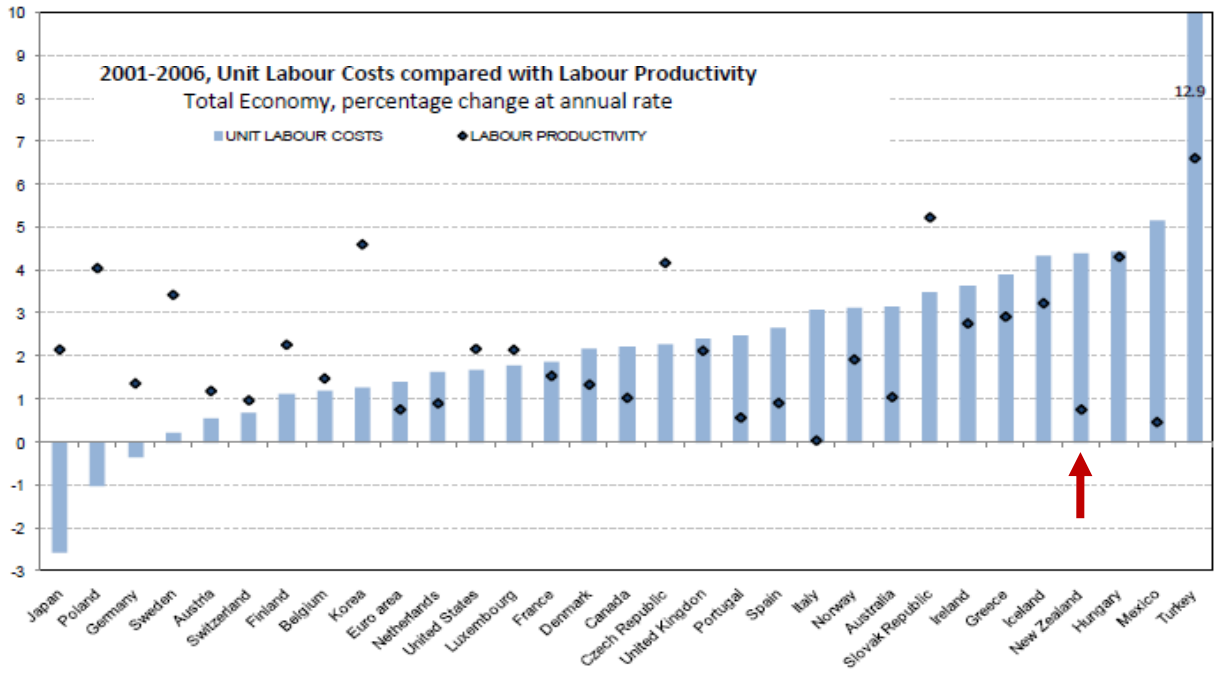
Figure 3.3: Percentage growth of labour productivity, 1995-2000 and 2001-2007




*Source OECD Compendium of Productivity Indicators, 2008*

Relative incomes are discussed in detail in the following section. However, a look at the percentage change (growth) in incomes, percentage growth in labour productivity, and growth in labour costs (wage increases) provides an indication of inflationary pressures in some OECD economies (OECD, 2008:50). For 2001-2006, the United States had strong labour productivity growth but lower unit labour cost growth, implying a lower inflationary environment compared to Denmark, Australia, Canada and New Zealand (Figure 3.4). Interestingly, NZ had the highest differential between growth in unit labour cost and labour productivity growth, pointing to inflationary pressures on producers' prices.

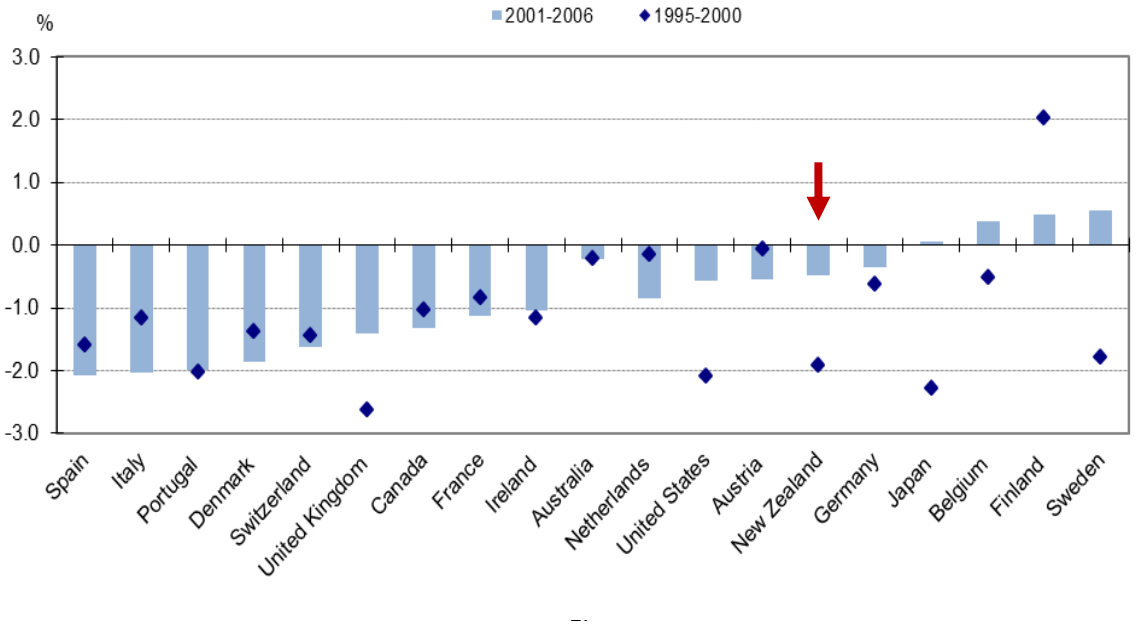
Figure 3.4: Comparison of unit labour cost growth and labour productivity change




*Source: OECD Compendium of Productivity Indicators 2008*

While labour productivity is the most common partial productivity measure, capital productivity also provides some interesting information about productivity change. Figure 3.5 below is taken from the OECD (2008) publication and provides information on capital productivity growth for OECD countries across two periods, 2001-2006 and 1995-2000. With the exception of Belgium, Finland and Sweden, all countries experienced declines in capital productivity over the two periods. For NZ, there was a particularly marked decline in capital productivity over the 1995-2000 period, at -1.92 per cent per annum. A factor that strongly influences the rate of output per unit of capital input is the amount of workable hours available per unit of capital. Generally, the cost of using capital has declined relative to labour, so that labour input per capital input has declined – leading to the observed decline in capital productivities.

Figure 3.5: Growth in capital productivity, 2001-2006[1] compared with 1995-2000.




2. 2001-2004 for Australia, Belgium and Switzerland, 2001-2005 for Austria, Finland, Netherlands, Portugal and the UK.

*Source: OECD Compendium of Productivity Indicators 2008*

In terms of interpreting this indicator, it is important to note that capital productivity values vary considerably with business cycles, and that no adjustments are made to account for capacity utilisation. This is important because capital investments tend to occur relatively infrequently, providing excess capacity to be taken up over time. In calculating capital productivities, the rate of change of capital services is, however, simply assumed to coincide with the rate of change of the capital stock.

### 3.1.3 SYNTHESIS: PRODUCTIVITY

The growth of multifactor productivity slowed in all comparator countries (except the United States) in the first years of this decade, compared to the second half of the 1990s. For New Zealand, from 2006 to 2009, multifactor productivity declined for the first time across a business cycle in the wider series (SNZ). Output rose 0.5 percent on an average annual basis, while total inputs rose 2.0 percent. New Zealand had higher

labour productivity growth than Demark for the period 1995-2000, but was behind Australia, Canada and the United States. For the most recent period (2001-2009), the results show New Zealand outperforming Canada as well as Denmark and moving into closer alignment with Australia. New Zealand had the highest differential between growth in unit labour costs and labour productivity growth for the comparator countries, implying high inflationary pressure on producer's price. There has been an actual decline in capital productivity over the same two periods for all comparator countries. A factor that strongly influences the rate of output per unit of capital input is the amount of workable hours available per unit of capital. Generally, the cost of using capital has declined relative to labour, so that the labour input per capital input has declined as well – leading to the observed decline in capital productivities. It is important to interpret capital productivity in terms of the business cycle, as capital investments occur relatively infrequently.

## 3.2 INCOMES

The level of income is a fundamental outcome of economic activity. Incomes are often used to compare the standard of living in a city-region. Calculation of incomes is not an insignificant task, as capturing all sources of income (earned through wages and salaries or through investment) is not necessarily straightforward. There is also the problem of self-reporting income levels through surveys, and these incomes tend to be under-reported. Taxes are levied on income, and countries have differing tax rates, affecting the net income that workers receive. In addition to income, there are many other factors that affect the relative competitiveness of a city-region with respect to attracting labour on income grounds. Two comparable indicators are used in this section to unbundle some of the differences between the comparator cities of the study: (1) average weekly earnings of households across the seven city-regions and (2) an indicator of income differentials – the Gini coefficient. The latter shows how income is distributed within the countries, with detailed regional data available for Auckland for this indicator.

### 3.2.1 HOUSEHOLD INCOME

Income is one of the single most important influences on quality of life, as income levels determine the ability of people to purchase goods and services according to their needs and preferences. Incomes are, in turn, an outcome of economic activity. Workers are repatriated for their contribution to industry (wages/salary) and households also receive returns on investment. Also affecting household income levels are government transfers amongst income sources, captured through taxes and benefits/subsidies.

SNZ publishes data from the NZ Income survey annually (as a supplement to the Household Labour Force Survey). In this survey, weekly income is defined as the income received before tax from all sources, such as wages, salary, self-employment, government transfers, private superannuation and pension schemes, annuities and investment income. It measures the income received over an average week in the June quarter. Average weekly income for all people is the total of weekly income for the working-age population, divided by the working-age population.

Over the past decade, both Auckland and Wellington have maintained a consistent wage premium over the rest of the country.[6] Auckland also has a higher proportion of employees in high-wage industries. Average weekly earnings per household in the Auckland region were NZ$913 in June 2009. This was 5 per cent

[6] Data sourced from http://monitorauckland.arc.govt.nz

above the New Zealand average of NZ$868. Interestingly, average weekly earnings per household did however drop by NZ$6 over the year to June 2009. For assessing average weekly household incomes for the comparator cities, calculations were made using official reported statistics. It was not possible to get consistent data for a comparable year, but adjustments were made to figures to convert them to 2006 US dollar equivalents. Data was sourced for the 2006 year, but was not available for Copenhagen (data 2007 Census was used) or Seattle (data from the 2008 King Country Census was used).[7]

In comparing average weekly household incomes across the comparator cities from these estimates (converting local currencies to US dollars), Auckland had the second lowest level (US$849), above Adelaide (Table 3.1). Average weekly household incomes in Copenhagen (US$1,757) were double that of Auckland.

Table 3.1: Average weekly household incomes in US dollar equivalent, 2006

| Auckland | Copenhagen[1] | Seattle[2] | Vancouver | Brisbane | Melbourne | Adelaide |
|---|---|---|---|---|---|---|
| 849 | 1,757 | 1,185 | 1,202 | 898 | 872 | 747 |

Sources: [1] *Data from 2007 Census*; [2] *Data estimated from 2008 King County Census Other sources Censuses 2006*

This indicator of average weekly household incomes is estimated from different data sources that are not directly comparable. The most appropriate data sources were chosen, and consideration was taken to reduce estimation bias. However, caution is warranted in their interpretation, and they should be treated as estimates. Direct comparison of income levels should be treated with caution, as they do not indicate the purchasing power of that income. Attention is drawn to Section 5.2.5 which discusses the average wage rates of different cities using a purchasing power parity approach. The distribution of income in an economy is an important indicator, revealing how concentrated wealth is.

### 3.2.2 GINI COEFFICIENT

While acknowledging that household size, composition and preferences differ markedly, and that these attributes affect the utility experienced by different households from incomes received, income distributions are considered to be an important measure of living standards. It is implicitly assumed that a certain level of equity in incomes is desirable, on social justice grounds. For one, it is assumed that an equitable distribution of incomes amongst a population will maintain cohesion within a society and reduce conflict. Additionally, it is reasoned that, because of declining marginal utility, additional units of income received by the very wealthy will not provide as significant benefits as additional units of income received by the very poor. The Gini coefficient is a commonly utilised indicator of income distribution, recording the ratio of income distribution per quintile. Specifically, Gini coefficients, G, are calculated using this formula:

$$G = \frac{\sum_{i=1}^{n} (2i-n-1)X_i}{n \sum_{i=1}^{n} X_i}$$

where $n$ is the number of income groups (Quintiles), $i$ is the rank value in ascending order (1 to 5) and $X_i$ is the average annual income in each income interval. A Gini coefficient of 0 indicates a complete equal distribution of incomes, while a value of 1 indicates complete inequality, or all income is held by a single quintile.

[7] Data for Copenhagen sourced from the 2007 Census from www.skm.dk; for Auckland, sourced from the Household Income survey http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/income-tables.aspx; for Vancouver from Census data www.bcstats.gov.bc.ca; for Seattle from Census data http://www.census.gov/hhes/www/income/data/historical/metro/msa1.html and for the Australian cities from Census data from http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Census+data

Comparable Gini coefficients were available at a national level, from the United Nations database. Denmark has the most equal distribution of incomes in the world, with a coefficient of 0.24. Of the five countries, New Zealand had incomes more equally distributed only than the United States, and the levels of income distribution are similar to Australia, and slightly more unequal than Canada.

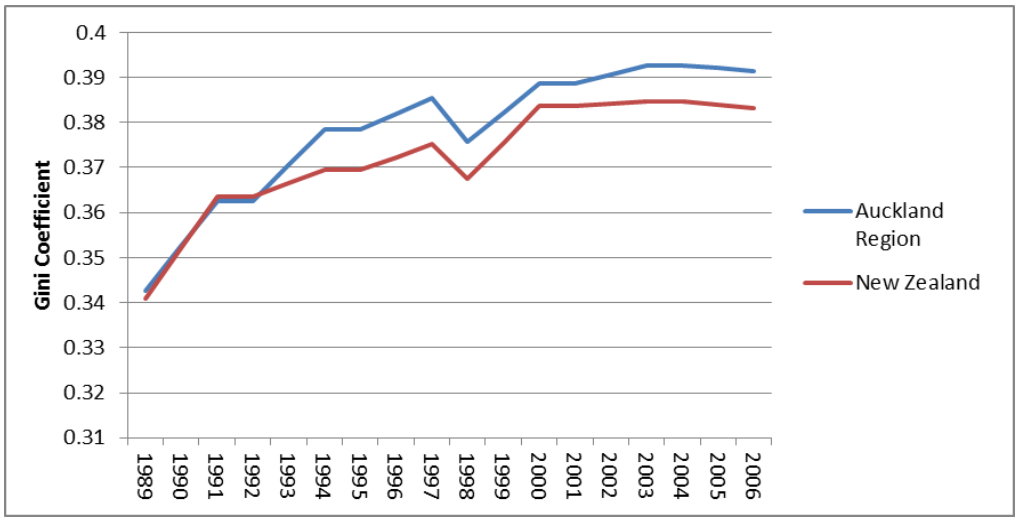
Table 3.2: Gini Coefficient

| | Denmark | Canada | Australia | New Zealand | United States |
|---|---|---|---|---|---|
| **Gini Coefficient** | 0.247 | 0.326 | 0.352 | 0.362 | 0.408 |

*Source: UN Human Development Index, 2009*

Although not directly comparable to the UN Gini coefficient, a New Zealand study into income inequality showed similar rates. Gini coefficients were measured for both the Auckland region and the country in its entirety (Figure 3.6). Looking at the time series over the last twenty years both Auckland and NZ have experienced general growth in the Gini coefficient over time, meaning that the level of income disparity has increased. For Auckland the coefficient increased from 0.34 in 2008 to 0.39 in 2006, and for the country as a whole the coefficient increased from 0.34 to 0.38 over the same period. Interestingly, whereas up until around 1992 the Gini coefficient was approximately the same for NZ and Auckland, post this date there was a strong divergence, with Auckland experiencing higher levels of inequity than New Zealand.

Figure 3.6: Auckland Region and New Zealand Gini coefficients 1989-2006




*Source: Market Economics Ltd, based on Statistics New Zealand data*

### 3.2.3 SYNTHESIS: INCOMES

Auckland maintained a consistent wage premium (5 per cent above) over the rest of the country for the last ten years. Auckland also has a higher proportion of employees in high-wage industries. With regards the comparator international cities, Auckland's household incomes were low, behind all the city-regions except for Adelaide. Copenhagen had average household incomes double that of Auckland. In terms of income distribution, New Zealand had incomes more equally distributed only than the United States, (although New Zealand's distribution was similar to Australia's). New Zealand's income distribution was slightly more unequal than Canada's. For New Zealand, income disparity has increased over the last twenty years, but Auckland has even higher income inequity than the national average.

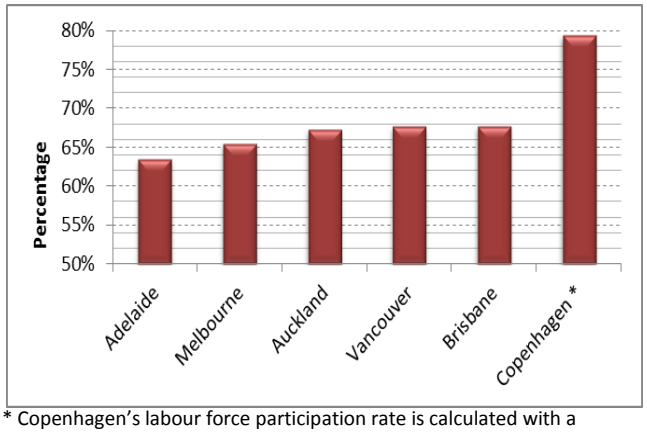
## 3.3 EMPLOYMENT

Employment provides an income, which directly relates to an individual's standard of living and an ability to sustain themselves. Employment indicators are important as they mark the boundaries between social and economic outcomes. Overall performance of the city-region is affected, if employment is not utilised. It can result in a loss of output, be costly to the government in terms of providing for those out of work, and can have psychological effects on those unemployed. This section explores three aspects of employment in the comparator city-regions. An indicator of labour force participation rates in each city region is presented, along with the unemployment rate, and rates of unemployment across ethnic groups.

### 3.3.1 LABOUR FORCE PARTICIPATION RATE

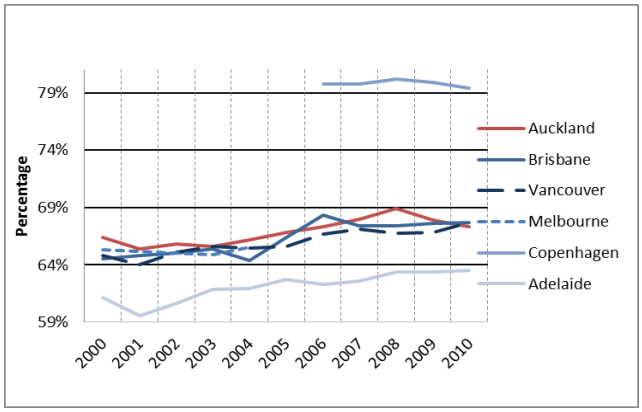
An understanding of the labour force participation rate is fundamental as it is a key component for long term economic growth. The labour force participation rate shows the total labour force as a percentage of the working age population. It is sometimes called the economic activity rate, and it provides an indication of the relative size of the supply of labour available for the production of goods and services. Labour force participation decisions also have important implications for the distribution of income. Generally in the more developed economies and comparator cities, the labour force participation rate increased significantly in the twentieth century, largely due to the increasing number of women in the workplace. For the second quarter of 2010, the labour force participation rate for Auckland was similar for the comparator cities, with the exception of Copenhagen (Figure 3.7). This however is due to a difference in the calculation of Copenhagen's rate.

Figure 3.7: Labour force participation rate, 2010 (second quarter)




* Copenhagen's labour force participation rate is calculated with a different definition for the working age population. It is defined as those aged 15-66 but, it is 15+ for everywhere else.

Figure 3.8: Changes in labour force participation rates (2000 – 2010)




*Source: SNZ; ABS; Stats Denmark; Statistics Canada/BC Stats*

In 2000, Auckland had the highest Labour force participation rate, followed by Melbourne, Vancouver, Brisbane and Adelaide, which was significantly lower. In Auckland, the labour force participation rate had been increasing steadily from just under 66 per cent in 2000 to just under 69 per cent at its ten year high, in 2009 (Figure 3.8). However, the recession that hit the world economy in late 2008 reversed this trend. This was similar for Copenhagen and Vancouver, whereas participation rates in the Australian city regions were not affected to any great extent, and Adelaide actually increased by over a percentage point during the recession.

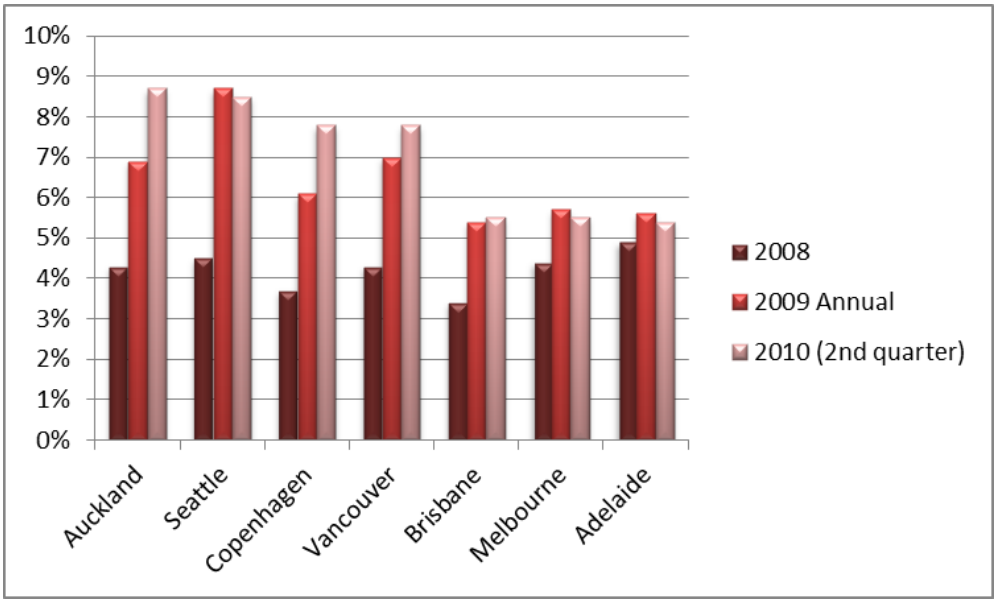
### 3.3.2 UNEMPLOYMENT RATE

The unemployment rate of an economy is the number of unemployed persons expressed as a percentage of the labour force. The number of unemployed persons, in turn, is defined as the total number of people aged 15 years and over who are not employed and who are actively seeking and available for paid work. The unemployment rate is a key indicator of labour market outcomes reflecting overall economic conditions and the ease with which people are able to move into employment.

Overall the unemployment rate in Auckland was the highest of the comparator city-regions (Figure 3.9), in the second quarter of 2010, at 8.7 per cent. The unemployment rate in Seattle was as high (annual average) in 2009, but the static rate in the second quarter of 2010 showed a drop. Copenhagen had the third highest rate in 2010, at 7.8 per cent. The lowest rate of comparator city-regions was Adelaide, at 5.4 per cent. The rise in unemployment rates over the three years is evidence of the global recession, with unemployment usually a lagging economic indicator.

The overall rate of unemployment for a city-region can mask significant trends within the indicator. This is especially the case for Auckland, as the rates are particularly high for segments of the population. In particular, there are strong disparities between different age and ethnicity groups. Youth unemployment is a significant problem for Auckland, with a staggering 29.9 per cent among 15 to 19 year olds and 16.6 per cent among 20 to 24 year olds (in the June quarter).

Figure 3.9: Unemployment rates, comparator city-regions




*Source: SNZ Household Labour Force Survey; ABS Regional profile/Labour Force Survey; StatBank Denmark Labour Force Survey; Statistics Canada Labour Force Survey/ British Columbia Labour Force Annual Characteristics*

With regards to ethnicity, Pacific people and Māori continue to have higher rates of unemployment. Pacific unemployment was 15.2 per cent in the year to June 2010, with Māori just below that rate, with 14.4 per cent. The comparator countries (with the exception of Copenhagen) are unique as they have concentrations of indigenous peoples. In Vancouver, First Nation individuals are overrepresented in terms of unemployment and unemployment rates are almost double the total unemployment rate.

### 3.3.3 UNEMPLOYMENT BY ETHNIC GROUP

Accessing and utilising diversity in the workplace has the potential to contribute towards economic growth. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality or citizenship. It is self-reported in the Census. People can identify with more than one ethnicity, and it is not necessarily the same as birthplace. Despite the potential advantages of diversity, some ethnic groups face barriers to participate in the mainstream economy. The level of unemployment within the main ethnic groups is used as a proxy for the economic utilisation of the different groups. A summary of recently released unemployment rates for Auckland by ethnic group is presented in Table 3.3.

Table 3.3: Unemployment by Ethnic Group

| | European | Asian | Māori | MELAA[1] | Pacific Island | Total |
|---|---|---|---|---|---|---|
| Auckland | 5.7% | 9.4% | 14.4% | 7.2% | 15.2% | 7.8% |

1 - Middle Eastern/Latin American/African

*Source: SNZ: Household Labour Force Survey. Year end June 2010*

The Pacific Islander communities had the highest annual average unemployment rate of 15.2 per cent, at June 2010. This was followed by Māori (14.4%) and Asian (9.4%) whose rates were both above the regional average. Middle Eastern/Latin American/African and European had unemployment rates below the regional average, with 7.2 per cent and 5.7 per cent respectively.

As there are such higher unemployment levels for most ethnicities above European rates (nearly three times as high for Māori and Pacific Islanders), this points toward a potential under-utilisation of diversity in the region. The disparity between European and Asian unemployment could potentially be due to language barriers and/or a lack of access to job networks.[8]

### 3.3.4 SYNTHESIS: EMPLOYMENT

The labour force participation rate is similar in the comparator cities, ranging between 62 and 65 per cent, indicating similar structuration of the labour market. Copenhagen's rate is markedly different, but not comparable as there is a different definition used for calculating the Danish rate (they do not include retired people in their calculation). The unemployment rate in Auckland was the highest of the comparator cities in the most recent quarter. Interestingly the unemployment rate for the Australian city-regions was much lower, confirming the resilience of their economies during the recent global recession. Youth unemployment is a significant problem in Auckland, as are ethnic differences in Auckland's labour market.

[8] For further research in this area which also shows the strength of migrant networks, see Spoonley *et al.* (2010). Bamboo Networks: Chinese Employers and Employees in Auckland.

## 3.4 INDUSTRY AGGLOMERATION

Theories of the firm and strategic management argue that competitive advantage originates in the development and exploitation of firm-specific assets or capabilities that may be internal or external to the firm. Dense concentrations of economic activity are generally seen as giving rise to increasing returns that may be shared by business units that co-locate in particular locations. These (external) benefits of clustering are typically associated with agglomeration.

Agglomeration refers to the spatial density of economic activity and there are several benefits to agglomeration. These benefits manifest through reduced transaction costs, labour markets deepening and increased specialisation. A further benefit of agglomeration is the sharing of knowledge. Communication and information sharing is more likely to occur between firms and organisations such as universities and think-tanks if they are closely located. Combined these externalities all help to raise productivity.

Ciccone and Hall (1996) found that over half of the variation in the productivity levels of different areas can be explained by the differences in the density of economic activity. Furthermore, according to their estimates, a doubling of employment density in an area is likely to increase the average level of output per worker by 6 per cent.[9] More recent studies estimate that this is between 3 and 6 per cent.[10]

It is recognised that the benefits of agglomeration can be limited by congestion, pollution and a loss of amenity. Investment in transportation infrastructure and ensuring there is enough vacant space for workers to accommodate workers can help alleviate this limitation. The effect of congestion limiting agglomeration means that there are two relationships that need to be focused on, that between agglomeration and productivity as well as that between congestion and agglomeration. However these negative externalities[11] are beyond the scope of this paper.

### 3.4.1 AGGLOMERATION

There are a small number of empirical studies that estimate the strength of agglomeration effects on productivity in New Zealand and the main papers include:

- Assessing Agglomeration Impacts in Auckland: Phase 1, MED Occasional Paper 08/05,
- Assessing Agglomeration Impacts in Auckland: Phase 2, MED Occasional Paper 08/06,
- Labour Productivity in Auckland Firms, Motu Working Paper 08-12.
- Agglomeration Elasticities in New Zealand. Motu Working Paper 09-06.
- Agglomeration Elasticities and Firm Heterogeneity, SERC Discussion Paper 43

In phase 1 of assessing agglomeration impacts in Auckland, Williamson *et al* (2008a) report an elasticity of around 0.03 between employment density and average earnings in Auckland using data from the 2001 Census. This study replicated the methodology used in a London study on agglomeration to understand the dynamics of agglomeration in Auckland.

Earnings were used as a proxy for productivity which was in line with international research on the benefits of agglomeration. A positive relationship between employment density and earnings for the different

[9] Antonio Ciccone and Robert E. Hall, Productivity and the Density of Economic Activity, The American Economic Review, Vol. 86, No.1. (Mar., 1996), pp.54-70.
[10] Assessing Agglomeration Impacts in Auckland: Phase 1
[11] However, in an equilibrium, dis-amenities from agglomeration on the side of households may be offset the productivity advantages on the side of firms (Ciccone and Hall; 1996 p.55).

suburbs of Auckland City was found. Their modeling suggested that an increase of employment density from 10 workers per hectare to 100 per hectare is associated with an increase in average earnings of 30 per cent, implying an elasticity of 0.03 (3%). In economics, elasticity is the ratio of the percent change in one variable to the percent change in another variable. It is a tool for measuring the responsiveness of a function to changes in parameters in a unit-less way. The higher the elasticity, the more responsive a change in one variable is to another being tested. Agglomeration elasticity measures how a change in density affects the change in earnings. The relationship was tested in the other territorial authorities in the region and although the relationships were not as statistically robust as in Auckland, the positive relationship between employment density and productivity held. Interestingly the study also revealed that although Auckland is performing relatively well, congestion in the city is likely to be limiting agglomeration and its associated benefits. They found that from 2000-2004 employment in the central business district grew by only 0.6 per cent per annum whereas at the same time employment in Auckland City grew by 2.8 per cent per annum and by 3.6 per cent in the Auckland region overall. They suggest that part of the reason for this comparatively low growth may be attributed to congestion.

In phase 2 of the agglomeration study, Williamson *et al.* (2008b) extend this analysis by adjusting for differences in industry and qualification composition of different areas, with a resulting elasticity estimate of 9.9 per cent. Maré (2008) examines the relationship between employment density and labour productivity, and estimates a cross sectional elasticity of 9 per cent between area units within the Auckland region. Controlling for area fixed effects reduces the estimated elasticity to 5 per cent. These estimates control for 3-digit industry composition, but not for capital intensity of firms.

Table 3.4: Agglomeration – Derived Relationships (New Zealand)

| | Sector | Return to scale | Agglomeration Elasticity | Labour augmenting | Capital Augmenting | Intermediate Consumption Augmenting | Direct Effect |
|---|---|---|---|---|---|---|---|
| A | Agriculture, Forestry & Fishing | 1.023 | -0.107 | 0.008 | -0.18 | 0.042 | 0.022 |
| B | Mining & Quarrying | 0.997 | 0.022 | -0.18 | -1.195 | 0.409 | 0.988 |
| C | Manufacturing | 1.069 | -0.012 | 0.042 | 0.193 | -0.462 | 0.215 |
| D | Electricity | | | | | | |
| E | Construction | 1.067 | 0.038 | 0.012 | 0.124 | -0.377 | 0.28 |
| F | Wholesale Trade | 1.029 | 0.066 | 0.033 | -0.02 | -0.385 | 0.438 |
| G | Retail Trade | 1.071 | 0.037 | 0.046 | 0.14 | -0.199 | 0.051 |
| H | Accommodation & Cafes | 1.073 | -0.015 | 0.066 | 0.171 | -0.493 | 0.241 |
| I | Transport & Storage | 1.081 | 0.032 | 0.017 | 0.119 | -0.348 | 0.245 |
| J | Communication Service | 1.07 | -0.026 | 0.023 | 0.176 | -0.307 | 0.082 |
| K | Finance and Insurance | 0.898 | -0.028 | -0.014 | 0.278 | -0.417 | 0.126 |
| L | Property & Bus Services | 0.98 | 0.054 | 0.025 | 0.162 | -0.361 | 0.228 |
| M | Government Administration | | | | | | |
| N | Education | 1.123 | 0.065 | 0.082 | -0.223 | -0.642 | 0.848 |
| O | Health & Community Services | 1.05 | 0.022 | 0.005 | -0.087 | 0.01 | 0.094 |
| P | Cultural and Recreational Services | 1.095 | -0.014 | 0.004 | 0.134 | -0.259 | 0.108 |
| | All Industries | 1.039 | 0.012 | 0.034 | 0.159 | -0.532 | 0.351 |

*Source: Maré and Graham (2009)*

Maré and Graham (2009) calculate industry specific patterns (returns to scale and agglomeration elasticity decomposition) and factor elasticities, notwithstanding a number of caveats. Using Motu's research, average effective densities were calculated for the country as a whole. Table 3.4 summarises Motu's

'derived relationships',[12] 'scale' and 'agglomeration' (from 'within enterprise') specification (by one-digit industry) and the average effective densities, for New Zealand.

At the New Zealand level, the sectors with the highest (estimated) return to scale are education, cultural and recreation services and transport and storage. In terms of agglomeration elasticities, wholesaling, education and, property and business services are estimated to have the highest elasticities.

In a recently released paper, Mare & Graham (2010) estimate the relationship between agglomeration and multi-factor productivity at the one digit industry level and by region using longitudinal firm level data for New Zealand. This paper adds to this literature on New Zealand agglomeration by presenting a micro-econometric analysis of the impact of agglomeration on firms' multi-factor productivity using a longitudinal unit record dataset with close to economy wide coverage of the New Zealand economy. This study presents the first set of agglomeration elasticity estimates directly estimated from New Zealand business-level data. The report shows that within high-density regions (Auckland, Wellington and Canterbury), more productive industries group into higher density areas. Interpreting the 'within local industry' estimates, the report finds that the three densest regions, Auckland, Wellington and Canterbury, have similar agglomeration elasticities of 0.056, 0.063, and 0.048 respectively. This is consistent with the decreasing returns to effective density found in the industry-specific estimates.

These research pieces served as a foundation for estimating the effective densities at a New Zealand level and to derive a factor with which to adjust Auckland level productivity. This productivity scalar is based on estimates of average agglomeration elasticities and effective densities which are derived from national level values. Table 3.5 summarises the average agglomeration elasticities and the Auckland region productivity factor.

### 3.4.1 SYNTHESIS: INDUSTRY AGGLOMERATION

The central theme of the current knowledge base is that agglomeration generally increases the productivity of labour and capital inputs, though the contributions of agglomeration through these channels are smaller than the direct (factor-neutral) effect. New Zealand specific research on agglomeration, effective densities and the interactions with productivity is not as advanced as it is in other parts of the world. The New Zealand Transport Agency and the Foundation for Research Science and Technology has funded research into agglomeration. Extending the understanding of Auckland specific agglomeration issues is a research gap identified through this study. The key sectors for Auckland identified in this study (see section 5.5) tend to fall into sectors that have comparatively large agglomeration elasticities (implying that a portion of their earnings/productivity results from agglomeration effects). They include health and community services, business services as well as wholesaling. A high agglomeration elasticity means that the industry obtains an advantage by virtue of its location, and proximity to other industry.

[12] This table has been copied from Agglomeration Elasticities in New Zealand, David C Maré & Daniel J Graham. Motu Working Paper 09-06. Motu Economic and Public Policy Research.

Table 3.5: Agglomeration elasticities and Auckland agglomeration productivity scalar

| | Sector | Agglomeration Elasticities (2000-2006) | Auckland Agglomeration Productivity Scalar |
|---|---|---|---|
| A | Agriculture, Forestry & Fishing | 0.032 | 1.000 |
| B | Mining & Quarrying | 0.035 | 0.982 |
| C | Manufacturing | 0.061 | 1.053 |
| D | Electricity | 0.035 | 1.025 |
| E | Construction | 0.056 | 1.042 |
| F | Wholesale Trade | 0.086 | 1.054 |
| G | Retail Trade | 0.086 | 1.052 |
| H | Accommodation & Cafes | 0.056 | 1.046 |
| I | Transport & Storage | 0.057 | 1.049 |
| J | Communication Service | 0.068 | 1.038 |
| K | Finance and Insurance | 0.087 | 1.031 |
| L | Property & Bus Services | 0.079 | 1.045 |
| M | Government Administration | 0.076 | 0.960 |
| N | Education | 0.076 | 1.060 |
| O | Health & Community Services | 0.083 | 1.057 |
| P | Cultural and Recreational Services | 0.053 | 1.041 |

*Source: Market Economics Calculations based on the five documents list on page 25*

# 4 CITY-REGION DISTINCTIVENESS

Distinctiveness embodies difference, variety and ultimately a positive sense of pride in uniqueness. City-regions carry distinct characteristics, and although subjective, embody the essence of the place. This distinctiveness emanates from the diversity of people, the way they perceive and are perceived by others, the image they portray, the sense of identity and connection to the place, including the built and natural environs. A city-region is distinguished by how connected the people are to each other, their place and to external people and places. As such, this forms how the social institutions manifest on a city-region level and overall contribute to the functioning of the city-region. Every city-region embodies layers of knowledge, from the indigenous tacit knowledge of understanding the 'beat' or the functioning of the city, to the structured technical knowledge associated with formalised structures and processes. City-region distinctiveness as a concept is difficult to articulate, but it exists, and it shapes the economy through the institutions and connections to economic activity. This section peels back some of the layers of distinctiveness, in an attempt to reveal the inter-connection between the unique features embodied in city-regions and their effect on economic outcomes. Distinctiveness is categorised according to the city-region's: (1) image and identity; (2) built environment; (3) connectivity; (4) knowledge resources; and (5) amenities.

## 4.1 IMAGE AND IDENTITY

A city-region's image is important, as it affects the desirability of that region. Image is important for the labour market and enticing people with desired skills, as with a mobile labour force, their choice of (re)location will be influenced by the image and brand portrayed by the various potential labour markets. Image is important for the competitiveness of a city-region, and it also distinguishes the unique characteristics of that city-region, due to history, path dependencies, the natural environment, the people and less tangible characteristics such as social institutions amongst other factors. This section looks at an array of indicators which help define Auckland as a unique city region, with a focus on attractiveness, leadership and equality. Image and identity indicators are largely qualitative, and based on perception surveys. It is not always possible to make international city-region comparisons – but where data was available, the comparable cities were discussed. Three indicators for attractiveness were chosen: city brand ranking; the number of signature events and the quality of living index. The concept of leadership was included as an indicator, due to its importance for the direction a city-region takes. Leadership contributes directly to the identity of a city region, and can influence significant economic outcomes.

Identity is important, and people are shaped by the place where they live. The people within a region also shape the city-region. The demographic structure of the city region is important, as are the growth and migration of people into the city-region. Census indicators were selected to represent this aspect of the demographic profile of a city-region, including the number of residents born overseas, the age structure of the population and significant demographic changes that have occurred, or are projected to occur. There are eight indicators chosen for image and identity.

### 4.1.1 CITY BRAND RANKING

During 2008 research was completed for Auckland Plus and the Ministry of Economic Development with the aim of developing a deeper understanding of Auckland's brand image in local and international markets. In addition, the research aimed to identify the key brand attributes Auckland needs to build to compete more effectively with other international cities. The findings of this research[13] are summarised in Table 4.1.

Table 4.1: Key findings regarding Auckland's Brand

| | |
|---|---|
| **In New Zealand:**<br>Auckland is a strong brand, excelling in knowledge and differentiation, but lagging the other major cities in esteem.<br>Strengths: unique, dynamic, progressive, trendy, glamorous, energetic, fun, daring, stylish, social.<br>Weaknesses: arrogant, service (helpful, obliging, caring, trustworthy, reliable), quality, value, simplicity (down-to-earth, straightforward). | **Within Auckland:**<br>Strengths: higher esteem than do those who live in other parts of the country.<br>Weaknesses: arrogant, unapproachable, lack of service, simple and good value. |
| **Target attributes**:<br>Strengths: seen to be strongly dynamic, progressive and energetic, and somewhat distinctive,<br>friendly and innovative<br>Weaknesses: perceptions of high performance, authentic and especially high quality | **Compared with brand New Zealand:**<br>Strengths: seen to be strongly unique, different, dynamic, progressive, energetic, daring and stylish<br>Weaknesses: Not well interchanged with NZ brand |
| **Image at a national level**:<br>Similar profile as international cities (seen as somewhat arrogant and unapproachable) | **On a global level**<br>Strengths: Basics are in place, need volume<br>Weakness: Auckland is a city which simply doesn't feature very strongly on most people's world map, and that's its only serious problem. The world view of respondents in Commonwealth countries is noticeably different from that of those in non-Commonwealth countries. |

*Source: Brand Capital (2009)*

Aucklanders generally have very positive feelings about the city but may be perceived as 'unapproachable' by other parts of New Zealand. Although Aucklanders and other New Zealanders have similar positive feelings about the country, non-Aucklanders are less complementary about the city. Non-residents also consider the city as unique, dynamic, progressive, trendy, energetic and fun, but not as high as Aucklanders themselves do.

In terms of Auckland's presence on the global stage, the 2007 Anholt City Brand Index ranks the city at 19th out of a possible 40. This index is made up of 6 dimensions with variables under each. The six dimensions are:

- Presence: How familiar people are with each city and how much of a contribution they believe that each city has made to the world in the last 30 years
- Place: Physical and climatic attributes of each city
- Prerequisites: Basic amenities such as affordable accommodation and the standard of schools, hospitals.
- People: the friendliness and safety of each city
- Pulse: the variety of activities available in each city

[13] The research was undertaken by Brand Capital for the Regional Auckland brand working group.

On the international scale, Auckland has a favourable City Brand Index (see Table 4.2) ranked 19th, but behind the comparator cities; Melbourne was 6th rank; Vancouver 8th and Copenhagen 16th. The other comparator cities were not covered in the Anholt City Brands Index Survey of Cities.

In summary, Auckland is a well regarded city but is limited by its exposure and attraction power. The city was seen as a friendly, safe and welcoming place. The main weakness for Auckland was in the 'presence' of the city and its contribution to the world stage.

Table 4.2: City Brands Index, 2007

| City | Rank | City | Rank | City | Rank |
|---|---|---|---|---|---|
| Sydney | 1 | Toronto | 11 | Dublin | 21 |
| London | 2 | Berlin | 12 | Edinburgh | 22 |
| Paris | 3 | Madrid | 13 | Singapore | 23 |
| New York | 4 | Geneva | 14 | Chicago | 24 |
| Rome | 5 | Milan | 15 | Oslo | 25 |
| **Melbourne** | **6** | **Copenhagen** | **16** | Hong Kong | 26 |
| Barcelona | 7 | Stockholm | 17 | The Hague | 27 |
| **Vancouver** | **8** | Brussels | 18 | Prague | 28 |
| Amsterdam | 9 | **Auckland** | **19** | Manchester | 29 |
| Montreal | 10 | Tokyo | 20 | Helsinki | 30 |

*Source: Anholt City Brand Index*

### 4.1.2 NUMBER OF SIGNATURE EVENTS

A signature event is an occasion or activity that brings people together in a particular place, usually with a sporting, social or cultural focus. Signature events are important for city-regions as they are means of showcasing the region, raising the international profile with the potential to attract additional visitors, boosting the visitor/tourism sector. Signature events are important for the 'softer' forms of capital in an economy, such as social capital and networks, as they bring businesses together and generate networks of association. If managed well, signature events can lead to a sense of pride-in-place, with positive social spin-offs, such as lower crime rates and greater sense of community. Signature events increasingly require coordinated management, public-private partnership and the maintenance/establishment of global networks for international events. In effect there is an array of infrastructure required to host major events – from quality venues, public transport links and accommodation. Scale becomes important with regards to the investment and cost/benefit decisions taken.

These events assist in stimulating economic activity through investment in infrastructure and an inflow of foreign visitors which translates into local employment creation and higher economic growth. Auckland hosts (and hosted) a number of recurring events most notably the Louis Vuitton Cup (sailing) and the ASB Classic & Heineken Open (tennis). It was estimated that the Louis Vuitton Pacific Series generated 589 million TV viewers during the 2009 event.[14] Like any competitive process, not all attempts to host signature events are successful – Auckland failed to secure some major events and lost others which were here, such as the Ellerslie International Flower Show and the Volvo Round the World Yacht Race. This has raised questions as to whether Auckland is losing ground and falling short of its potential[15] and whether there are

[14] Covec (2009): The impact of the Louis Vuitton Pacific Series 2009 on Auckland. Report prepared for Auckland Plus and Auckland City Council.
[15] Auckland Plus: (2008) Positioning Auckland as a Major Events Destination. Available at: www.aucklandplus.com

certain inhibitors to hosting and holding signature events. Auckland has hosted the 1990 Commonwealth Games, two America's Cups and successful annual events such as the unique Pasifika.

Apart from the recurring events, Auckland has also hosted a number of large, one-off events that raised the city's profile. Not all events are high profile (in the local media) but contribute towards the international exposure of the City. Examples of such events include the U19 Men's World Basketball Championship, the ISA World Junior Surfing Championships and the FIA World Rally Championship. This year's Rugby World Cup will also generate significant exposure for the city. The bulk of Auckland's large (international) events are sports related.

All the comparator cities host large, internationally focused events, although direct comparison in a quantitative way is difficult, given the lack of agreement over what defines a signature event. The comparator cities have also hosted a number of large one-off events with the United Nations Summit on Climate Change in Copenhagen being one prominent example. An event on such a scale would not be possible in Auckland, due to insufficient infrastructure for such a large event. Auckland's current conference capacity is limited, with a maximum of 1,500 delegates per conference (compare this with Christchurch which has a capacity of 2,500). Other notable events include: Olympics hosted in Melbourne, Seattle and Vancouver. The comparator cities all have a wide variety of events and festivals that cater to the regional needs.

### 4.1.3 PROPORTION OF PEOPLE IN CREATIVE INDUSTRIES, ARTS AND PERFORMING ARTS

The presence of creative industries contributes to the attractiveness of a city-region – making it the sort of place to attract talented workers. Certain components of the creative industries (such as design, film production) have the ability to add value to the economy. The creative industries contribute to the buzz of a city, and are central to regional and country branding.

Measuring the proportion of people employed in the creative industries shows the relative importance of this transformative force in an economy. Creative industry classifications (ANZSIC) include Performing Arts: Music and theatre productions, Recorded music retailing, Sound recording studios, Performing arts venues and Services to the arts not elsewhere classified. Visual Arts: Photographic studios, Advertising services, Architectural services, Commercial art and display services, Film and video production, Film and video distribution, Motion picture exhibition, Video hire outlets, Radio services, TV services and other creative arts.

In 2009, 25,327 employees, or 3.4 per cent of people employed (including owner/proprietors) in Auckland were in the creative industry. This is above the New Zealand rate of 2.4 per cent (Table 4.3). A breakdown by industry classification is given in Table 4.4. Design and Publishing are the two largest industries in terms of numbers employed, with 39 per cent and 22 per cent respectively. The numbers employed in publishing has declined over the last four years. Ten per cent of employees in Auckland's creative industries were in TV, with an additional 9 per cent in film and video and 7 per cent in visual arts. Five per cent were employed in radio and in performing arts; and 3 per cent of creative industry employees were in the digital media industry. Just one per cent was in the music industry. Over the last four years, there has been little change in the numbers employed in each industry – only the publishing industry had a slight decline in the numbers employed, whereas there were minor increases in all the other creative industries.

Table 4.3: Proportion of Employee Counts* in Creative Industries

| | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| Auckland | 3.5% | 3.5% | 3.5% | 3.4% |
| New Zealand | 2.5% | 2.5% | 2.5% | 2.4% |

** Note figures are modified employee counts, which includes owner/proprietors*

*Source: Economic Futures Model, ARC and Statistics NZ Business Demographic Data.*

Table 4.4: Employment in Auckland's Creative Industries (Modified Employee Counts-MECs)

| | 2006 | | 2007 | | 2008 | | 2009 | |
|---|---|---|---|---|---|---|---|---|
| Design | 9,586 | 38% | 10,250 | 39% | 10,908 | 40% | 9,777 | 39% |
| Publishing | 6,723 | 27% | 6,176 | 23% | 6,244 | 23% | 5,501 | 22% |
| TV | 2,252 | 9% | 2,424 | 9% | 2,425 | 9% | 2,551 | 10% |
| Film, Video | 1,944 | 8% | 2,461 | 9% | 2,424 | 9% | 2,246 | 9% |
| Visual Arts | 1,644 | 7% | 1,696 | 6% | 1,658 | 6% | 1,667 | 7% |
| Radio | 1,066 | 4% | 1,159 | 4% | 1,165 | 4% | 1,238 | 5% |
| Performing Arts | 911 | 4% | 956 | 4% | 1,085 | 4% | 1,136 | 5% |
| Digital Media | 841 | 3% | 988 | 4% | 927 | 3% | 895 | 3% |
| Music | 304 | 1% | 283 | 1% | 322 | 1% | 317 | 1% |
| Total Creative Industry | 25,270 | | 26,394 | | 27,158 | | 25,327 | |
| Total Auckland MECs | 725,788 | | 748,940 | | 772,204 | | 740,553 | |

*Source: Market Economics database; SNZ*

A cursory comparison of the comparator city-regions is available for the Australian cities and Vancouver (Table 4.5). The Australian data was sourced from a (State) capital city study undertaken using Census 2001 data[16]. However the industry classification used differs to that in the Auckland study (Table 4.4: Employment in Auckland's Creative Industries (Modified Employee Counts-MECs) so a direct comparison is not possible. Melbourne had 4.1 per cent of its people employed in the creative industries; Brisbane had 3.4 per cent and Adelaide had 3.3 per cent in 2001. The figure for Vancouver is higher, reported at 6.5 per cent. The definition of creative industries was aggregated for Vancouver – measuring those employed in 'Information and Cultural Industries' and 'Arts, Entertainment and Recreation' (2.2%).[17] Therefore the figures are not directly comparable. It is possible that the Vancouver classification of creative industry includes more categories than the Australian/New Zealand, and thus may be over inflated.

Table 4.5: Proportion of workforce employed in creative industry

| Vancouver | Melbourne | Brisbane | Adelaide | Auckland |
|---|---|---|---|---|
| 6.5% | 4.1% | 3.4% | 3.3% | 3.5% |

*Source: ABS Census 2001; BC Census 2001; SNZ*

[16] Cox, S. (2003) Brisbane's Creative Industries 2003.

[17] Data sourced from http://vancouver.ca/commsvcs/cultural/policy/plan/creativecity/pdf/covlabourforce.pdf
The Arts, Entertainment and Recreation category included Performing Arts, Spectator Sports and Related Industries, Heritage institutions; Amusement, Gambling and Recreation Industries. The Information and Cultural Industries category included Publishing industries, motion picture and sound recording, broadcasting, internet publishing and broadcasting, telecommunications, ISP, Web search and data processing services, other information services.

### 4.1.4 QUALITY OF LIVING INDEX

The term quality of life is used to evaluate the general well-being of individuals and societies. The term is used in a wide range of contexts, but should not be confused with the standard of living, which primarily focuses on incomes, purchasing power and differentials. Quality of life is a more encompassing concept, and contributes to a city-region's distinctiveness. In New Zealand, considerable work has been undertaken to measure the quality of life in urban areas[18], in order to provide information that contributes to the understanding of social, economic and environmental conditions in the major New Zealand cities/urban areas. This research encompasses five of the seven territorial authorities in the Auckland region – omitting Franklin and Papakura, but data for the five Auckland territorial authorities were not aggregated. Nevertheless the (NZ) Quality of Living Survey provides a rich indicator set on: People; Knowledge and Skills; Economic Standard of Living; Economic Development; Housing; Health; Natural Environment; Built Environment; Safety; Social Connectedness; and Civil and Political Rights.

The term quality of life is also used by politicians and economists to measure the liveability of a given city or nation. The company, Mercer, produce city rankings from a worldwide 'Quality of Living Survey'. The survey is undertaken annually, primarily with a company (enterprise) focus, to enable international companies who relocate staff worldwide to recompense staff accordingly. The Mercer Survey evaluates the quality of living experienced by expatriates, and criteria are selected with this in mind. This is done through a combination of subjective life-satisfaction surveys and objective determinants of quality of living such as divorce rates, safety, and infrastructure.

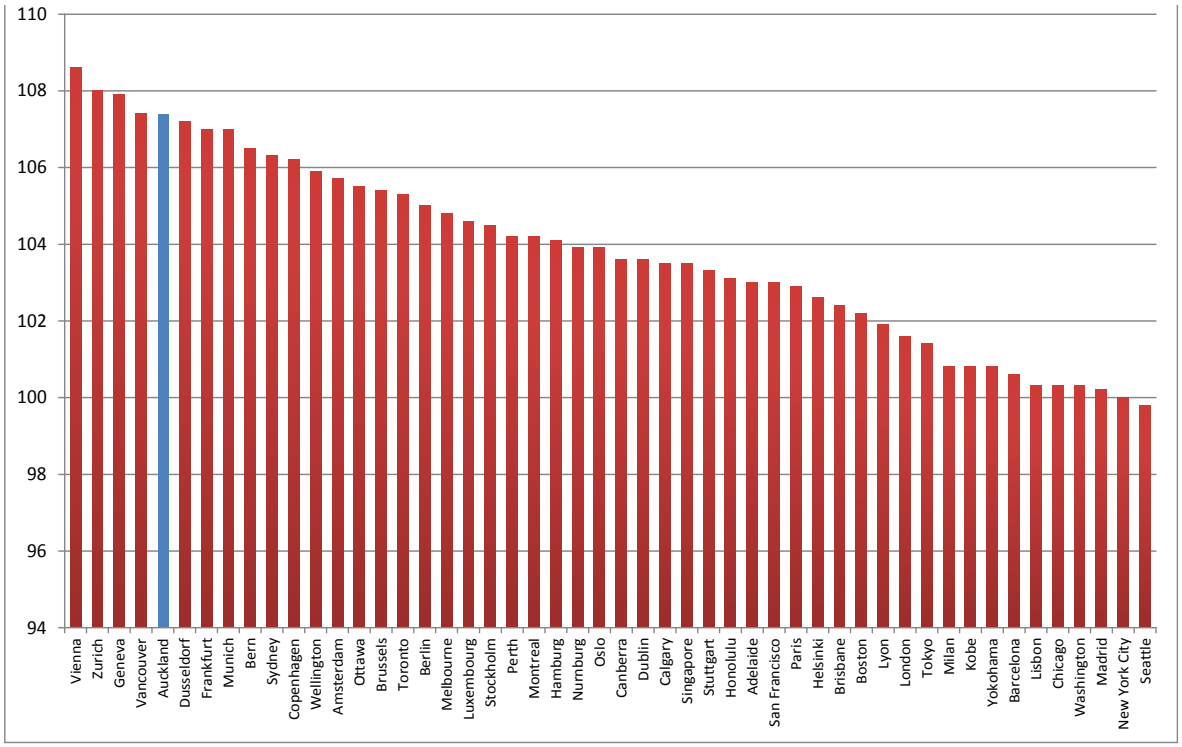
Such measures relate more broadly to the population of a city, state, or country, rather than the individual level. However, similar to the Quality of Living Survey, the unit of analysis for Auckland is the city of Auckland, not the region, so caution should be exercised as it is a partial indicator for the Auckland region. Within the Mercer Quality of Living study, information is collected on more than 420 cities. Local living conditions are evaluated and analysed according to 39 factors, grouped in 10 categories:

1. Political and social environment (including political stability, crime, law enforcement)
2. Economic environment (including currency exchange regulations, banking services)
3. Socio-cultural environment (including censorship, limitations on personal freedom)
4. Health and sanitation (including medical supplies and services, infectious diseases, sewage, waste disposal, air pollution)
5. Schools and education (including standard and availability of international schools)
6. Public services and transportation (including electricity, water, public transport, traffic congestion)
7. Recreation (including restaurants, theatres, cinemas, sports and leisure)
8. Consumer goods (including availability of food/daily consumption items, cars)
9. Housing (including housing, household appliances, furniture, maintenance services)
10. Natural environment (including climate, record of natural disasters).

Out of the 420 cities surveyed, Auckland City was ranked 4$^{th}$ equal with Vancouver. Auckland City consistently ranked as one of the best cities in the world in which to live based on the total score in recent years. Of the seven cities in this study these were the highest ranks given and were followed by Copenhagen (11$^{th}$), Melbourne (18$^{th}$), Adelaide (32$^{nd}$), Brisbane (36$^{th}$), and Seattle (50$^{th}$). A selection of international cities' position using the 2010 survey results is shown in Figure 4.1.

[18] See http://www.bigcities.govt.nz/

Figure 4.1: Mercer Quality of Living Rankings (2010)




*Source: Mercer Quality of Living, 2010*

Table 4.6 shows how the comparator cities scored on each of these factors *relative* to Auckland. Aside from other New Zealand cities, Auckland scored the highest in terms of its political and social environment. This element of the survey took into account the city's relationship with other countries, internal stability, crime, law enforcement and ease of exit and entry.

Table 4.6: Auckland Comparison with Other Cities –Mercer Quality of Living Survey[19]

| Index Categories | Base City Auckland | Copenhagen | Adelaide | Brisbane | Melbourne | Sydney | Vancouver | Christchurch | Wellington | Busan | Seattle |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Political and social environment | 100 | 99 | 90 | 90 | 94 | 94 | 98 | 100 | 100 | 78 | 79 |
| Economic environment | 100 | 100 | 90 | 90 | 90 | 97 | 97 | 100 | 100 | 82 | 90 |
| Socio-cultural environment | 100 | 105 | 100 | 100 | 100 | 100 | 105 | 100 | 100 | 95 | 105 |
| Medical and health considerations | 100 | 99 | 96 | 93 | 95 | 91 | 101 | 97 | 100 | 74 | 96 |
| Schools and education | 100 | 113 | 88 | 88 | 100 | 113 | 100 | 75 | 75 | 75 | 100 |
| Public services and transport | 100 | 109 | 101 | 101 | 101 | 106 | 107 | 90 | 99 | 89 | 98 |
| Recreation | 100 | 94 | 102 | 103 | 105 | 108 | 100 | 90 | 98 | 68 | 97 |
| Consumer goods | 100 | 101 | 99 | 99 | 99 | 100 | 101 | 99 | 99 | 80 | 101 |
| Housing | 100 | 95 | 100 | 100 | 100 | 100 | 95 | 89 | 100 | 80 | 95 |
| Natural environment | 100 | 74 | 93 | 93 | 94 | 104 | 91 | 100 | 100 | 57 | 94 |
| **TOTAL INDEX** | **100** | **99** | **96** | **95** | **97** | **99** | **100** | **96** | **99** | **77** | **93** |

*Source: Mercer Quality of Living, 2010*

The second factor Mercer's Quality of Living Survey considered was each city's economic environment. This factor looked at the currency exchange regulations and the banking services. Auckland scored on par with Copenhagen, Christchurch and Wellington and ahead of the other selected comparison cities.

Of the comparison cities, Seattle, Vancouver and Copenhagen scored highest in terms of their socio-cultural environment, 5 per cent ahead of Auckland. This measure considered limitations on personal freedom and

[19] This data was sourced from Mercer Quality of Living Global HR Monitor 2009, accessed 1 October 2010.

media censorship. Auckland also scored well in terms of medical and health considerations. Of the comparison cities Vancouver had the highest score just 1 per cent above Auckland with the next highest score, equal with Wellington. Across the comparison cities the scores were more varied for the schools and education element of the survey. Copenhagen and Sydney had the highest scores, 13 per cent greater than the next highest which were Auckland, Melbourne, Vancouver and Seattle each with the same score. The public services and transport criteria considered the following factors: electricity, water availability, telephone, mail, public transport, traffic congestion and the airport. Auckland did not score as well in this factor as it did in the others. Of the comparison cities Copenhagen scored the highest, 9 per cent above Auckland, this was followed by Vancouver, Sydney, Melbourne, Brisbane, Adelaide and Auckland.

For the recreation criteria, Auckland scored ten out of ten for the choice of top class restaurants available and the organised sport and leisure activities on offer, the city scored 9 for its cinemas and 8 for the theatrical and musical performances. Each of the comparison cities had very similar scores for the consumer goods factor. This element of the survey considered daily consumption items, meat and fish, fruit and vegetables, alcoholic beverages and automobiles. For the housing criteria, Auckland scored highest equally with Adelaide, Brisbane, Melbourne, Sydney and Wellington. The final criterion considered in the survey was each city's natural environment. For this criteria, Sydney scored the highest but Auckland had the highest score of the comparator studies chosen for this research, equal with Christchurch and Wellington. This criterion took into account the climate and record of natural disasters.

Overall Auckland scored highest for the following criteria compared to the other comparison cities: the political and social environment, the economic environment, housing, the natural environment and the medical and health considerations.

### 4.1.5 LEADERSHIP

Leadership at a city-region level is crucial for economic development, as important decisions and the evaluation of trade-offs have to be made. Leadership embodies appropriate governance for that city-region. Leadership in this respect embodies the notion of a city-region having autonomy – being able to make decisions that affect the functioning of the area.

The issue of leadership for Auckland was discussed in a Royal Commission on Auckland's Governance research paper in 2008[20], and while this paper acknowledges that Auckland should not embark on a comparable international 'solution' to leadership and governance (given varying culture, history, legal systems and geopolitical factors across nations), it offers a rich insight into the form and functioning of leadership in an Auckland context.

As each comparator country has unique administrative structures, levels of civic engagement and political offices, it is difficult to settle on a comparable indicator. However, further qualitative research in this area is recommended. In addition an agreed indicator for leadership is required. Proxy indicators suggested include:

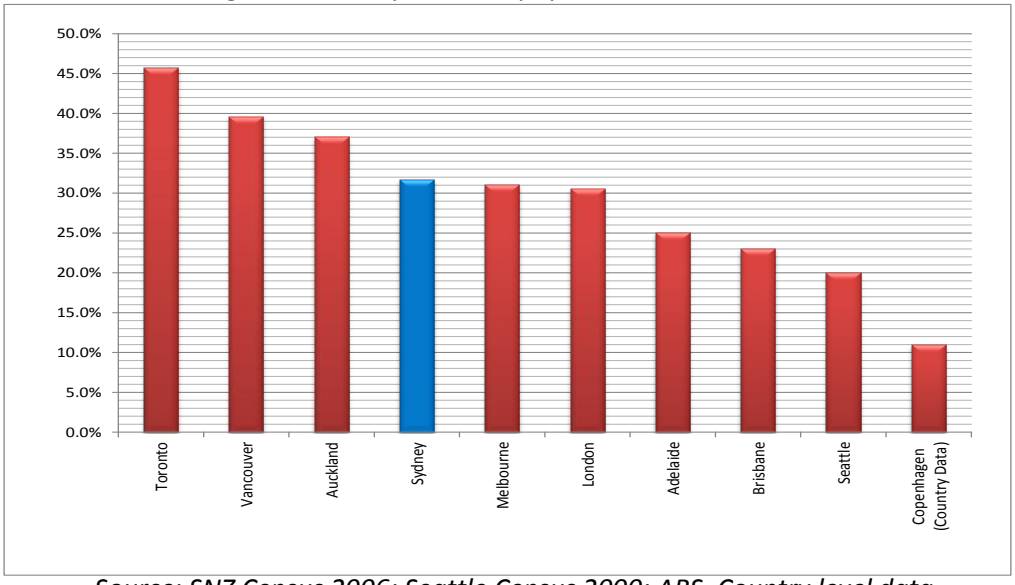
- Comparison of functions and responsibilities of Mayoral Office
- Evidence of strategic city-region decisions
- Evidence of flagship projects undertaken by Local Administration or Mayoral Office
- Voting patterns.

[20]Hambleton, R. (2008) Civic Leadership for Auckland. Royal Commission on Auckland's Governance Research Papers Part 11 Available at http://www.royalcommission.govt.nz/

### 4.1.6 NUMBER OF RESIDENTS WHO ARE BORN OVERSEAS

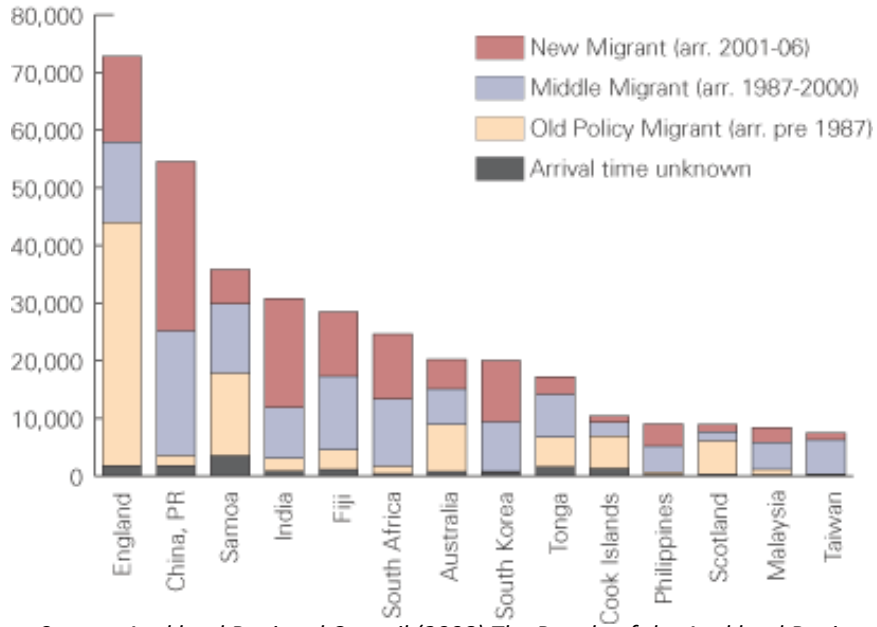
Some cities have concentrations of foreign-born residents. Auckland has a relatively diverse population and with more than a third (37%) of the region's population born overseas. This is higher than some of the large global cities such as London (30.5%) and Sydney (31.7%) but lower than Toronto (45.7%). Vancouver also has a large proportion of foreign-born residents (39%). Melbourne had the next most diverse population with 31 per cent of residents born overseas, followed by Adelaide (25%), Brisbane (23%), Seattle (17%) and Copenhagen (11%) - see Figures 4.2 and 4.3. Auckland's foreign-born population is dominated by migrants from the Asian countries representing an estimated 36.4 per cent of migrants. Two other groups are well represented including: Pacific Islanders (22.2%) and the United Kingdom and Ireland (20.1%). Other notable groups include Europe (5.8%), Australia (4.0%) and North America (1.9%). The balance of almost 10 per cent covers other nationalities.

Figure 4.2: Proportion of population born overseas




*Source: SNZ Census 2006; Seattle Census 2000; ABS. Country level data*

Figure 4.3: Number of overseas born by period of arrival in New Zealand



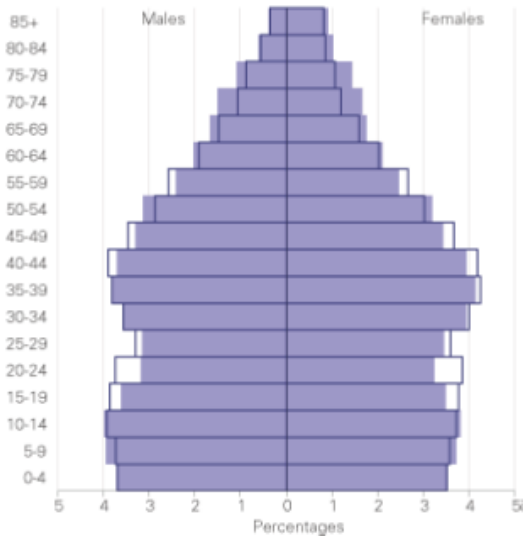

*Source: Auckland Regional Council (2008) The People of the Auckland Region.*

For Auckland, the steady increase in the percentage of the population who were born overseas came after the changes to New Zealand's immigration policy in 1987.[21] Patterns of migration and length of time living in New Zealand vary considerably across different migrant groups. The majority of the population born in England arrived in the period before the change of immigration policy in 1987, but a significant number arrived in the years between 2001 and 2006. Pacific migrants are also characterised by longer-term residence, although in each case there have also been considerable increases in recent years. Between the 2001 and 2006 censuses, the most notable increases were people from China and India, in each case more than doubling their populations over this period (Figure 4.3).

### 4.1.7 AGE STRUCTURE OF POPULATION

Overall, the Auckland region has a younger population than New Zealand as a whole. In 2006, the median age of Auckland residents was 33.9 years compared with 35.9 years nationally.[22] This is due to a combination of factors. The urban part of the Auckland region is a major centre for employment and education and study. In addition, some ethnic groups have comparatively high fertility rates, particularly the Pacific and Māori population. Some key features of the Auckland age structure are that Auckland region has proportionately fewer old people than New Zealand as a whole. The Auckland region is over represented in all age groups between 15 and 49 years (especially those aged between 15 and 30 years). There are more females than males in every age group over 30 years (Figure 4.4).

Figure 4.4: Age-Sex structure of Auckland region, compared with New Zealand



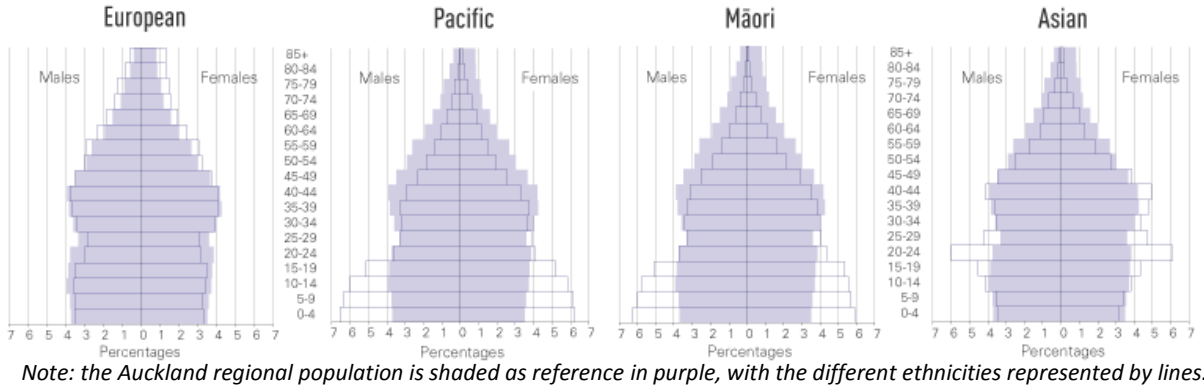

*Source: Auckland Regional Council (2008)*

There are salient ethnic differences in the age/sex structures of the different ethnic groups in Auckland. As touched on briefly in section 4.1.1, this is a result of different migration pathways and demographic characteristics. The age/sex characteristics of the European group are mainly a result of demographic changes that have taken place in recent decades within New Zealand (especially reduced birth rates and ageing population). Māori age structure is still much younger than the total population, as a result of high levels of fertility in the younger age cohorts and lower levels of life expectancy. The age/sex structure of Pacific peoples is similar to that of Māori, except that proportions of young people are even higher. Therefore population growth of Māori and Pacific Islanders is expected to be faster than in others, in the future. In both New Zealand and the Pacific nations of origin, fertility rates are relatively high, although within New Zealand these rates have declined with long term residency and with changes in socio-economic status. The effects of immigration policy on the Asian age/sex structure is clear, with relatively large numbers in the 15 to 24 year groups (particularly aged 20 to 24 years), reflecting large numbers of students arriving under the provisions of the international student visa (Figure 4.5). The higher rates of Pacific and Māori aged under 20 in the region, relative to the region's overall population structure,

[21] Auckland Regional Council (2008) *The People of the Auckland region*.
[22] This section has been taken directly from Auckland Regional Council (2008) The People of the Auckland region, p.7

is evident from the non-coloured boxes in Figure 4.5. Similarly there are more Europeans aged over 55, than the region's overall rate.

Figure 4.5: Auckland's age-sex structure by selected ethnicity




*Note: the Auckland regional population is shaded as reference in purple, with the different ethnicities represented by lines.*

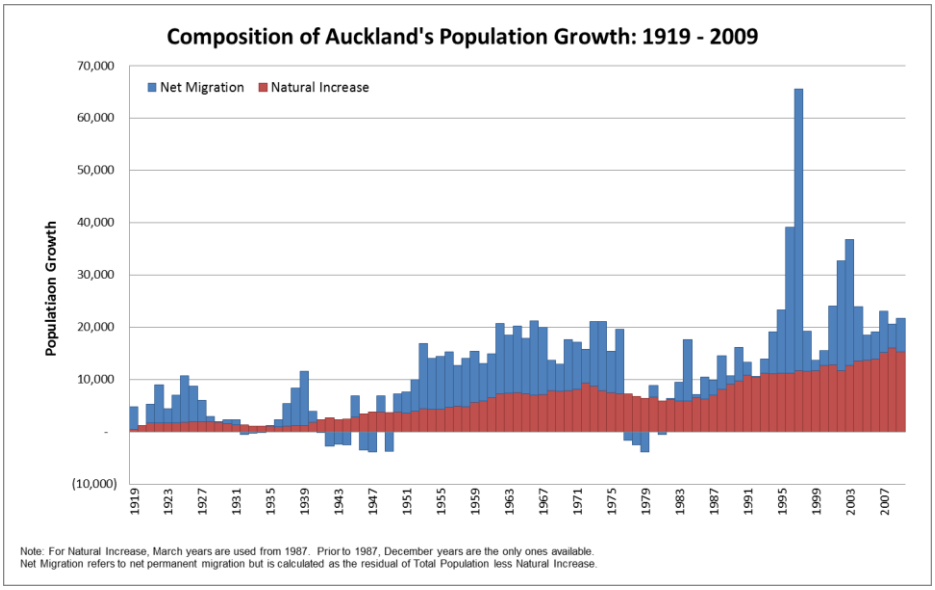
*Source: Auckland Regional Council (2008)*

The age structure of a population is important in terms of social and health services that are required by the population; and the levels of dependency within the population (i.e. the proportion in the working age population). Clearly there are differences amongst ethnic groups, which will impinge on the facilities and services required by each group.

### 4.1.8 HISTORIC AND PROJECTED GROWTH RATES OF POPULATION

Population growth occurs over time due to a combination of two things – natural increase (births minus deaths) and net migration (the movement to a city-region from other parts of the country or from overseas). Understanding the dynamics and structure of the population in a city-region indicates the future availability of labour and also enables better planning for the region.

Figure 4.6: Auckland's historic population growth, 1919 to 2006




*Source: Auckland Regional Council (2008) The People of the Auckland Region. Census 2006 Series*

Data is available in New Zealand from Statistics New Zealand's Census of Population and Dwellings. The indicator is updated every five years, the most recent being the Census of 2006. This section draws heavily from the Auckland Regional Council's projections and analysis of population change, based on Census

data.[23] In 2006, there were 1.3 million people living in the Auckland region, a third of the total of 4 million people in New Zealand. At the 2006 Census, about two thirds of Auckland region's residents had been living in the region five years earlier at the 2001 Census (most at the same address). A further 12 per cent were living in another part of New Zealand, 13 per cent were overseas and 7 per cent had not been born in 2001.

Figure 4.6 shows the composition of Auckland's historical population growth, 1919 to 2006. Natural increase has been and still is a constant and steady contributor to growth. In the Auckland region, rates of natural increase are sustained by a young age structure and substantial proportion of persons of working age and family formation age. There was consistent growth from net migration between 1950 and 1975. Between 1975 and 1980 there was net out migration, second only to the outmigration during the war years of the 1940s. There were significant spikes in the net migration between 1995 and 2000. Between 2001 and 2006, an estimated 66 per cent of the region's population growth came from immigration. The average rate of population growth in the region was 2.2 per cent in the decade from 1998 to 2008, compared with 1.3 per cent nationally.

Data was collected on population growth, for the longest timeframe that population data was available for each comparator city. For the period from 2001 to 2006, Auckland experienced the most rapid growth in population with the annual growth rate of 2.4 per cent, almost 3.5 times faster than that in Adelaide, which had a rate below 1 per cent. Copenhagen had the lowest rate, at just 0.5 per cent annual average between 2005 and 2009. The growth rate in Seattle was a bit higher than Adelaide at just 1 per cent per annum on average over the last decade. Brisbane's population grew at the second fastest rate of 1.8 per cent per annum between 2001 and 2006. Melbourne and Vancouver shared a similar growth rate of 1.5 per cent and 1.3 per cent respectively.

| | Auckland | Brisbane | Melbourne | Vancouver | Seattle | Adelaide | Copenhagen |
|---|---|---|---|---|---|---|---|
| 2001-2006 | 2.4% | 1.8% | 1.5% | 1.3% | 1.0% | 0.7% | - |
| Period* | 2.0%<br>1996-2009 | 1.8%<br>2001-2006 | 1.5%<br>2001-2006 | 1.5%<br>1996-2006 | 1.2%<br>2000-2009 | 0.7%<br>2001-2006 | 0.5%<br>2005-2009 |

**Source: Census data from the various countries.*

Table 4.7: Auckland Region Population Projections

| Period To March | Resident Population | Population Change | | | Natural Increase | | | | Net Migration |
|---|---|---|---|---|---|---|---|---|---|
| | | *Number* | *Rate (%)* | *Average Annual* | *Births* | *Deaths* | *Number* | *Rate, %)* | |
| 2006 | 1,371,000 | | | | | | | | |
| 2011 | 1,482,950 | 111,950 | 8.2% | 1.6% | 110,964 | 37,594 | 73,370 | 5.1 | 38,580 |
| 2016 | 1,596,817 | 113,867 | 7.7% | 1.5% | 112,352 | 40,065 | 72,287 | 4.7 | 41,580 |
| 2021 | 1,709,679 | 112,862 | 7.1% | 1.4% | 114,671 | 43,389 | 71,282 | 4.3 | 41,580 |
| 2026 | 1,820,565 | 110,885 | 6.5% | 1.3% | 117,184 | 47,879 | 69,305 | 3.9 | 41,580 |
| 2031 | 1,928,117 | 107,553 | 5.9% | 1.2% | 120,205 | 54,232 | 65,973 | 3.5 | 41,580 |
| 2036 | 2,028,530 | 100,413 | 5.2% | 1.0% | 123,662 | 64,830 | 58,833 | 3.0 | 41,580 |
| 2041 | 2,122,169 | 93,639 | 4.6% | 0.9% | 127,940 | 75,882 | 52,059 | 2.5 | 41,580 |
| 2046 | 2,209,898 | 87,729 | 4.1% | 0.8% | 132,213 | 86,064 | 46,149 | 2.1 | 41,580 |
| 2051 | 2,290,877 | 80,979 | 3.7% | 0.7% | 135,355 | 95,956 | 39,399 | 1.8 | 41,580 |

*Source: Auckland Regional Council Population Projections Model (medium assumption projections)*

[23] Auckland Regional Council (2008). The people of the Auckland Region. 2006 Census Series. Available at www.knowledgeauckland.org.nz. Population projections, using the ARC's population model.

The population of Auckland is expected to keep increasing, and the proportion of New Zealanders who live in the Auckland region will increase also. The ARC population projections indicate that the region will have 2 million residents by 2034. This would be an increase of approximately 500,000 residents in twenty five years, or an increase of one third of current people in the region (Table 4.7).

### 4.1.9 SYNTHESIS: IMAGE AND IDENTITY

Auckland is a migrant city, with 37 per cent of its population born overseas. Thus its sense of identity changes with the changing population, and perhaps means that the city is still in a process of self-identification. There are distinctive identities in the Auckland region. Only Vancouver had higher rates of overseas born residents. Interesting to note is the period of arrival for the new migrants and where they come from (based on migration policy), in terms of how they integrate with their new country, and the length of time they reside in the new country, in order to anchor their social institutions to that country, and develop connections and a sense of identity to the city-region. Migration to New Zealand pre 1980s was dominated by migrants from England, with a constant arrival of Pacific Islanders. From 1987 onwards, the new migrants tended to come predominantly from China, India, Fiji and South Africa. With such high rates of overseas born population, there are strong international networks held by Auckland residents. However, the city seems to be undercapitalizing on attracting or hosting signature events. Auckland has a strong city brand, and this may also be underutilized in terms of showcasing the city-region. In terms of international quality of living indices, Auckland city was ranked fourth equal with Vancouver, ahead of the other comparator cities. Thus, it is ranked highly internationally as a place to live/be relocated to, and therefore a desirable place to live. Auckland is perceived as having a strong brand, excelling in knowledge and differentiation, but lagging the other major cities in esteem. It is seen to be strongly dynamic, progressive and energetic, but on the flip side, the weaknesses were seen as the perception of high performance, authenticity and high quality, in terms of target attributes. On a global scale in terms of brand identity, Auckland is seen as a place where the basics are in place, but in general it doesn't feature very strongly on most people's world map.

In terms of hosting major events there are questions as to whether Auckland is losing ground and falling short of its potential and whether there are certain inhibitors to hosting and holding signature events, including the adequate infrastructure. All comparator cities host larger internationally focused events, although direct comparison in a quantitative way is difficult, not least given the difficulty in defining a signature event. Auckland has a greater share of workers in the creative industries than New Zealand as a whole, with design dominating the creative industries. Publishing, TV, film and video were also important creative industries. Although not completely comparable, the Australian cities had similar rates employed in creative industries, with Melbourne slightly higher.

## 4.2 BUILT ENVIRONMENT

Cities are defined by their built environment – it is what distinguishes them from less densely populated areas where people live. City-regions encompass not just the built environment, but a system of land (and perhaps sea), natural environment and accompanying eco-systems embodied in the geography of the city-region. The vernacular architecture, the availability of land, the preference for residential dwellings, the budget allocated to public buildings and infrastructure all influence the built environment of a city-region. This section assesses four aspects of the built environment: population density, the housing affordability of

the city-region, the stock of heritage buildings and a subjective indicator of the amount of attractive buildings to gauge the aesthetic or design element which distinguishes buildings within urban areas. The presence of a large volcanic field scattered across the Auckland isthmus – the resultant cones, lakes, lagoons, caldera, islands and depressions have influenced the shape of urban development. Further constraints on the urban form come from the two mountain ranges that border the Auckland urban area – the Waitakere Ranges to the north-west and the Hunua Ranges to the south-east. The Waitemata harbour to the east, and Manukau harbour to the west are separated by a thin isthmus. Early European settlement, which gave rise to the current urban form, originated around the ports and jetties of what is now the Auckland waterfront and Onehunga. These were the most important transport networks of the day. The transport networks have switched from sea to land based, and the built environment and urban form have spread along these land networks (Auckland Regional Council, 2010).

### 4.2.1 URBAN AREAS BY POPULATION DENSITY

Urban density is an important factor in understanding how city-regions function. The more compact a city is in terms of its land footprint, the lower the cost of transportation and cost of providing networked infrastructure and services. City-regions with scarce land supply face the opportunity costs of using greenfield land. There are economic, health and environmental trade-offs associated with differing urban densities, which can impact directly on economic outcomes.

> *'Historically, the development of Auckland's urban form has been characterised by growth in suburbs, sprawl and low density development, accompanied by a dependency on private motor vehicles to get around. Since the turn of the twenty first century however, there has been growth in the proportion of new housing developments that are medium density and apartments, particularly in the Central Business District, but also in fringe areas, as the urban limits are reached and the benefits of mixed-use and intensified development are realised by residents and developers'* (Auckland Regional Council, 2010:5).

The indicator chosen is urban area by population density. Note, this differs to the concept of 'urban density', which is a specific measurement of the population of an urbanised area, excluding non-urban land-uses (i.e. regional open space, agriculture and water-bodies) (Demographia, 2007). This is important for the Auckland region, where 89 per cent of the population live in 11 per cent of the (metropolitan) land area (Table 4.8: Auckland region population densities

Table 4.8: Auckland region population densities

| Area Definitions (2006) | Population (2006 Census) | Area (km) | Density (population per km$^2$) |
|---|---|---|---|
| Auckland region | 1,303,068 | 4,998.9 | 261 |
| Auckland Metropolitan area | 1,160,751 | 559.2 | 2076 |
| Auckland urbanised area | 1,156,623 | 482.9 | 2395 |

*Source: Auckland Regional Council population density calculations (Memorandum – September 2010)*

An urban area is defined by Demographia as a continuously built up land mass of urban development. It is generally the urban footprint – the lighted area that can be observed from an airplane on a clear night. Although urban areas may grow together, Demographia consider these separate, and the figures below confine the urban area to a single metropolitan area or labour market area. Hence the urban area of

Auckland below is cited as 531km$^2$, although the total land area of the Auckland region is 4998.9km$^2$ (ARC, 2010). Demographia's geographic boundaries are not completely aligned to the administrative units used in this study (as some use satellite photograph analysis). Also to note is that the reported data in the Demographia study differs from the official statistics published by Statistics New Zealand, and Demographia have a different methodology to measuring density for metropolitan areas that the OECD use (Table 4.99).

Table 4.9: Urban area by population density

| URBAN AREAS BY POPULATION DENSITY | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | Urban Area | Geography | 2010 or Base Year | N [1] | Base Year Population | Square Miles | Density (Note) | Square KMs | Density (Note) | Base Year | Source Population | Source Area |
| 261 | Copenhagen | Denmark | 1,535,000 | # | 1,525,000 | 250 | 6,100 | 648 | 2,400 | 2003 | D | B |
| 674 | Auckland | New Zealand | 1,185,000 | # | 1,125,000 | 205 | 5,600 | 531 | 2,200 | 2006 | C | B |
| 694 | Vancouver, BC | Canada | 2,100,000 | # | 2,026,000 | 455 | 4,500 | 1,178 | 1,700 | 2006 | H | A |
| 699 | Melbourne, VIC | Australia | 3,485,000 | # | 3,372,000 | 831 | 4,100 | 2,152 | 1,600 | 2006 | C | A |
| 713 | Adelaide, SA | Australia | 1,040,000 | | 1,040,000 | 292 | 3,600 | 755 | 1,400 | 2006 | C | A |
| 732 | Seattle, WA | United States | 3,040,000 | # | 2,712,000 | 954 | 2,800 | 2,470 | 1,100 | 2000 | A | A |
| 752 | Brisbane, QLD | Australia | 1,765,000 | # | 1,676,000 | 705 | 2,400 | 1,826 | 900 | 2006 | C | A |

[1] #: in "N" column indicates 2010 population estimate in "2010 or Base Year Population" column

Note: Density calculated using population midpoint between base and current year except where land area source is "A" where base year population is used

A: National census authority data agglomeration data (land area or population).

B: Demographia land area estimate based upon map or satellite photograph analysis.

C: Demographia population "build up" from third, fourth or fifth order jurisdictions (NUTS-3, NUTS-4, NUTS-5 or equivalent)

D: Population estimate based upon United Nations agglomeration estimate.

H: Combination of adjacent national census authority agglomerations.

Among the seven regions, Copenhagen has the highest density with 2,400 people per square kilometre (p/km$^2$) and ranked 261 out of total 780 urban agglomerations or urban areas in the Demographia study. Auckland was second highest on the list (2,200p/km$^2$) and ranked 674. Auckland's population density is higher than comparator Australian cities. All other regions have population density below 2000 p/km$^2$. Seattle's population density is only half of that in Auckland. Brisbane has the lowest population density just below 1,000 p/km$^2$. Interestingly, the Demographia study showed that Auckland's population density is also higher than that of New York (1,800 p/km$^2$), which illustrates that although there can be suburbs, such as Manhatten, that have higher density, the average for the urban area is much lower. The large lots/sections in the suburbs lower the average out for the New York urban area.

### 4.2.2 HOUSING AFFORDABILITY

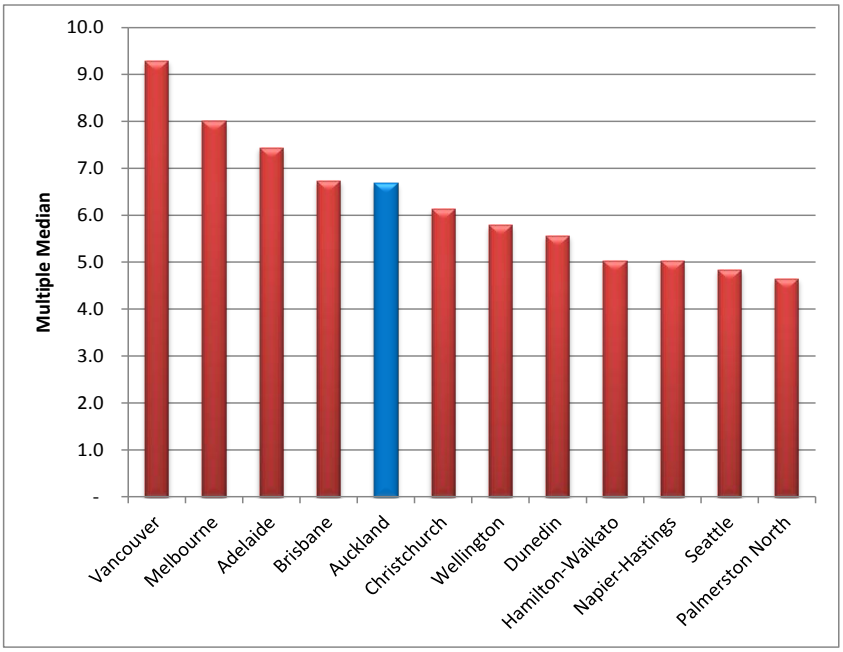
Residents' access to quality affordable housing is fundamental to successful economic growth, stability across the region, good social outcomes and healthy communities. Housing costs are the sum of annualised accommodation expenditure including mortgage payments, payments to local authorities, property rent, boarding house and student accommodation. The ratio of housing cost to income is often used as a way of measuring affordability. Determinants of affordability include average earnings and disposable income. The Ministry of Social Development measures the extent of housing affordability in New Zealand, using the Household Economic Survey. The threshold for affordability is household expenditure/outgoings to household income ratio of 30 per cent. Measures of housing affordability do not indicate the quality or suitability of the housing stock.

For New Zealand as a whole, affordable housing has become a critical issue for more households over the last twenty years. In 1990, 15 per cent of New Zealand households spent more than thirty per cent of their

household incomes on housing. By 1998, this figure had increased to 30 per cent of households[24]. The situation in Auckland is most likely exacerbated by higher median house prices[25], and in a comparable regional New Zealand calculation of differences in housing affordability (noting the higher threshold of 40 per cent of disposable income spent on housing costs, in comparison to the MSD study), it was estimated that 21 per cent of Auckland households spent more than 40 per cent of their net income on housing costs. This was significantly higher than the national count at 17 per cent, and higher than the other selected regions of Waikato, Wellington, and Canterbury. When looking at tenure for Auckland, it appears that households who are renting carry a higher financial burden, with an average of 46 per cent of net income spent on housing, compared to 24 per cent for households who owned the home in which they lived.[26]

For comparability with international cities, the Demographia Housing Affordability Report was used. The method used in this study differs from the New Zealand approach above, and so is not directly comparable. The Demographia Housing Affordability method uses median income levels (obtained from leading national reporting agencies) and compares it with median housing prices. The relationship (called the Median Multiple[27]) and as it focuses on house prices, is looking at affordability for home owners (who made up 64.6 per cent of households in 2001)[28], and so is exclusionary. Nevertheless it has good coverage of the comparator cities.

Figure 4.7: Housing Affordability select cities




*Source: Demographia (2010)*

According to Demographia (2010) New Zealand is identified as one of the nations with a 'severely unaffordable' housing market with a multiple median of over 5.1. As expected, Auckland had the highest multiple median of the New Zealand cities at 6.6. The Australian cities have higher multiple mean (Brisbane 6.7, Adelaide 7.4, and Melbourne 8). Vancouver was the least affordable, with a multiple median of 9.3.

[24] Ministry of Social Development (2009) The Social Report. http://www.socialreport.msd.govt.nz/economic-standard-living/housing-affordability.html
[25] http://knowledgeauckland.org.nz
[26] http://monitorauckland.arc.govt.nz
[27] The Median Multiple is widely used for evaluating urban markets, and this information was extracted from the Demographia Report; data for the Q3 2009).
[28] http://www.chranz.co.nz/pdfs/future-of-home-ownership-and-the-role-of-the-private-rental-market-in-auckland-bulletin.pdf

The United Kingdom's median is 5.1. The relative housing affordability of international as well as New Zealand cities is shown in the Figure 4.7.

The multiple median index indicates the relative affordability by using an Affordability Rating as shown in Table 4.1010. Auckland's index of 6.7 falls in the 'severely unaffordable' category and is the highest New Zealand city. Auckland's housing affordability is relatively low when compared to other international cities and is joint 22nd out of over 270 markets and is comparable with Brisbane, London Exurbs[29] and Abbotsford (Canada). Internationally, the three cities (regions) with lowest affordability were Vancouver, Sydney and the Sunshine Coast. Other notable areas with low affordability were London (Greater London Authority), San Francisco, New York and Victoria (Canada).

Table 4.10: Demographia Housing Affordability Rating Categories

| Rating | Median Multiple |
|---|---|
| Severely Unaffordable | 5.1 & Over |
| Seriously Unaffordable | 4.1 to 5.0 |
| Moderately Unaffordable | 3.1 to 4.0 |
| Affordable | 3.0 or Less |

*Source: Demographic (2010)*

Comparing Auckland's housing affordability levels with the 6 comparator cities shows that only Seattle is not in the 'severely' unaffordable category and that Auckland's affordability (while in the worst category) is marginally better than the other comparator cities. It is important to realise that income levels in New Zealand (and Auckland) are relatively low by international standards and the median income is $68,500 in Auckland. The other comparator cities' median income is an average of 11 per cent higher than Auckland's. Expressing the median house prices in New Zealand dollar terms show that Auckland's real estate is 34 per cent lower than Vancouver, 22 per cent lower than Melbourne and 13 per cent lower than Brisbane. This implies that Auckland's house prices are, relatively, lower than housing in the comparator cities. Conversely, Auckland's median house price is around 2 per cent higher than in Adelaide and Seattle.

### 4.2.3 HERITAGE BUILDINGS AND HISTORIC PLACES

Heritage refers to the legacy of physical and intangible attributes, passed on to successive generations in an area/location. Cities are areas with high concentrations of buildings, whose ages depend on the period of city growth and expansion. The building needs of an expanding city may encroach on historical sites and the functions of buildings change over time, potentially creating a tension between heritage buildings and the changing demands of a city.

Physical or 'tangible cultural heritage' include artifacts, buildings and historic places, that are considered worthy of preservation for the future. These include objects significant to the archaeology, architecture, science or technology of a specific culture. Heritage is increasingly recognised in cultural landscapes (natural features that may have cultural attributes), while natural heritage remains an important element of heritage, encompassing the natural environment and biodiversity.

[29] Areas outside the Greenbelt

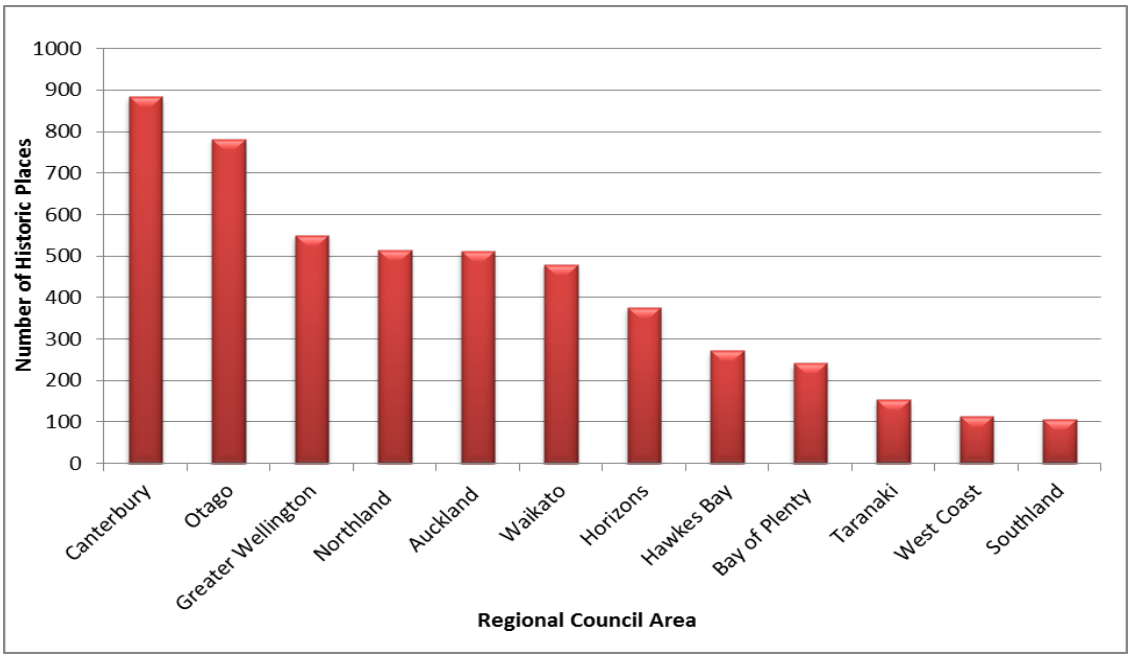
This indicator partially captures the notion of built heritage in cities, relating to historic places, and uses New Zealand comparable data only. The New Zealand Historic Places Trust (NZHPT) is New Zealand's leading national historic heritage agency. NZHPT's work includes identifying heritage places, seeking to ensure they survive for appreciation by current and future generations, and fostering that appreciation by recording and sharing their stories.

Rarangi Taonga is the Register of Historic Places, Historic Areas, Wahi Tapu and Wahi Tapu Areas is the national schedule of New Zealand's treasured heritage places. It is established under the Historic Places Act 1993, and compiled by the New Zealand Historic Places Trust Pouhere Taonga. Registration means that a place or area is included on the Register. There are four categories in the register:

- Historic Places include bridges, memorials, pa, archaeological sites, buildings, mining sites, cemeteries, gardens, shipwrecks, and many other types of places.
- Historic Areas are groups of related historic places such as a geographical area with a number of properties or sites, or a cultural landscape. Emphasis is on the significance of the group.
- Wahi Tapu are places sacred to Māori in the traditional, spiritual, religious, ritual or mythological sense.
- Wahi Tapu Areas are groups of wahi tapu.

Historic places are further divided into two categories: Category I status is given to places of 'special or outstanding historical or cultural heritage significance or value'; Category II status to places of 'historical or cultural heritage significance or value'. The total numbers of historic places (all categories) for Regional Council areas are given in **Error! Reference source not found.**.8.

Figure 4.8: Registered Historical Places and Areas, Wahi Tapu & Wahi Tapu by Regional Authority, 2010




*Source: Historic Places Trust Regional Data*

Auckland had 512 registered historic places, on par with the Northland region. This was slightly below Greater Wellington (550), and significantly below the two South Island regional authority areas of Canterbury, with 884 registered historical places and Otago, with 782.

### 4.2.4 SYNTHESIS: BUILT ENVIRONMENT

A comparison of the built environment for international cities requires further analysis. Factors influencing the built environment are complex, ranging from population growth pressures, existing buildings and structures, relative scarcity of land, transport and infrastructure provision. This section has scratched the surface of a few of these elements, but more work is required for a comprehensive comparison. The comparator city-regions in this study have relatively low population densities. Only Copenhagen has a higher density than Auckland. In an international study, New Zealand was identified as one of the nations with a 'severely unaffordable' housing market – and Auckland has the least affordable housing market of New Zealand cities. However, the comparator cities were worse than Auckland in terms of affordability, with the exception of Seattle. Data was collected for the number of registered historic places in New Zealand, and showed Auckland on par with the Northland and Waikato regions, but below Canterbury, Otago and Greater Wellington in terms of absolute numbers. Further analysis is required to assess the quality of buildings, but an indicator of the quantity of buildings with international awards does not indicate the quality or functionality of the existing built environment. The built environment directly impacts on quality of living, in terms of health outcomes from the residential housing stock, the distances required to travel for work and to amenities, which are captured through measurements of connectivity also.

## 4.3 CONNECTIVITY

Connectivity is a concept that relates to both position and communication. Connectivity can be physical, with a focus on distance, or it can relate to how connected people are via information flows. High connectivity helps to promote economic efficiencies and competitiveness, as disconnected economies have higher costs involved – mainly around inappropriate or excessive costs associated with the movement of people, goods and information. Connectivity is important not only internally, or within a city-region, but also externally between city regions.

The indicators selected for measuring connectivity are developed around three themes: (1) physical connectivity within the city-region, (2) physical connectivity between Auckland and other cities/nations and (3) information connectivity.

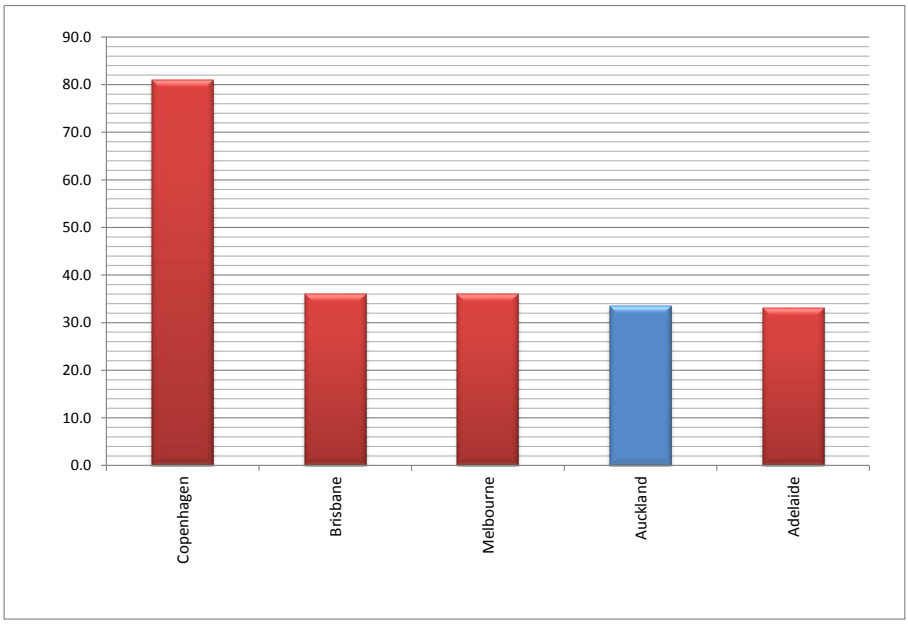
In terms of (1), physical connectivity within the city region, the specific indicators examined are congestion (second of delay per kilometre) and transport modes (mode of travel to work). Congestion is an important limiting factor to city-region competitiveness because not only are there direct costs associated with congestion (the time spent in traffic) there are also indirect costs due to unproductive time. (2) physical connectivity between Auckland and other cities/nations is measured through the number of airlines using Auckland. (3) information connectivity is measured using the proportion of people using broadband as an indicator.

### 4.3.1 CONGESTION

Congestion is an externality created from the transport of people and goods. If the carrying capacity of the transportation (usually road) system is not sufficient to cater towards the level of mobility, congestion occurs. Congestion wastes time, fuel, and money and leads to greater air pollution, usually peaking during normal commuting hours. The levels of congestion experienced within a city will also have a dramatic impact on the urban landscape, rendering people and activities more or less accessible. It is also worth noting that congestion is one of the so-called diseconomies of agglomeration. Like effects such as heightened competition, higher land prices, and more intense competition in output markets, congestion can act to counter balance the benefits that might otherwise be achieved through agglomeration.

Congestion is typically evaluated using measures of travel time, and sometimes also trip time reliability and predictability. We used the average delay per trip as proxy for congestion and converted all data to the single measure of second delay per kilometre. Unfortunately in some instances insufficient data was available to enable the conversion and in these cases the data is not reported. Another consideration is the time of day when delay is measured, with congestion often measured during the morning peak, the afternoon peak as well as the off-peak. We used the day average as a proxy for overall congestion. The results for five cities are presented in Figure 4.9.

Figure 4.9: Seconds delay per kilometre (day average)




*Source: Monitor Auckland, MED database*

Auckland's 33 seconds delay per kilometre travelled (average daily delay) is similar to congestion in Adelaide and is better than in Brisbane and Melbourne (with an average delay of 36 seconds per kilometre travelled). Copenhagen has the highest congestion with 81 seconds delay per kilometre.

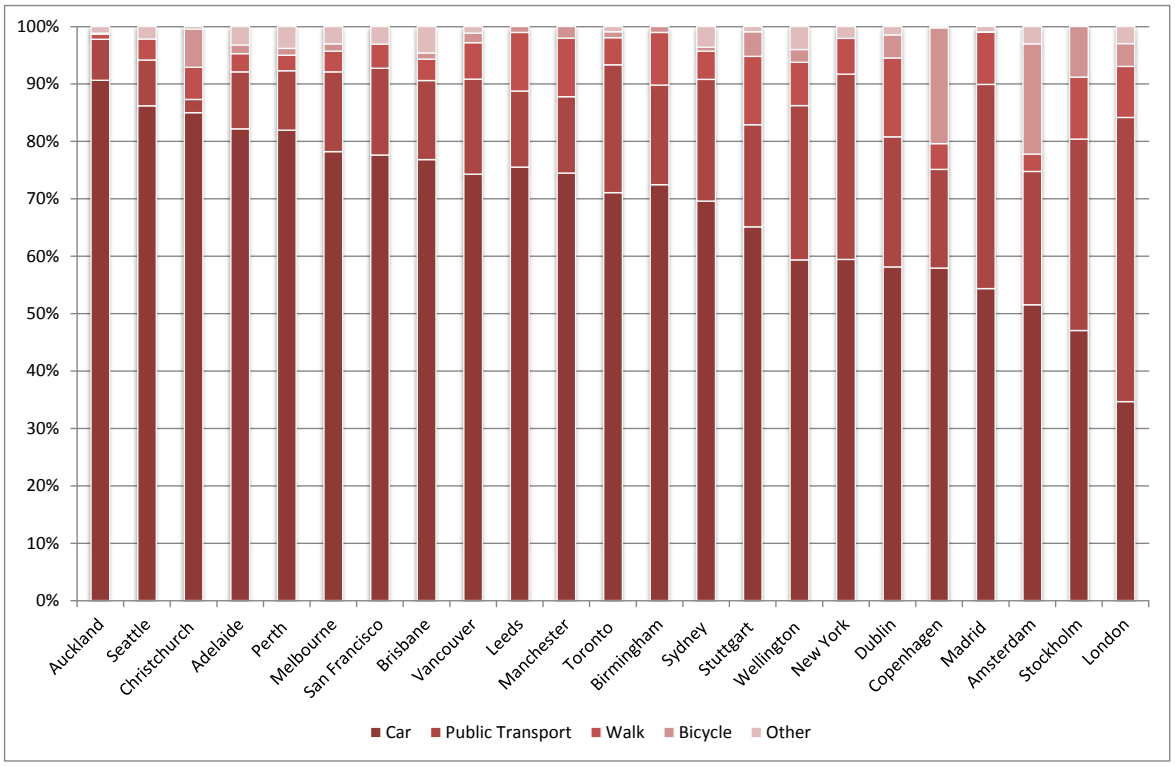
Another indicator of congestion, percentage extra time required for a trip was identified. GPS manufacturer *TomTom* has been collecting anonymous data provided by its GPS systems in some European cities. While no comparable data exists for Auckland it is interesting to note that Copenhagen is ranked 47$^{th}$ out of fifty nine in terms of congestion (and using the above indicator, Auckland's congestion is less severe than Copenhagen). The full set of data is presented in Appendix 2.

### 4.3.2 MEANS OF TRAVEL TO WORK

The way in which individuals travel to work can tell us a lot about the connectivity within a place. If there are a variety of travel options available, with public transport efficient and thus well-patronaged, this is an indication of a city-region with strong physical connectivity. Conversely, a strong tendency towards the use of private vehicles for travel is likely to occur when travel distances are high and alternative transport options are limited or inconvenient.

In terms of mode share, Aucklanders have a high usage of private motor vehicles for their journey-to-work trips, with only 7 per cent using public transport and less than 1 per cent of trips being undertaken by bicycles or by walking. The private vehicle is also the mode of choice in Adelaide and Perth accounting for 82 per cent of commuters in both cities. Copenhagen has the highest public transport usage (as percentage of mode) and Vancouver the highest rate of walking or cycling. The mode share of other international cities is outlined in Figure 4.10.

Figure 4.10: Mode Share Comparison




*Source: Ministry of Economic Development Database*

Note that a link exists between the level of congestion and public transport usage. Auckland has one of the lowest congestion indices irrespective of the high private car usage. This means that the disincentive to private car usage may not be as strong as in some of the comparator cities and in terms of providing connectivity, car transport may be more effective in Auckland than in comparable cities. This is one of the many examples of the complexity of interpreting indicators and the need to consider sets of indicators together

### 4.3.3 NUMBER OF AIRLINES USING AIRPORT

Table 4.111 summarises the passenger movements and number of airlines serviced in the airports of the main comparator cities. Overall, Auckland International Airport services 20 airlines[30] and had a throughput of 13.2m passengers (domestic and international) during 2009. In terms of airlines serviced, Auckland International Airport is relatively small and is comparable with Adelaide. The number of airlines serviced appears to be a function of location within the global airport network. Vancouver and Copenhagen is serviced by 53 and 48 airlines respectively and Brisbane is service by 32. Although Auckland is a regional hub, with connections to Australasia, the Pacific Island, the Middle East, and America, Auckland (and NZ) is relatively isolated. The distance from Europe means no direct flights are available.

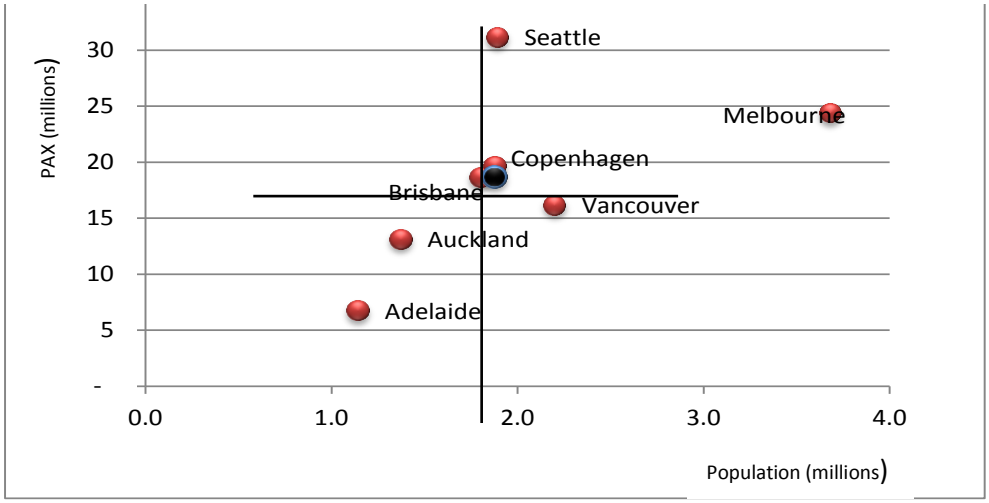
Table 4.11: Airport Passengers and Connections

| | Passenger Movements (m) | Airlines serviced |
|---|---|---|
| Auckland | 13.2 | 20 |
| Brisbane | 18.7 | 32 |
| Vancouver | 16.2 | 53 |
| Melbourne | 24.4 | 24 |
| Copenhagen | 19.7 | 48 |
| Seattle | 31.2 | 26 |
| Adelaide | 6.8 | 20 |
| | Year (2008/9 or 2009 calendar year) | |

*Source: MED information and Airport websites*

By combining passenger movements (PAX) with population size, the relative busyness of the airport is revealed. Auckland Airport has 9.1 PAX movements for every resident compared to 17.8 in Brisbane and 16.5 in Seattle. Seattle plays an important role in domestic travel in the USA and 90 per cent of passenger movements are to other US airports. International movements account for roughly 20 per cent of total movements at Brisbane Airport, whereas more than half of Auckland's PAX movements are related to international travel. In this light, Auckland International Airport plays an important role in connecting Auckland and New Zealand globally. If one is to take account of the size of Auckland's population, however, the number of international PAX is still not high. This is probably a reflection of the distance from markets and the difficulty (and time) associated with long-haul flights. The scale of PAX movements (domestic and international) in relation to the population of comparable cities is depicted visually in Figure 4.11.

Figure 4.11: Airport Passenger Movements & Population for Auckland and Comparator Cities




*Source: Calculations based on MED information*

[30] Including Pacific Blue Airlines as well as regional airlines

Auckland Airport has 9.1 passenger movements for every resident compared to 17.8 in Brisbane and 16.5 in Seattle. Seattle plays an important role in the air routes in the USA and the bulk (90 per cent) of its PAX movements is domestic. International movements accounts for roughly 20 per cent of total movements at Brisbane Airport. More than half of Auckland's PAX movements are related to international travel which underscores the important role of the airport in connecting Auckland (and New Zealand globally) and improving market accessibility.

The level of international connections (based on passenger movements) is comparatively low if the size of Auckland is taken into account. This is probably a reflection on the distance from the main markets reflecting the difficulty (and time) associated with the long-haul flights.

At the sector level (see market accessibility, in section 6.1.2), the degree to which the key sectors rely on the airport as a central facility for market accessibility is not understood well and the level of face-to-face engagements (with international markets) has to be investigated to quantify the degree to which these sector are reliant on, and use the international airport as part of their business transactions and international growth strategies. These gaps will need to be addressed as part of the sector engagement process.

### 4.3.4 PROPORTION OF PEOPLE WITH INTERNET AND BROADBAND CONNECTIONS

Within global markets, electronic connectivity enables market players to interface and communicate, leading to shared understanding and potentially enabling business. Electronic connectivity is also a measure of technological adaption.

A 'Connectivity Scorecard' was developed by Waverman and Dasgupa (2010)[31] in an effort to develop an indicator of how 'useful' technology is. The goal of the Waverman approach is to assess whether countries are 'connecting up' in the right places – whether investment in infrastructure is being matched by investment in usage or skills; and ultimately how economically beneficial investment in infrastructure is at linking technology use to long term productivity. The scorecard measures country level performance on six dimensions; consumer infrastructure, consumer usage and skills, business infrastructure, business usage and skills, government infrastructure and government usage and skills.

New Zealand has relatively strong Information and Communications Technology (ICT) consumer usage and skills, and has a respectable business infrastructure for ICT (Waverman and Dasgupa, 2010). Specifically the country has relatively high internet usage rates and also scores high on the use of internet technology and the uptake of internet based services (such as internet banking services). In terms of Auckland itself, the city is well-connected with more than 80 per cent of residents having access to internet and 72 per cent connected via a high speed connection (SNZ, 2010). This is higher than in the UK, where only 65 per cent of residents have access to the internet. In British Columbia (province in which Vancouver is located) more than 85 per cent of residents are connected to the internet. Copenhagen also has a high level of access to the internet with more than 86 per cent of this city's residents having an internet connection (Waverman and Dasgupa, 2010).

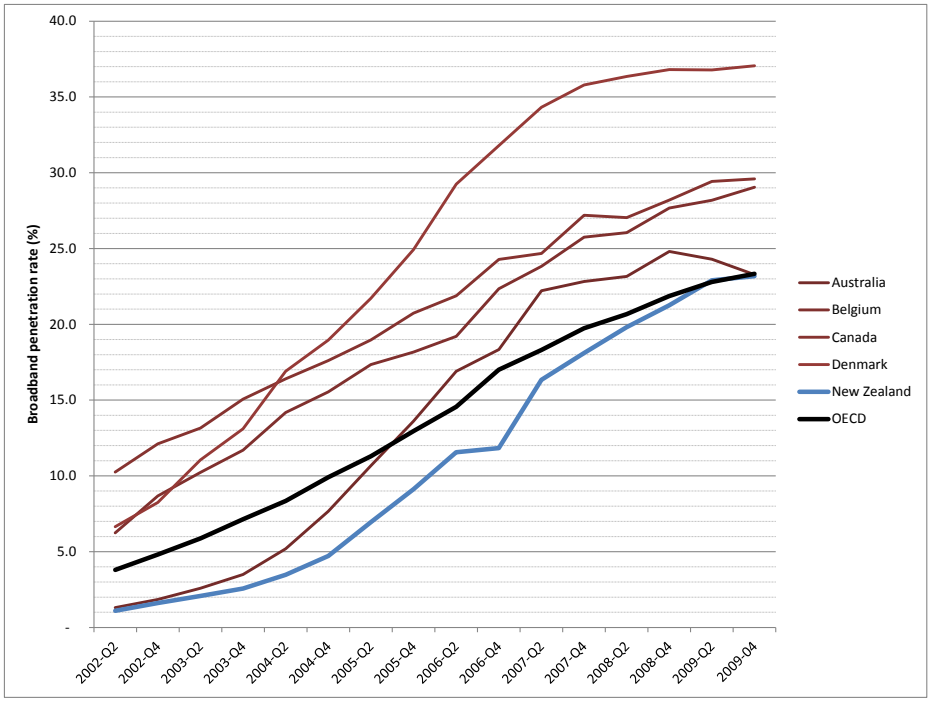
Compared to other countries, New Zealand posts a reasonable, but not strong, performance on the Networks Connectivity Scorecard 2010. The Scorecard identified the country's weak point as consumer infrastructure especially broadband infrastructure deployment and network quality. Further, the report

[31] http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2010.pdf

highlighted the need to invest in the deployment of advanced broadband infrastructure to harness the benefits of improved connectivity for all its user segments.

Despite these comments it is very interesting to note that the country's broadband penetration rates, as reported by the OECD, recently caught up with average OECD rates after previously lagging (see Figure 4.12).

Figure 4.12: New Zealand Broadband Penetration Rates (%)

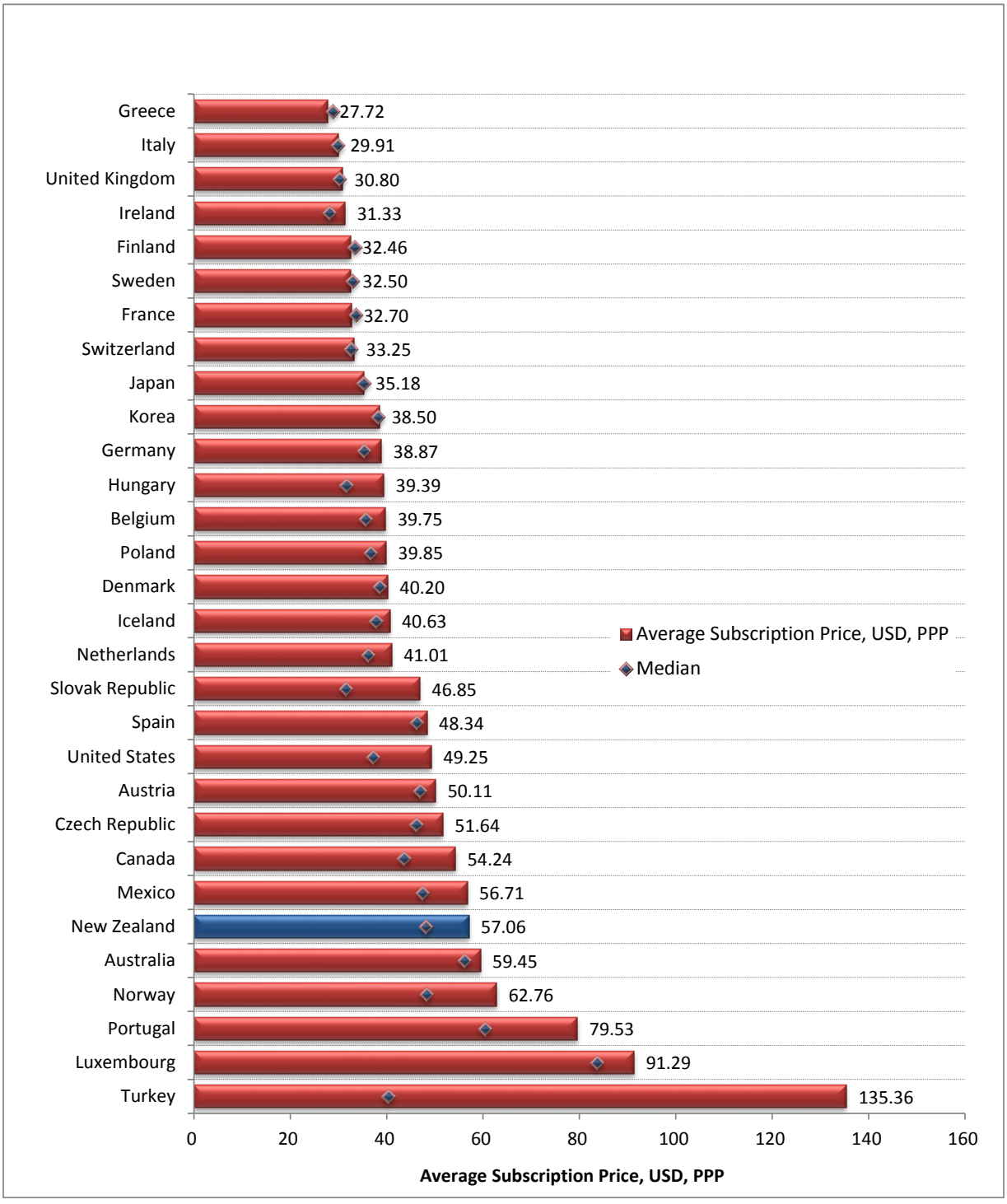



*Source: OECD, 2010*

Reaching the OECD average is significant, noting that this happened in spite of comparatively high broadband prices at average speeds. The average prices and speeds of broadband in New Zealand are compared to other OECD countries in Figure 4.13 and Figure 4.14.

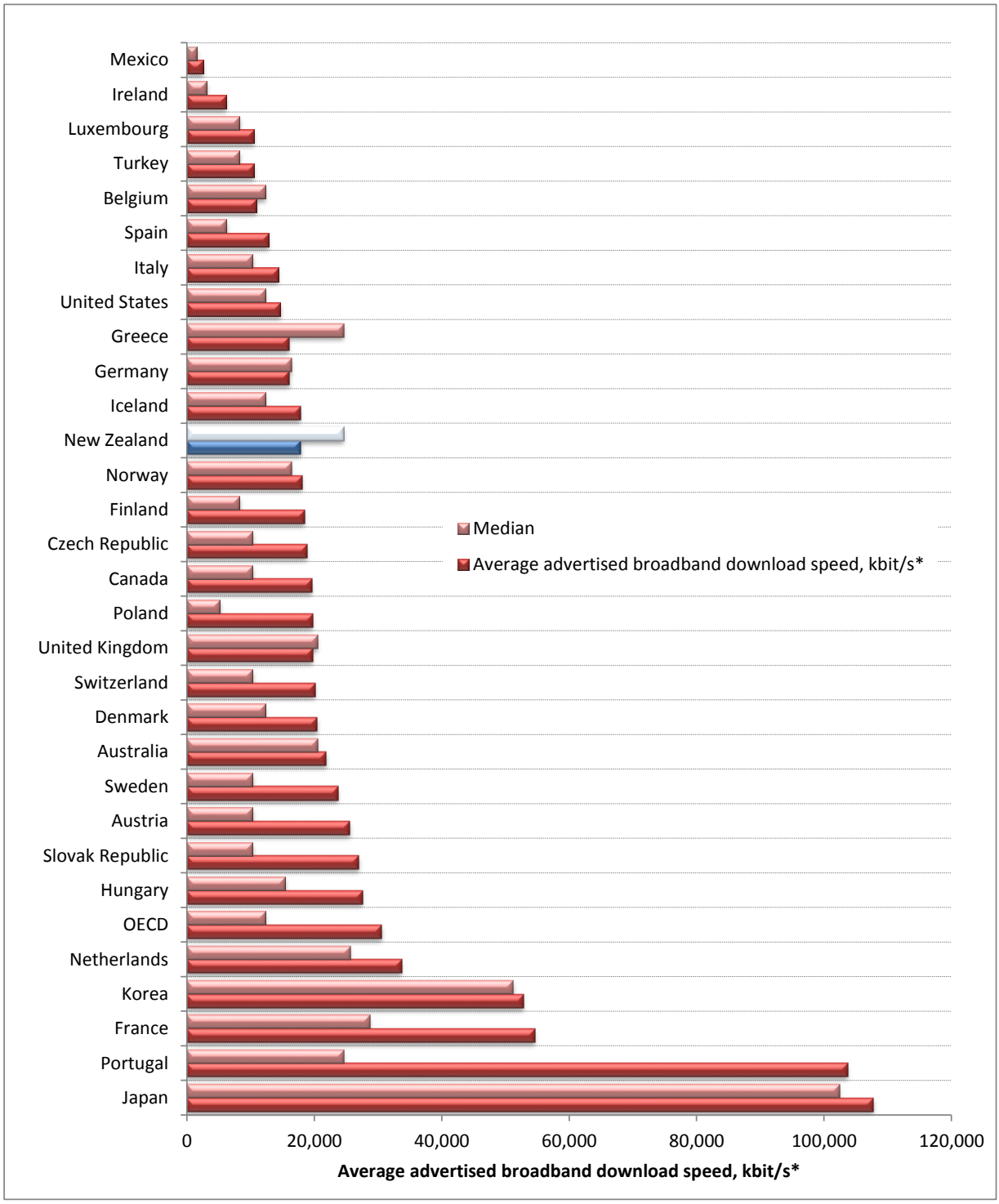
With a large portion of New Zealand's population concentrated in Auckland it can be expected that a substantial portion of ICT investment will take place in Auckland region (and the urban centres throughout the country). The telecommunication sector in New Zealand is constantly evolving and a number of current government initiatives will affect Auckland's relative position in terms of broadband performance and internet take-up. As investment in broadband infrastructure continues to grow broadband performance will also change.

Figure 4.13: Average subscription prices (US$, purchasing price parity)




*Source: OECD Broadband Portal*

Figure 4.14: Advertised Broadband Speeds (kbits/s)




*Source: OECD Broadband Portal*

### 4.3.5 SYNTHESIS: CONNECTIVITY

Auckland appears to perform relatively well internationally in terms of congestion, with times lower than the comparator cities (where data was available). Auckland however performs very poorly in terms of transport options, with over 90 percent of trips to work undertaken by private vehicles. This reflects low connectivity in terms of alternative transport options to commuters.

The country's ports play a pivotal role in facilitating the flow of goods and people into the global market place. The indicators selected for evaluating the physical connectivity of Auckland with other cities were passenger numbers through the airport and number of airlines servicing the airport. Overall, Auckland performs relatively poorly in terms of these indicators – especially in comparison to the comparator cities in the study. The results are likely to be a reflection of the city's relative isolation in a global context, and the difficulties (costs and time) associated with long-haul flights. Auckland's ports play a pivotal role in facilitating the flow of goods and people from New Zealand to the rest of the world.

New Zealand performs moderately well compared to other OECD countries, in terms of electronic connectivity, which is a sign of technology adoption. Electronic connectivity is of immense importance to business, enables the transmission of new ideas, ways of doing business and it is a means of overcoming geographical distances. New Zealand's broadband penetration rates recently caught up with the OECD average, after previously lagging. A weak point identified for New Zealand was consumer infrastructure, especially broadband infrastructure deployment and network quality.

## 4.4 KNOWLEDGE RESOURCES

Knowledge creation is the process of coming up with new ideas.[32] The most obvious method of knowledge creation used specifically for economic outcomes is formal research and development at the firm level (See section 6.3.1.2). Knowledge creation can also be conducted in other institutions, but it is important that this is somehow transmitted to the productive economy, if it is to be used in production processes.

The indicators selected for evaluating knowledge resources in the Auckland economy are: (1) adult literacy and numeracy, (2) highest qualifications of the adult population, (3) proportion of the workforce in knowledge intensive and high manufacturing occupations, (4) patent applications per capita and (5) the schooling system and (6) the tertiary education system.

### 4.4.1 ADULT LITERACY AND NUMERACY

The ability to participate fully in society by communicating and handling information is essential in our current economic system, with strong growth in technical change. The concept of literacy has moved beyond a simple definition of being able to read and write. Prose literacy, document literacy, numeracy and problem solving are some of the more specific measures of literacy. These indicators help to show the extent to which the adult population have life skills that enable them to adapt to changing environments, understand the world in which they live, and participate in the broad economy in a meaningful and informed manner.

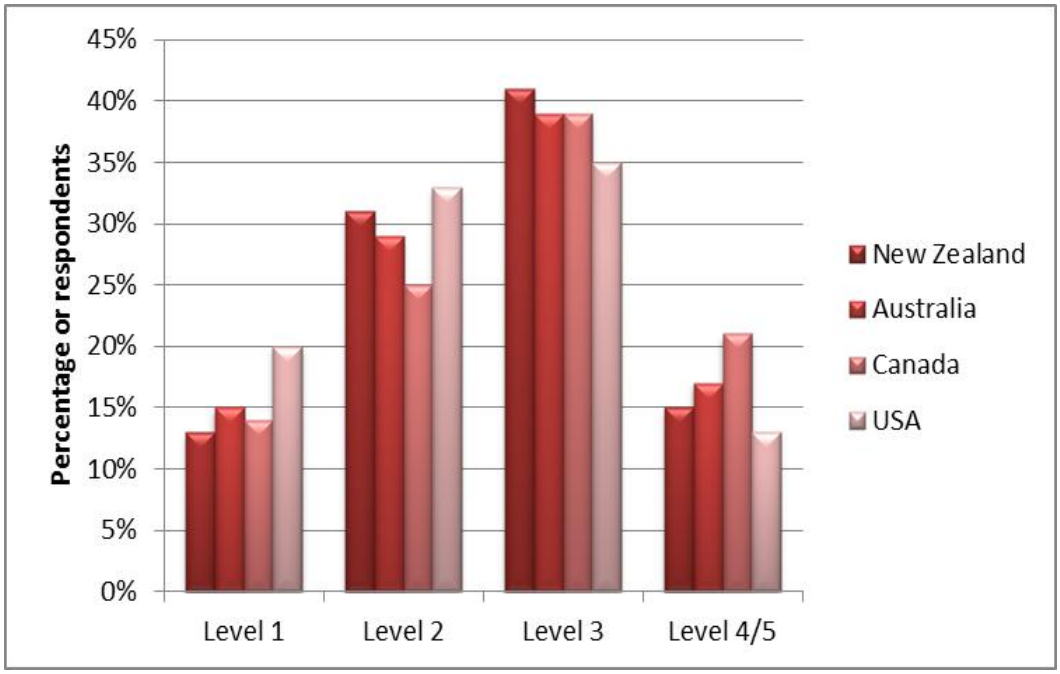
This section draws from the Ministry of Education's (2008) report entitled: *The Adults Literacy and Life Skills (ALL) Survey: Overview and International Comparisons.* The international comparisons were made possible by the international Adult Literacy and Life Skills Survey, administered jointly by the Government of Canada, the US National Centre for Education Statistics (NCES) and the Organisation for Economic Co-operation and Development (OECD), which examined the literacy, numeracy and problem solving skills of adults aged 16-65 in a number of different countries. In the case of Australia, information was gathered from the 2007 release of results from the Australian Bureau of Statistics. The NZ survey was conducted in 2006, and the Ministry of Education's work compared New Zealand's performance with that of Australia, the English speaking parts of Canada and the USA.[33] For the prose literacy, document literacy and numeracy, participants were put into one of five cognitive levels, for the problem solving skills assessment, four levels were used. The Ministry of Education's findings for each of the factors examined have been reproduced here, beginning with each country's performance in prose literacy.

The assessment of prose literacy levels examined respondent's ability to read and understand continuous texts such as news stories, editorials, brochures and instruction manuals. The proportion of people in New Zealand with limited prose skills is lower than that in the other comparison countries, with New Zealand having 13 per cent of people at skill level 1 compared to 15 per cent in Australia, 14 per cent in Canada and 20 per cent in the USA (Figure 4.15). However the proportion of people in levels four and five is also lower at 15 per cent compared to Australia's 17 per cent and Canada's 21 per cent. This shows that there is less variation in the skill level of New Zealanders compared to other countries.

[32] Blakeley, N., Lewis, G. and Mills, D. (2005) The Economics of Knowledge: What makes ideas special for economic growth. Wellington: The Treasury

[33] It is however important to note that the international study did not include an assessment of problem solving skills in the USA.

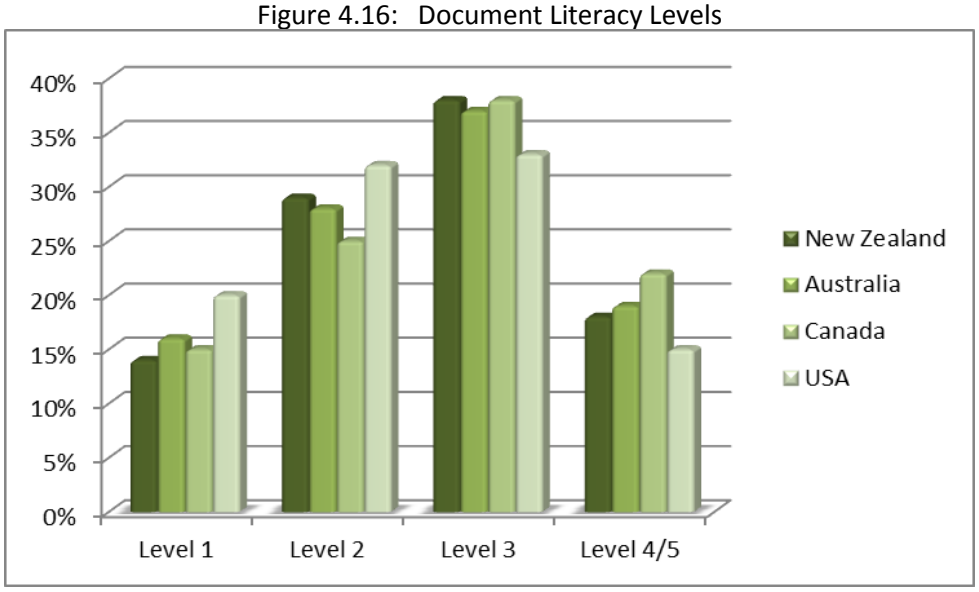
Figure 4.15: International Prose Literacy Levels




*Source: Ministry of Education (2008)*

The document literacy assessment examined people's ability to understand discontinuous texts such as charts, tables and maps. Overall NZ had 18 per cent of the population in levels 4 and 5 with advanced skills, 38 per cent at level 3, 29 per cent at level 2 and 14 per cent at level 1. Similar to the prose skills, NZ had smaller proportions of people at the extremes than in the other comparison countries (Figure 4.16).

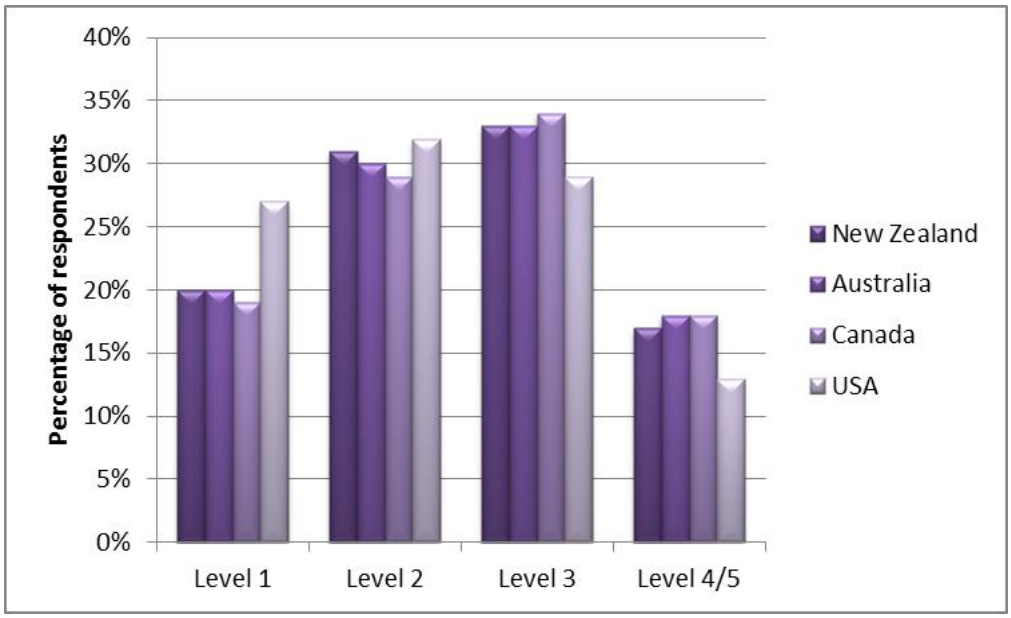
Figure 4.16: Document Literacy Levels




*Source: Ministry of Education (2008)*

The assessment of numeracy skills examined participants' mathematical abilities. Overall 17 per cent of New Zealand participants were considered level 4 or 5 with high numeracy skills, 33 per cent were at level 3, 31 per cent were at level 2 and 20 per cent were at level 1. This distribution is very similar to that found in Australia and Canada and suggests more advanced numerical skills than that found in the USA where 13 per cent were at level 4 or 5 and 27 per cent were at level 1 (Figure 4.17).

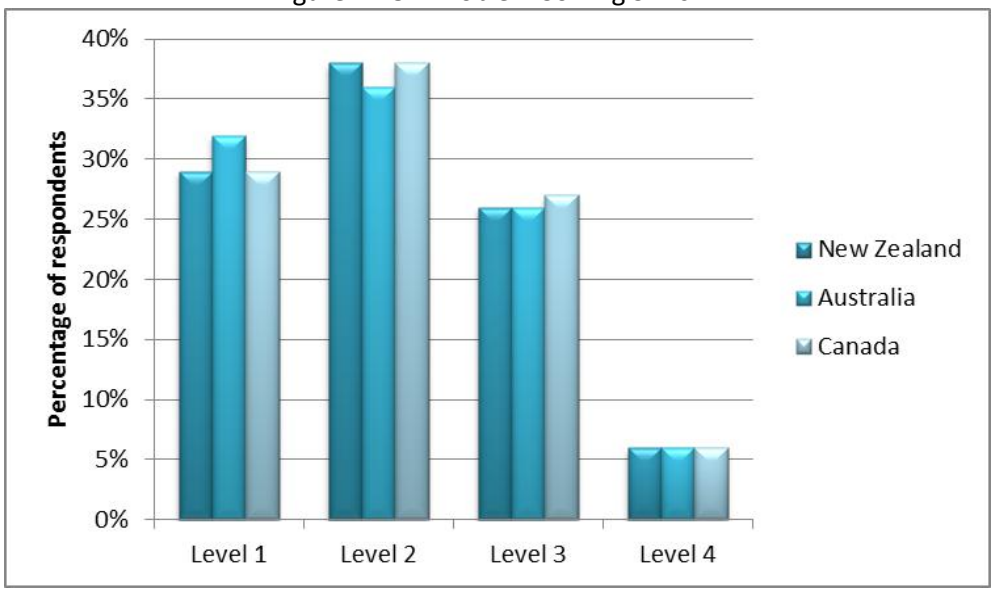
Figure 4.17: Numeracy Levels




*Source: Ministry of Education (2008)*

In New Zealand, Australia and Canada the 'problem solving skills' of the population are very similar, with 6 per cent of the population at a skill level of 4 and about 26 per cent at skill level 3. New Zealand has fewer people with low problem solving skills than Australia with 29 per cent of the population at this level compared to 32 per cent (Figure 4.18).

Figure 4.18: Problem Solving Skills




*Source: Ministry of Education (2008)*

A regional analysis of the above survey was undertaken for Auckland by Sutton and Vester (2010). Their report found a substantial literacy and numeracy skills gap across Auckland. 44 per cent of adults had low literacy and 51 per cent low numeracy. This has impacts on the workforce, and it was found that 56 per cent of the people in Auckland region with low literacy or numeracy are already in work. There were stark differences across the Auckland region – for example, in five of the new wards of the Auckland Council[34], more than 20 per cent of the population had no qualifications (a proxy measure for low literacy and/or numeracy), while two of the new wards had more than 30 per cent of the population unqualified.[35] Literacy and numeracy skills are higher in the north and centre of the Auckland region, and lower in the south and west. In Counties Manukau, 58 per cent of adults have low prose literacy, and 65 per cent have low numeracy.

### 4.4.2 HIGHEST QUALIFICATION OF THE ADULT POPULATION IN AUCKLAND

There are strong inter-dependencies and connections between the attainment of formal education and opportunities in the labour market. Formal education encourages the ongoing development of skills that can be applied in the economy, contributing to a productive and competitive workforce. When interpreting this section it is important to note that although education attainment is a good indication of likely skill levels, formal education alone does not directly equate to skills, particularly in those industries requiring high practical abilities.

This indicator measures the levels of educational qualifications of the adult population over time, as reported in NZ Census.[36] Overall, the Auckland regional adult population is relatively highly qualified when compared to the rest of New Zealand (Table 4.12). For example, in 2006, 20.3 per cent of the population (aged 15 years and over) had no qualification, compared to 25.9 per cent nationally. The proportion with no formal qualification dropped from 34.3 per cent in 1996 to 20.3 per cent in 2006, and the proportion with a bachelor's degree has increased from 8.2 per cent to 14.3 per cent.

Table 4.12: Highest Qualification of those aged +15 years in Auckland region (per cent) (1996, 2001, 2006)

| **Level** | **1996** | **2001** | **2006** |
|---|---|---|---|
| No qualification | 34.3 | 22.7 | 20.3 |
| School qualification | 28.7 | 32.3 | 27.2 |
| Overseas school qualification | 4.1 | 10.9 | 10.0 |
| Post-school certificate or diploma | 21.1 | 19.4 | 22.6 |
| Bachelor degree and level 7 qualification | 8.2 | 10.3 | 14.3 |
| Post-graduate degree | 3.7 | 4.4 | 5.6 |
| Total region | 100 | 100 | 100 |

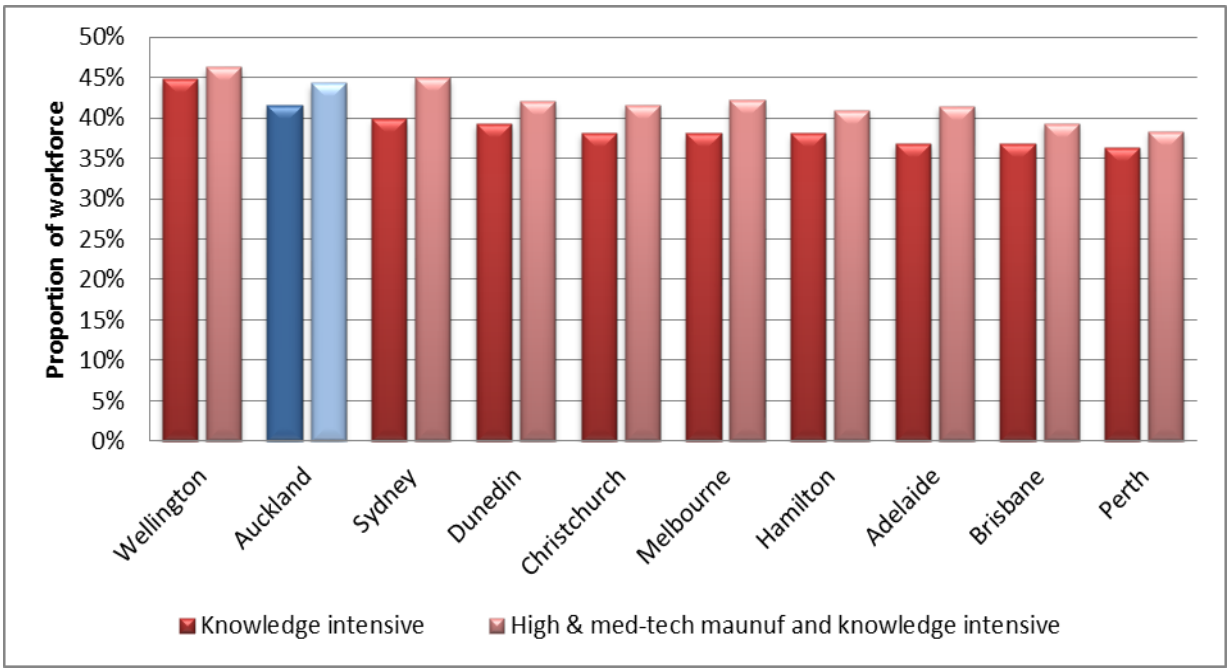
*Source: SNZ Census*

[34] These were the new wards of Franklin, Maungakiekie-Tamaki, Rodney, Waitakere and Whau.
[35] Manukau and Manurewa-Papakura
[36] The summary results are drawn from the Auckland Regional Council's monitoring at http://monitorauckland.arc.govt.nz/our-community/education/educational-qualifications-of-the-working-age-population.cfm

### 4.4.3 PROPORTION OF WORKFORCE IN KNOWLEDGE-INTENSIVE AND HIGH-TECH MANUFACTURING OCCUPATIONS

The Ministry of Economic Development defines knowledge intensive workers according to employment by occupation type. These occupations included within the knowledge-intensive group include those employed as: managers; business professionals; science and engineering professionals; science – technical occupations; health professionals; other health occupations; education, law and social science related; art and culture professionals.

Figure 4.19: Proportion of workforce in knowledge-intensive and high-tech manufacturing in Australian and NZ cities, 2006

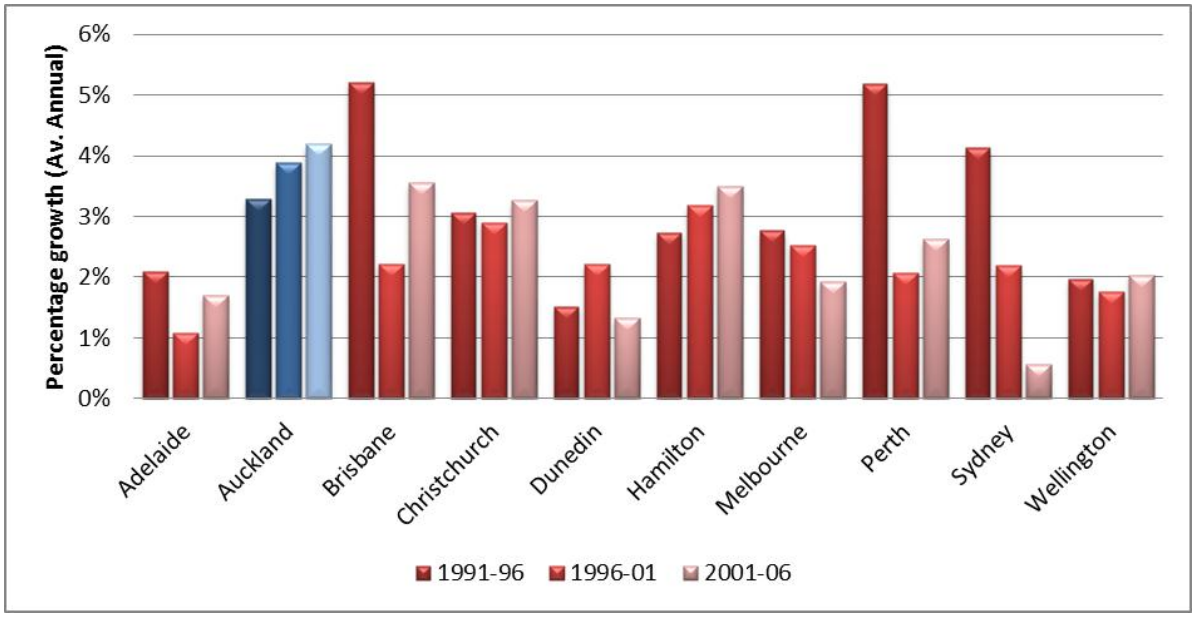



*Source: Grimes, Le Vaillant and McCann (2011).*

Figure 4.19 provides detailed information on the proportion of the workforce employed in knowledge intensive and high and medium-high tech manufacturing in NZ and Australian cities (Grimes, Le Vaillant and McCann, 2011). Of these cities, Wellington had the highest proportion of the workers in knowledge intensive occupations, with 45 per cent of workers (Figure 4.20). This was followed by Auckland (42 per cent of workers), which was higher than Sydney (40 per cent of workers). In terms of high and medium-high tech manufacturing occupations, Adelaide and Melbourne had the highest proportion of their workforces in these occupations in 2006, with 4.5 per cent and 4 per cent respectively. For NZ cities, Christchurch had the highest proportion of its workforce, with 3.5 per cent. Auckland had 2.6 per cent – and interestingly this proportion had declined in Auckland from 4.4 per cent of the workers in 1991. This decline in high and medium-high tech manufacturing occupations was evident in all comparator cities, with the exception of Hamilton (an increase of 0.5 per cent) and Dunedin (a marginal 0.05 per cent increase of total workers).

The total growth rates of knowledge intensive service workers and high and medium-high tech manufacturing workers over the period 1991-2006 are shown in Figure 4.20. Overall these occupations have grown in the fifteen years, with rates higher than that of growth in all workers, showing their relative importance as emerging employment areas. Auckland's growth rates have also been moderately high when compared to other NZ and Australian cities.

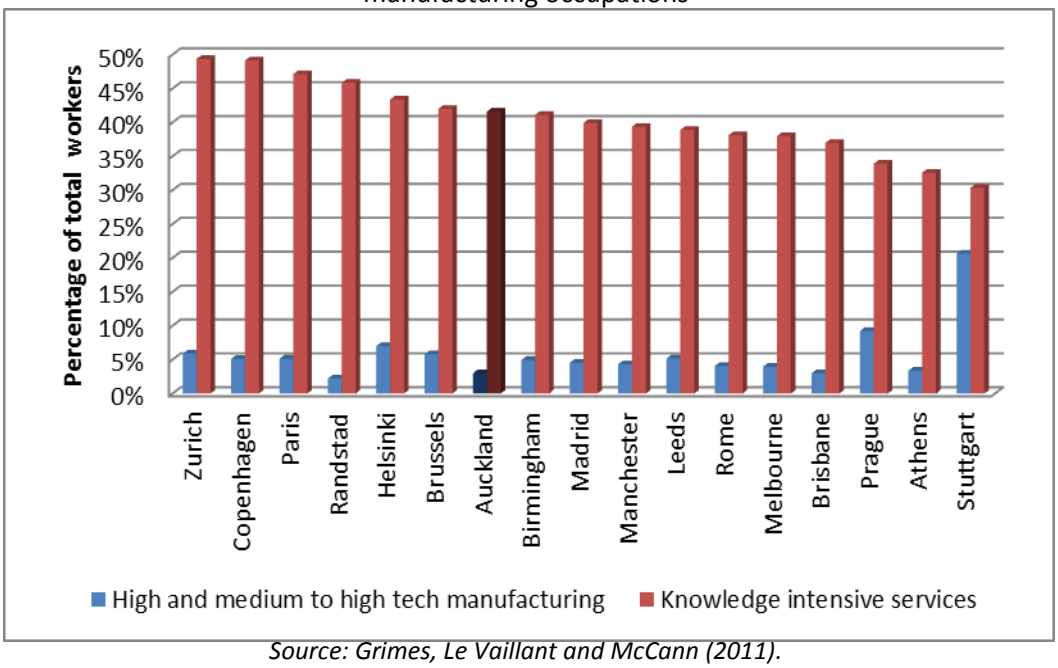
Figure 4.20: Growth in knowledge intensive services and high tech manufacturing occupations, 1991-2006




*Source: Grimes, Le Vaillant and McCann (2011).*

A comparison with other city regions globally is possible, although the base year (2008) is different to the Australian and New Zealand cities (2006). Auckland had a lower proportion of workers in high and medium to high tech manufacturing, with only Brisbane and Randstadt out of the available city-regions in the study having lower proportions (Figure 4.21). Stuttgart had the highest proportion of its workforce in high and medium to high tech manufacturing.

Figure 4.21: Proportion of select international city-region workforces in knowledge intensive and high-tech manufacturing occupations




*Source: Grimes, Le Vaillant and McCann (2011).*

The median proportion of workers was 5 per cent for this select group, although Stuttgart was radically different from the other countries, with 21 per cent of workers in medium to high tech manufacturing.

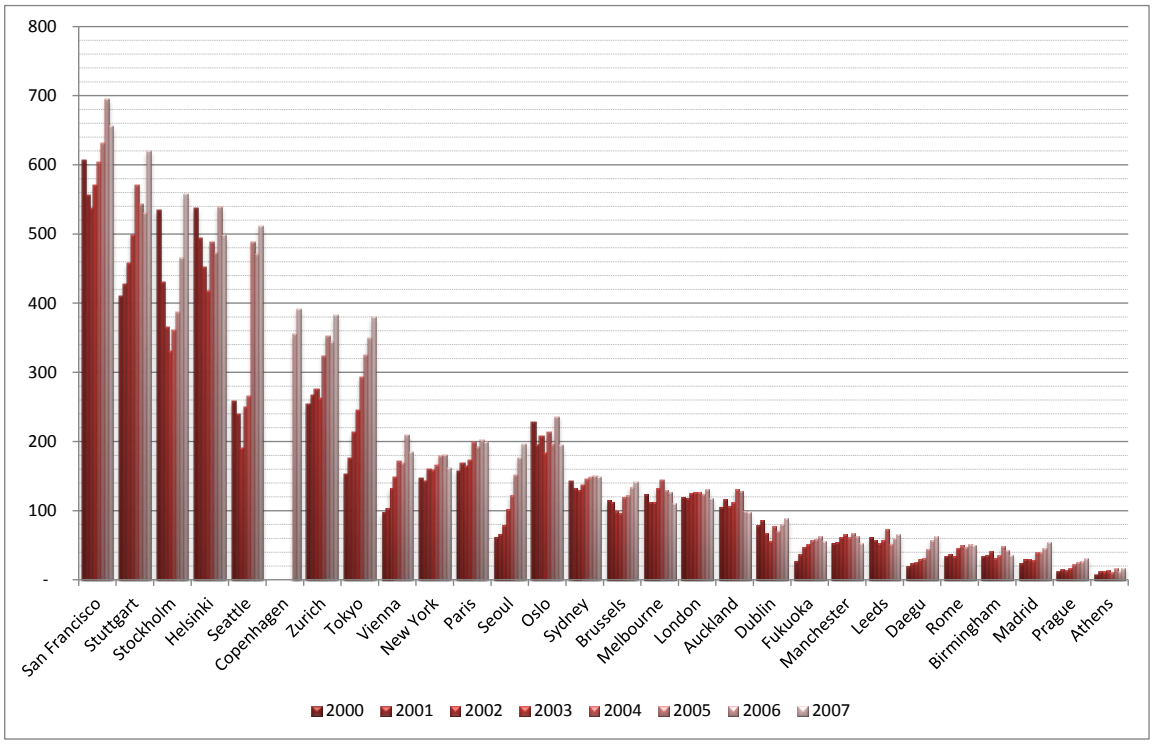
Overall, Auckland's share of employment in knowledge intensive services is broadly in the middle of the international comparator cities, but its share of employment in the manufacture of medium and high technology goods is relatively low.

### 4.4.4 NUMBER OF PATENT APPLICANTS PER CAPITA

A patent is a monopoly right that allows the exclusive use of an invention for a set period. A patent can be bought, sold, transferred or licensed like any other property. To file for a new patent, an application is registered in NZ (the Intellectual Property Office of NZ) or in a country that adheres to the Patent Cooperation Treaty, so that there is protection in countries outside of NZ also.

The lodging of a patent is a signal of innovation, creativity and the potential for generating economic activity. Although it is acknowledged that the filing of a patent is a precursor but not necessarily a guarantee of commercializing knowledge and innovation, given the considerable transactions costs involved in filing a patent, one would assume that a rate of return from a patent is likely. Also, while patents do not cover every kind of innovation, they do include many innovations. Hence the patent registrations are frequently used as an indicator for innovative output and are recorded by organisations such as the OECD and Eurostat. Figure 4.22 shows a breakdown of applications per million population.

Figure 4.22: PCT Patent Applications per million population (selected cities)



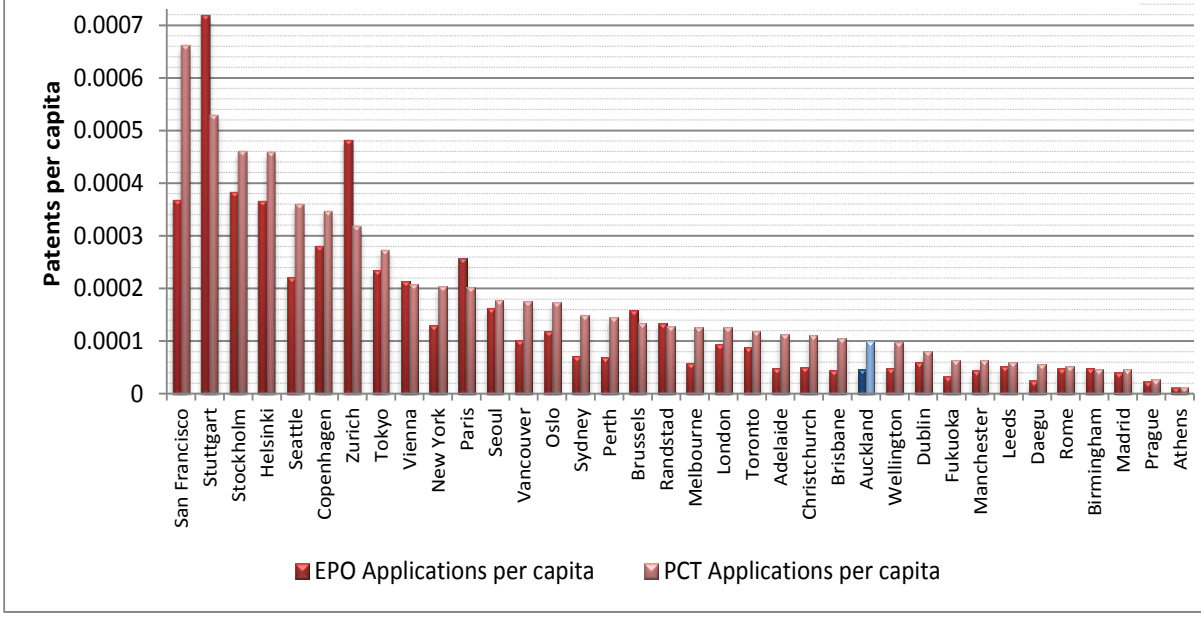

*Source: OECD & MED Data*

Obtaining a patent from the European Patent Office (EPO) takes, on average, just over four years to be granted, while on average in the US it takes between 2 and 5 years for a patent to be granted. The differences in lead times cause some issues in comparing patent generation rates between countries and over time. Iinformation supplied by the Ministry of Economic Development was combined with data from the OECD on EPO and Patent Cooperation Treaty (PCT) activities. The different data sources offer insight into the extent of patent activity in Auckland compared with other international cities.

Auckland's innovative activity as measured with PCT patent applications per million population is slightly lower than that of London but higher than Dublin, and this position has remained stable since 2000. Of the international cities, the average PCT patent applications between 2000 and 2007 are around 112, which is similar to PCT applications originating from Brussels. While the PCT data does not include Vancouver, Brisbane or Adelaide, the other comparator cities are included. Auckland and Melbourne have the lowest (average) patent activity at more than 2.8 times lower than Copenhagen and Seattle. The origin of patent applications from cities such as San Francisco, Stuttgart and Stockholm are substantially higher than any of the comparator cities and also outperforms Copenhagen. These high patent application rates are associated with key industries in these cities such as:

- In San Francisco:
  - Bio-medical (Bayer, Genentech)
  - Aerospace (NASA, and Lockheed Martin)
  - High Technology (Silicon Valley)
- In Stuttgart:
  - Automotive industry (Porsche, Mercedes Benz, Daimler AG)
  - Information technology and telecommunications (Deutsche Telekom)
- In Stockholm:
  - Electronics and communications (Ericsson, Xerox)
  - Automotive industry (Ohlins, SAAB, Volvo, Skandia)

Figure 4.23: Patent applications per Capita




*Source: OECD and MED Data*

Using another measure of patent activity - EPO applications - all the comparator cities are included. Again Auckland falls in the bottom half. In terms of the number of applications per capita, Auckland is marginally behind Christchurch (PCT and EPO applications per capita, Figure 4.23). In terms of absolute numbers, Auckland submitted three times more patent applications than Christchurch.

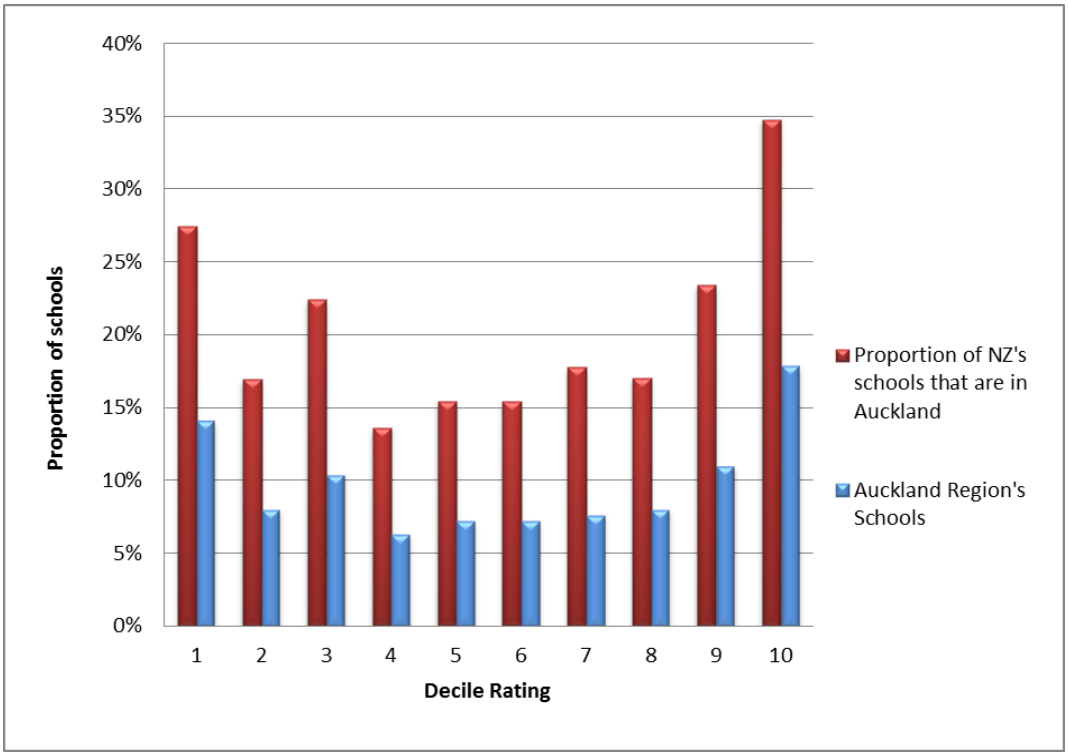
It is important to note that the comparatively lower patent levels do not imply that innovation, research and development is not undertaken. The link between research and development, universities (and research institutions) and the private sector are all part of the system of regional knowledge resources.

### 4.4.5 SCHOOLING SYSTEM

The New Zealand schooling system is overseen by the Ministry of Education. As part of the process of determining governmental financial allocations to each school, a ranking system has been developed. Lower ranked schools receive higher governmental funding. The Ministry of Education uses a decile ranking system. It does not relate to the quality of teaching or education standards attained by the students, but gives an indication of the socio-economic status of the families in the school catchment.

Decile, by definition, refers to the division of data into ten equal parts, so that each part represents one-tenth of the sample or population. The Ministry of Education classifies all New Zealand schools according to their socio-economic decile outcome, based on information from matching the addresses of families attending the school with their corresponding meshblock (statistical area unit) in the Census. These are calculated every five years.[37]

Figure 4.23: Decile ratings of Auckland and New Zealand schools




*Source: Ministry of Education 2010*

[37] For more information on the Ministry of Education's methodology, see: http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/Resourcing/ResourcingHandbook/Chapter1/DecileRatings.aspx

Decile 1 schools are the 10 per cent of schools with the highest proportion of students from low socio-economic communities. Decile 10 schools are the 10 per cent of schools with the lowest proportion of these students. A school's decile does not indicate the overall socio-economic mix of the school. Auckland has a disproportionate amount of decile 1 schools (14 per cent of Auckland's schools) and decile 10 schools (18 per cent of Auckland's schools).

Auckland has 21 per cent of New Zealand schools, yet 35 per cent of decile 1 schools are located in Auckland, and 27 per cent of decile 10 schools are found in Auckland (Figure 4.23).

The distribution of decile ranked schools differs throughout the region, reflecting the relative concentrations of wealth and poverty within the region. A disproportionate number of decile 1 schools are located in the Manukau Ward, while a large number of decile 10 schools are located in the Albany Ward (Table 4.13).

Table 4.13: Distribution of decile rated schools within the new Auckland Ward boundaries

| Ward | Decile rating | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **99** | **Total** |
| Albany | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 4 | 26 | 3 | 40 |
| Albert - Eden - Roskill | 0 | 5 | 3 | 4 | 5 | 8 | 3 | 8 | 3 | 4 | 8 | 3 | 54 |
| Franklin | 0 | 1 | 1 | 1 | 4 | 4 | 5 | 5 | 4 | 6 | 5 | 1 | 37 |
| Manukau | 1 | 41 | 11 | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 67 |
| Manurewa - Papakura | 0 | 17 | 13 | 6 | 2 | 2 | 1 | 3 | 4 | 0 | 1 | 3 | 52 |
| Maungakiekie - Tamaki | 0 | 13 | 3 | 6 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 28 |
| North Shore | 0 | 1 | 0 | 2 | 1 | 2 | 4 | 8 | 8 | 8 | 15 | 1 | 50 |
| Orakei | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 5 | 10 | 2 | 24 |
| Rodney | 0 | 0 | 1 | 0 | 3 | 3 | 2 | 10 | 3 | 4 | 4 | 1 | 31 |
| Te Irirangi | 0 | 1 | 2 | 0 | 4 | 0 | 1 | 4 | 2 | 7 | 15 | 3 | 39 |
| Waitakere | 1 | 1 | 4 | 12 | 10 | 6 | 10 | 2 | 6 | 2 | 1 | 0 | 55 |
| Waitemata and Gulf | 2 | 1 | 1 | 4 | 1 | 4 | 2 | 4 | 2 | 3 | 4 | 3 | 31 |
| Whau | 0 | 0 | 3 | 10 | 4 | 3 | 1 | 3 | 2 | 0 | 0 | 2 | 28 |

*Source: Ministry of Education, compiled by the Auckland Regional Council's SERM team.*

### 4.4.6 TERTIARY EDUCATION SYSTEM

The tertiary education system is a key component of a city's knowledge infrastructure. Tertiary education contributes to social and economic development through: the formation of human capital (primarily through teaching); the building of knowledge bases (primarily through research and knowledge development); the dissemination and use of knowledge (primarily through interactions with knowledge users; and the maintenance of knowledge (inter-generational storage and transmission of knowledge).

Auckland has a disproportionate share of NZ's university students, even when the large population of Auckland is taken into account, at 42 per cent. This is an unusual concentration and a unique asset. Auckland hosts a number of tertiary education institutions (TEI) that have a substantial presence in the city, including the University of Auckland, Auckland University of Technology, and Massey University. Additional providers include Unitec, Manukau Institute for Technology, and a range of private education providers

In order to compare Auckland's provision of tertiary education services to the population, the three universities were chosen for direct comparability, as a focus on degree level qualification tends to be more standardised than the qualifications from providers who have a more vocational focus. Combining (city-region) population total and the number of institutions as an indicator, it is possible to compare the per capita density of universities across different city-regions.

In addition to the number of TEIs, the quality of education provided by these community assets influence regional competitiveness. Measuring the quality of universities and ranking them continues to be controversial. A number of conceptual issues constrain a comparison of university quality and comparing the results of different rankings. The *Times Higher Education-QS World University Rankings* is presented below, which is based on the results of a global survey. The criteria used, a brief description and the weightings are summarised in Table 4.144.

According to the 2009 Times Higher Education-QS World University Rankings, the top universities in the world were Harvard University (Cambridge, US) in first place, the University of Cambridge (UK) in second and Yale University (New Haven, US) in third.

Table 4.14: University rankings – Criteria, Description and Weightings

| Criteria | Description | % |
|---|---|---|
| **Academic Peer Review** | Composite score drawn from peer review survey (which is divided into five subject areas). 9,386 responses in 2009 (6,354 in 2008). Respondents are not permitted to submit their own institution or to respond more than once (their latest response is counted). Weightings are applied both geographically and by discipline to ensure as fair a representative spread as possible. | 40 |
| **Employer Review** | Similar to the Academic Peer Review, this indicator is based on a global online survey, this time distributed to employers. Results are again based on three years' worth of 'latest response' data. Geographical weightings are again applied to ensure fair representation from key regions of the world. Score based on responses to employer survey. 3,281 responses in. | 10 |
| **Faculty Student Ratio** | Faculty Student Ratio is used in many ranking systems and evaluations in the world, and whilst it may not be a perfect measure of teaching quality, it is the most globally available and accessible measure of commitment to teaching. An indication that the institution in question has sufficient staff to teach its students. | 20 |
| **Citations per Faculty** | Citations are a widely used, conventional measure of research strength. A citation is a reference to one academic publication in the text of another. The more citations a publication receives the better it is perceived to be, the more highly cited papers a university publishes, the stronger it can be considered to be. As a measure this is somewhat geared towards scientific and technical subjects, which is why it doesn't carry more weight. The source used in this evaluation is Scopus, the world's largest abstract and citation database of research literature. The latest five complete years of data are used. The total citation count is factored against the number of faculty in order to take into account the size of the institution. | 20 |
| **International Faculty** | In today's increasingly globalized world, the most successful universities have to attract the world's best students and faculty. Simple evaluations of the proportion of international students and international faculty serve as indicators of an institution's international attractiveness. | 5 |
| **International Students** | Score based on proportion of international students | 5 |

*Source: Times Higher Education-QS World University*

The University of Auckland is consistently ranked as a global Top 100 university. Within the six comparator cities considered in this study, there are eight universities ranked within the top 200 in the world. A list of the universities in the comparator cities and their respective rankings is in Table 4.155. The table shows the rankings for 2008 and 2009 as well as the score (out of 100) for each criteria. It also presents data from two other New Zealand universities – Otago and Canterbury – which feature in the top 200.

Table 4.15: University Rankings

| City | Institution | 2009 | 2008 | Peer Review | Employer Review | Staff/Student score | Citations/Staff score | International staff score | International Students | Overall Score |
|---|---|---|---|---|---|---|---|---|---|---|
| Melbourne | University of Melbourne | 36 | 38 | 100 | 100 | 57 | 61 | 59 | 97 | 83.1 |
| Vancouver | University of British Columbia | 40 | 34= | 100 | 93 | 51 | 77 | 34 | 60 | 81.2 |
| Brisbane | University of Queensland | 41 | 43 | 94 | 95 | 47 | 67 | 99 | 82 | 80.7 |
| Melbourne | Monash University | 45 | 47 | 98 | 99 | 56 | 42 | 95 | 96 | 80 |
| Copenhagen | University of Copenhagen | 51 | 48 | 84 | 67 | 100 | 48 | 71 | 73 | 78.8 |
| **Auckland** | **University of Auckland** | **61** | **65** | **95** | **96** | **36** | **45** | **93** | **99** | **74.7** |
| Seattle | University of Washington | 80 | 59 | 83 | 46 | 45 | 99 | 25 | 36 | 71.1 |
| Adelaide | University of Adelaide | 81 | 106 | 78 | 87 | 38 | 62 | 87 | 96 | 70.8 |
| Dunedin | University of Otago | 125 | 124 | 68 | 77 | 39 | 52 | 100 | 60 | 63.9 |
| Christchurch | University of Canterbury | 188 | 186 | 57 | 89 | 27 | 39 | 99 | 82 | 55.2 |
| Vancouver | Simon Fraser University | 196 | 164 | 67 | 49 | 19 | 53 | 88 | 49 | 53.9 |

*Source: 2009 THE-QS World University Rankings*

The University of Auckland falls outside the top 50 with three of the comparator cities having universities within the top 50 (Melbourne having its two universities within the top 50). An area that scores high for the University of Auckland is the 'peer review' criteria. This category relates to the perceived quality of the university amongst its peers and this score confirms the quality of the institution. The University of Auckland outperforms a number of world renowned universities on the 'international students' category including: University of Cambridge and Harvard University and is only marginally behind the London School of Economics. This reinforces the strong evidence of the importance of export education in the Auckland region. Comparing the cost of studying at different universities and institutions within a country and on the international stage is complex as different aspects influence the total cost. The cost of studying is not solely related to the tuition fees but also includes administration and admission fees, books and materials, the cost of living and opportunity costs. A review of course fees for a basic degree (for a domestic student including compulsory fees), it appears as if the University of Auckland has a cost competitive position over universities in the comparator cities of between 40 per cent and 125 per cent. It is important to realise that the THE-QS World University Rankings do not include other TEIs making it difficult to reflect on, and compare, these parts of the tertiary education system against international cities.

### 4.4.7 SYNTHESIS: KNOWLEDGE RESOURCES

New Zealand performs moderately when compared with other English speaking nations in terms of literacy and numeracy. For literacy (prose and document) levels, New Zealand has less people at the extremes of both low and high levels. Thus the majority of people range in the middle levels. For numeracy levels, New Zealand has more adults at the lowest level, than for literacy. The figures become starker for problem solving skills, where New Zealand has over one in four adults at the lowest level. However, these figures were not so different for the other English speaking countries of the study.

A substantial literacy and numeracy skill gap exists within Auckland. Forty four per cent of adults had low literacy and 51 per cent low numeracy. This impacts the workforce, and it was found that 56 per cent of the people in Auckland region with low literacy or numeracy are already in work. There were stark differences

across the Auckland region – for example, in five of the new wards of the Auckland Council[38], more than 20 per cent of the population had no qualifications (a proxy measure for low literacy and/or numeracy), while two of the new wards had more than 30 per cent of the population unqualified.[39] Literacy and numeracy skills are higher in the north and centre of the Auckland region, and lower in the south and west. In Counties Manukau, 58 per cent of adults have low prose literacy, and 65 per cent have low numeracy.

Overall in terms of education attainment, the Auckland region generally performs well, compared with the rest of the country (this is despite the stark concentration of non-qualified people in certain areas of the region). The Auckland population is relatively highly qualified by New Zealand standards. Overall, Auckland performs only moderately in terms of the third indicator – the proportions of the workforce in knowledge intensive and high manufacturing occupations. Generally, employment in knowledge intensive occupations for Auckland is average for the international comparator cities, but its share of employment in medium and high tech manufacturing is low. Auckland compares relatively poorly with the comparator cities in regards to patent applications. Auckland University is placed within the top 100 universities in the world (ranked 61). Melbourne performs better, with its two universities ranked within the top 50.

[38] These were the new wards of Franklin, Maungakiekie-Tamaki, Rodney, Waitakere and Whau.
[39] Manukau and Manurewa-Papakura

## 4.5 AMENITIES (NATURAL, SOCIAL AND CULTURAL)

An amenity is something that engenders value when used. Amenities are provided through infrastructure, social institutions and the natural environment. Amenities can be, but are not exclusively public goods. The provision of high quality amenities in a city-region is important for the well-being of residents, and can add to the competitiveness and attractiveness of a city-region – making it a desirable place to work, visit and do business. This section distinguishes between natural, social and cultural amenities. As the concept of a quality amenity is rather subjective, a number of indicators are selected in each category, in an attempt to tease out the concept.

### 4.5.1 NATURAL AMENITIES - CLIMATE

Climate encompasses statistics of temperature, humidity, wind, rainfall and other meteorological elements in a given region over periods of time. The climate of a city-region is a natural amenity, which can affect how people live within the region, and the activities they undertake. It is also a consideration in the desirability of a region for habitation, for health or recreation grounds. Average annual statistics on climate conditions were taken for the comparator cities, for a cursory comparison across the city regions and are summarised in Table 4.166.

Table 4.16: Average Climate Statistics

| | Low temp (°C) | High temp (°C) | Sunshine (hours) | Rainfall (mm) | Humidity (am) | Humidity (pm) |
|---|---|---|---|---|---|---|
| Auckland | 12 | 18 | 6 | 104 | 76 | 67 |
| Adelaide | 12 | 23 | 7 | 45 | 55 | 46 |
| Melbourne | 10 | 20 | 6 | 54 | 69 | 56 |
| Brisbane | 15 | 26 | 8 | 95 | 68 | 55 |
| Vancouver | 6 | 14 | 5 | 122 | 90 | 73 |
| Seattle | 7 | 15 | 6 | 71 | 86 | 65 |
| Copenhagen | 6 | 12 | 4 | 50 | 81 | 73 |

*Source: Lonely Planet*

As expected, the northern hemisphere cities had similar climates, given their latitude, with the exception that Vancouver had higher rainfall than the other two. The southern hemisphere city regions had higher average temperatures and number of sunshine hours. Auckland had the highest rainfall of the southern hemisphere city-regions, although not as high as Vancouver.

### 4.5.2 NATURAL AMENITIES - PUBLIC SPACES/PARKS

Open space and access to park facilities play a key role in determining and influencing the quality of living environments and the importance of these areas is increasing due to continued growth and urban intensification (ARC, 2005; Sallis and Kerr, 2006). Open spaces are believed to generate a wide range of benefits. The social, environmental and economic benefits of open spaces can play an important role in decisions about zoning, land-uses, and urban development regulations. In addition to the private benefits created by parks (e.g. improving property values), they may also generate public benefits such as reducing air pollution, contributing to flood control and improved water quality and facilitating healthy lifestyles.

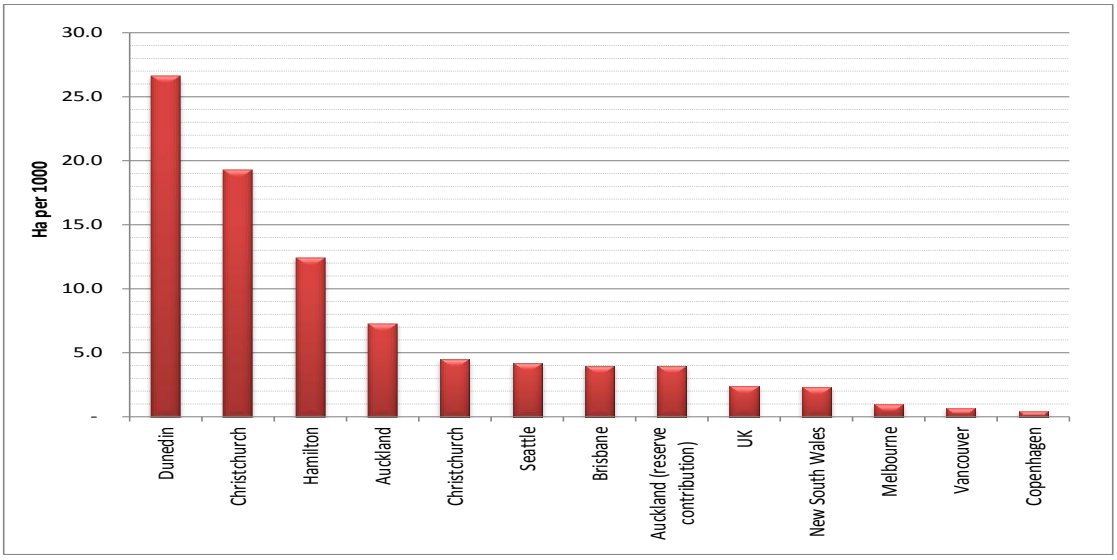
To measure and compare open space and its availability, a number of possible indicators were reviewed. This included a review of urban planning standards (i.e. the size of landscaped area/park space that has to be provided by household or per unit of office space developed); the number of facilities per household

with certain distance and the total area of open space that can be used by the local population. For example, the standards are expressed in 5 different ways:

- Fixed standards;
- Area percentage standards;
- Catchment based standards;
- Facility standards; and
- Local standards.

Variation in the definitions and spatial areas used, the incompleteness and the age of data proved to be a challenge in selecting a useful comparable indicator. The data was captured from individual sources and converted into a fixed standard equivalent(s) to enable a comparison. Expressing the open space as hectare (Ha) per 1,000 population and comparing the resulting ratio was identified as the most appropriate indicator. The results are shown in Figure 4.24. The figure includes non-city regions of New Zealand to allow domestic comparison also.

Figure 4.24: Open Space per 1,000 Population




*Note this figure excludes Auckland's regional parks.*
*Source: Calculations based on respective Council's data.*

Based on open space managed from a council level Figure 4.23 shows that Auckland has more open space per 1,000 than any of the comparator cities with almost 9ha per 1,000 residents. This is double the value of Seattle and Brisbane and is substantially more than the urban areas of Copenhagen. In the United Kingdom the average ratio is 2.4ha/1,000 residents. This figure however does not include the public space embodied in Auckland's regional parks, which if added increases Auckland's ratio of open space hectare per population to 27ha. These regional parks are within a relatively short distance to the main urban areas, which substantially improves the rate of hectares of open space per 1,000 population.

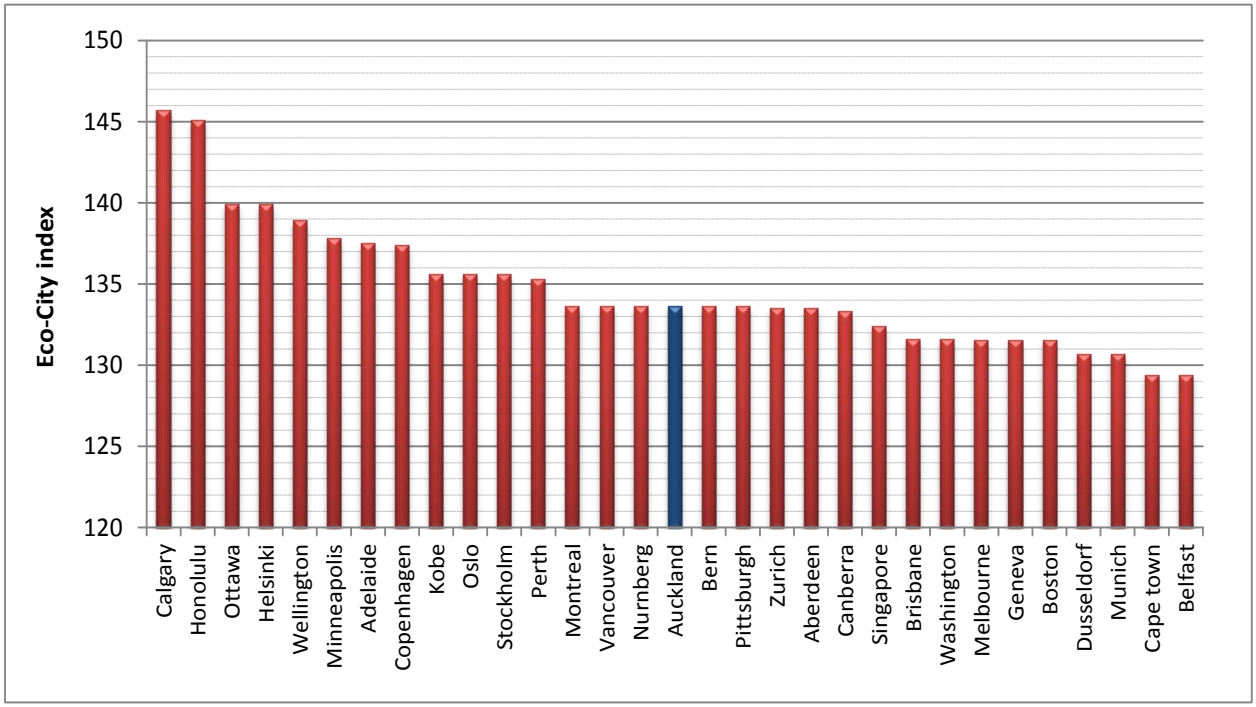
The high level of open space contributes towards Auckland's unique identity and gives the city its sense of place and it is central to people's identification with the region and their personal and social well-being. While Aucklanders have access to open space, it is worthwhile to note that a large portion of the open space is vested in regional parks. In terms of the development standards, (4ha of open space/reserve contribution per 1,000 population) Auckland is on par with the comparator cities. New Zealand cities are

better serviced with large regional parks than the overseas regions, having more ha per 1,000 of population.

### 4.5.3 NATURAL AMENITIES - ENVIRONMENTAL QUALITY INDEX

Environmental quality relates to the properties and characteristics of local environment and how it relates to human activity. These properties and characteristics are space dependant and differ between cities and urban regions. Auckland consistently ranks as one of the most liveable global cities in the Mercer Quality of Living survey (see Section 4.1.3). A recent extension of the Mercer Quality of Living survey is the Eco-City Index[40] of which the 2010 report is the first. This report assesses 221 cities against the six criteria; water availability, water potability, waste removal, sewage, air pollution and traffic congestion.

Figure 4.25: Mercer Eco-City Rankings (2010; Top 30)




*Source: Mercer Eco-City Index; 2010*

North American cities take the top positions with Wellington in fifth position. Auckland is on par with nine other cities including; Vancouver, Bern, Pittsburg, Montreal and Zurich. Of the comparator cities, Adelaide had the highest eco-city ranking marginally above Copenhagen. Auckland features joint third (with Vancouver) when measured against the comparator cities. Brisbane and Melbourne were ranked at 23rd and 25th respectively. Seattle was not in the top 50. Auckland outperforms most comparator cities in terms of the Mercer Eco-City Index and is 13th out of a possible 50 as shown in Figure 4.26 (note not all cities are shown in the figure). For more detail on environmental quality within the Auckland region, data is available from the Auckland Regional Council's (2010) 'State of Auckland Regional report 2010'.[41]

[40] This index emphasises congestion in transport rather than modal share and both these indicators are unpacked elsewhere in the report.

[41] Report available from http://www.arc.govt.nz/albany/index.cfm?FD6A3403-145E-173C-986A-A0E3C199B8C5

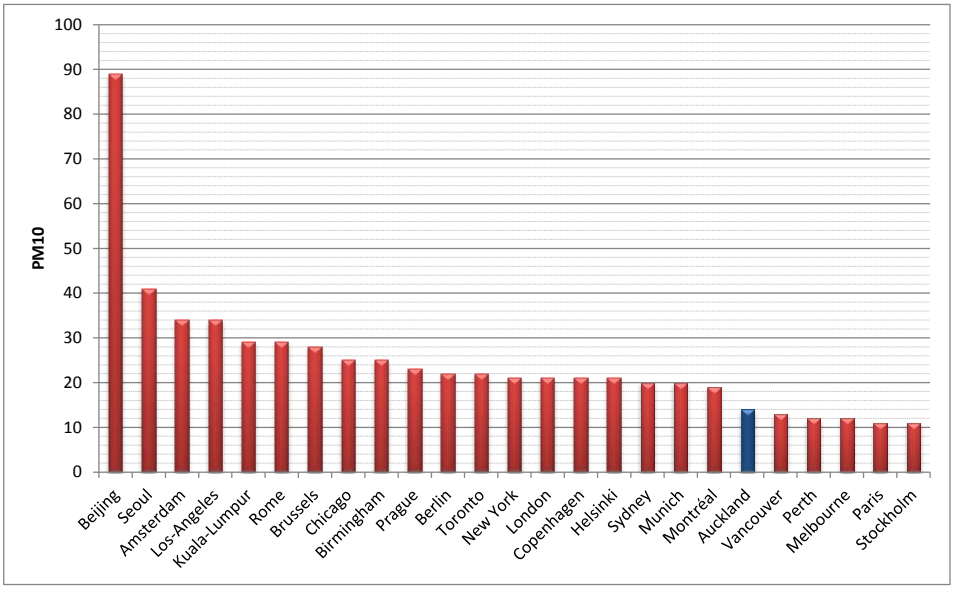
#### *4.5.3.1 AIR QUALITY*

Air Quality Standards/Guidelines are published by the World Health Organisation (WHO) as a comparable metric of what constitutes good quality (see Appendix 3). Air quality, and the way it is measured, reflects short term concentrations at a specific location and at a specific point in time. Average concentrations are the ambient concentrations that the region experiences most of the time. Short-term peaks refer to relatively infrequent higher concentrations experienced for short periods (one hour to one day). In addition the local, city level dynamics and geography, have a direct influence on air quality. For example, Adelaide faces issues with Ozone ($O_3$) and smog during periods of high humidity. Copenhagen's air quality is influenced by activities in neighbouring countries while Melbourne's air quality is affected by dust storms. Therefore air quality scientists reference quality in terms of acceptable thresholds of pollutants present in the air.[42]

The indicator for air quality uses the World Bank's 2007 World Development Indicators, which provided air pollution data for over 100 cities and is based on research completed by the Bank's Development Research Group and Environmental Department. Their method was to adjust site specific data to form estimate concentrations of air pollutants for residential areas. This enables a comparison of concentrations of particulate matter away from air pollution 'hotspots,' such as industrial districts and transport corridors. Air quality monitoring is sensitive to local conditions and monitoring sites in the same city may register different concentrations.

Auckland's air quality is compared against a range of international cities for three air pollutants: Particulate Matter of ten micrograms per cubic meter $PM_{10}$ (for the 2004 year), sulphur dioxide ($SO_2$) and nitrogen dioxide (for the period 1995 to 2001)

Figure 4.26: Particulate Matter - $PM_{10}$ - (2004; Micrograms/cubic metre)



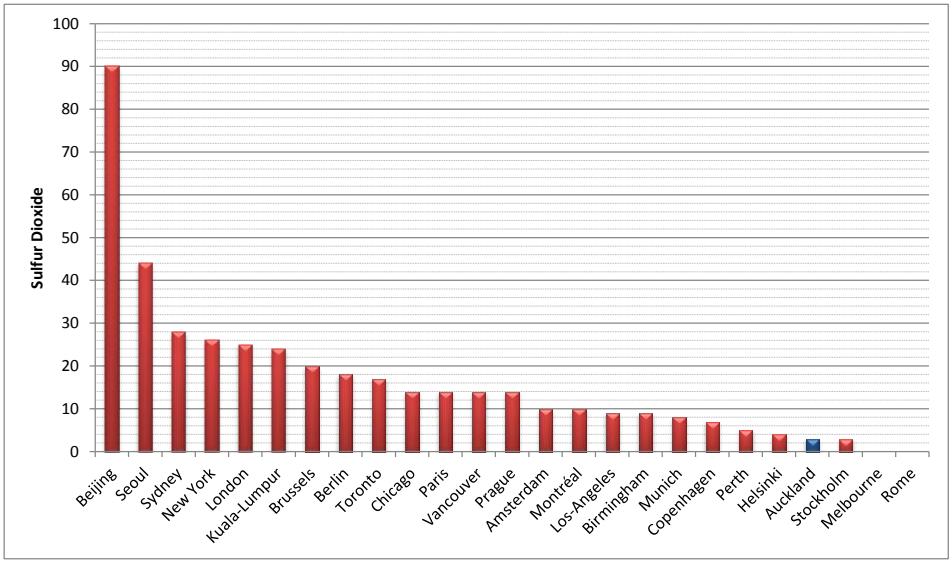

*Source: World Bank; World Development Indicators*

During this period Auckland's air quality was amongst the best in the world for all three of the pollutant indicators (see Figure 4.26 to Figure 4.28). Auckland fared better than Copenhagen on $PM_{10}$ levels in 2004,

[42] The Auckland Regional Council monitors the key air pollutants that impact air quality in the Auckland region. Further data is available from www.arc.govt.nz and reported in the State of the Auckland Region Report 2010, available from http://www.arc.govt.nz/plans/reports/state-of-the-environment-report.cfm

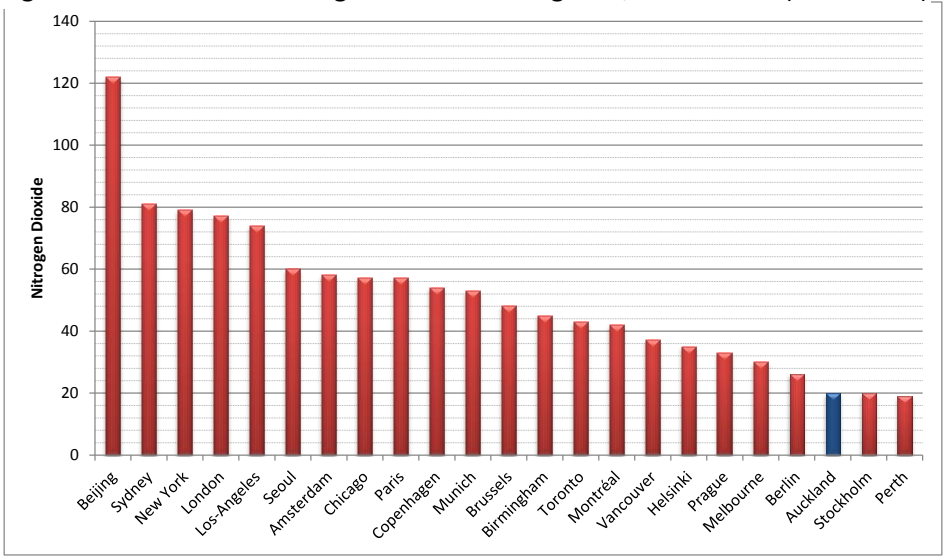
and had levels marginally above Vancouver and Melbourne, who both have exceptionally high air quality. Levels of $SO_2$ were not so good for Vancouver which had 14mg/$m^3$ between 1995 and 2001, double that of Copenhagen at 7mg/$m^3$ and four times the levels for Auckland 3mg/$m^3$. Melbourne had the best quality with regards $SO_2$ with negligible levels. Auckland had the lowest rates of nitrogen dioxide for the comparator city-regions (20mg/$m^3$) in the 1995-2001 period. Copenhagen levels were nearly three times that for Auckland, while Vancouver had nearly double the $NO_2$ levels.

Figure 4.27: Levels of Sulphur Dioxide (1995-2001) Micrograms/cubic metre)




*Source: World Bank; World Development Indicators*

Figure 4.28: Levels of Nitrogen Dioxide Micrograms/cubic metre (1995-2001)




*Source: World Bank; World Development Indicators*

A review of Auckland Regional Council air quality monitoring reports shows that air quality in Auckland has improved since 1998. The number of times that air pollutants breached threshold levels declined from 53 in 1998 to 8 in 2008 (Auckland Regional Council, 2010). The air quality in Auckland supports an amenity of the highest standard by international comparisons. (See Appendix 3)

### 4.5.4 NATURAL AMENITIES - TOPOGRAPHIC INDICATOR

The topography or surface and shape of a city-region can impact on economic outcomes. The topography can constrain building and the available land, or it can affect the relative cost of building if there are additional engineering considerations to be taken into account due to the topography.

Topography can also offer economic opportunities, for example there is increasing interest in the volcanic peaks of the Auckland Volcanic Field and opportunities to enhance visitor experiences to the city by showcasing and capitalising on topographic features. The Jeju volcanic island in South Korea is a UNESCO World Heritage site, an example of valuing topographic features. Each city-region has specific natural amenities that are unique to that city-region. Further qualitative work is required to research and describe these topographic natural amenities in the comparator cities.

### 4.5.5 SYNTHESIS: NATURAL AMENITY

Auckland is distinctive as a city-region due to its natural amenity. The climatic conditions are favourable for hours of sunshine and rainfall, enabling the functioning of ecosystems. Auckland has the highest levels of access to public spaces/parks of all the international comparator cities, facilitating outdoor recreation which may be an important consideration in choice of residential location. In terms of an eco-city ranking of the comparator cities, Auckland was on par with Vancouver, and both were behind Adelaide and Copenhagen. However Auckland was ahead of Brisbane and Melbourne. Seattle did not feature in the top fifty. Auckland has good air quality in comparison to the other cities, although localised air problems persist, as they also do in the comparator cities. In terms of topography, Auckland is located on an active volcanic field – which offers economic benefits through rich volcanic soils while also posing an economic threat, should volcanic activity begin.

## 4.6 SOCIAL AND CULTURAL AMENITY

Social and cultural amenity potentially cover a large array of indicators, given that both 'social' and 'cultural' attributes are essentially contested, and rather subjective to the individual. Social amenities include social infrastructure such as schools, health services, sports facilities, shopping outlets amongst many others. Similarly, cultural amenities range over all the amenities that provide individuals with the ability to express their cultural activities, and can vary with age, interest and identity. This section does not seek to comprehensively include all social and cultural amenities, and the authors acknowledge that it provides only a partial set of indicators for a rather complex area of study. For an international comparison, the Mercer recreation index was chosen. Reported crime rates were also considered important for social amenity – and they have a direct impact on economic outcomes, in terms of cost to the society, individual or to private property. As urban areas are usually seen as important for retailing, the relative importance of shopping in the city region was explored.

### 4.6.1 CULTURAL AMENITY – RECREATION INDEX

Cultural amenity is a subjective concept, as what constitutes culture is not universally accepted and differs between the users of such amenity. For a comparable indicator across the various cities, the company Mercer produce city rankings from a worldwide 'Quality of Living Survey'. The survey is undertaken annually, primarily with a company (enterprise) focus, to enable international companies who relocate staff worldwide to recompense staff accordingly. The Mercer Survey evaluates the quality of living experienced by expatriates, and the method employed by Mercer is tailored with this in mind. Individual reports are produced for each city surveyed. Comparative quality of living indexes between a base city and a host city are generated, as are multiple-city comparisons. They scale cities between 0 (lowest score) to 10 (highest score). The Mercer Survey contains a 'Recreation Index', and the overall position of the comparator cities relative to Auckland (base city) is shown in Figure 4.29. Domestically, Auckland was ranked higher than Wellington and Christchurch, the New Zealand cities compared in 2009. It was also ranked higher than Copenhagen and Seattle. Auckland was ranked on par with Vancouver, but was below the four Australian cities – Adelaide, Brisbane, Melbourne and Sydney.

Figure 4.29: Mercer Recreation Index

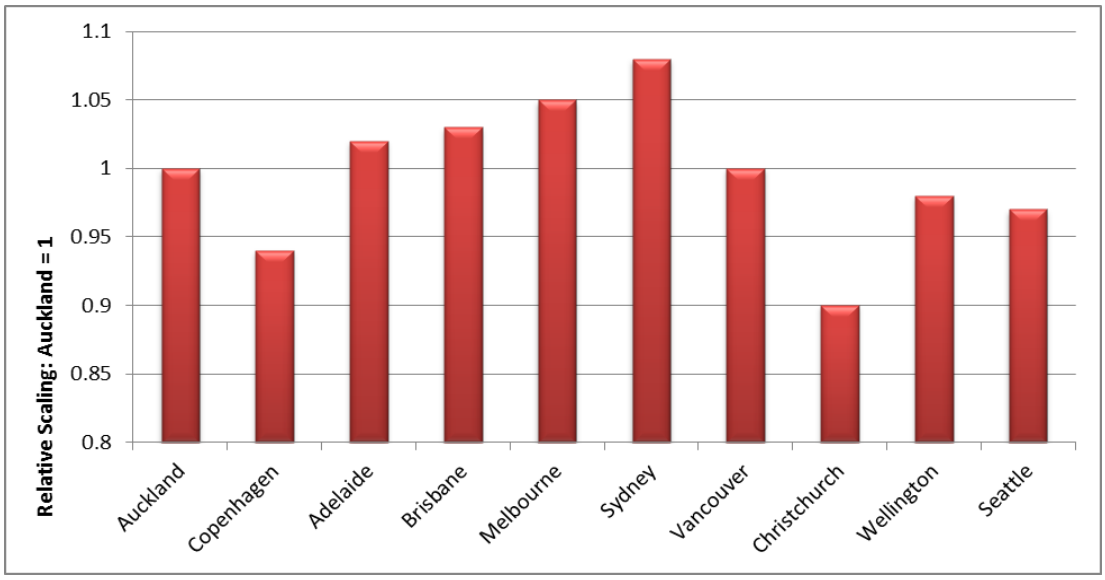
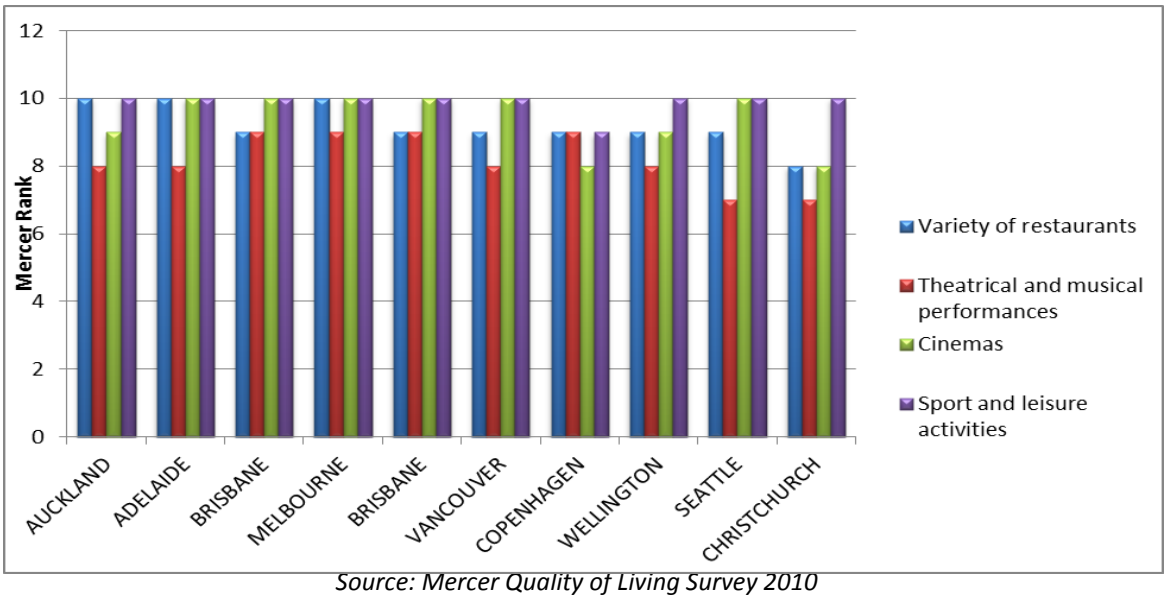


Figure 4.30: Mercer relative ranking of cultural index




*Source: Mercer Quality of Living Survey 2010*

In terms of the breakdown of the recreational index, four variables were considered – the variety of restaurants; theatrical and musical performances; cinemas and sport and leisure activities. Auckland scored a Mercer rank 10 (highest) for the variety of restaurants and its sport and leisure activities. It had a rank of 8 for theatrical and musical performances, and a rank of 9 for cinemas. No city in the selection scored a 10 for theatrical and musical performances. In general, the selected cities scored relatively similarly on the four recreation variables (Figure 4.30). The recreation rankings are explained in Table 4.177.

Table 4.17: Mercer Recreation Rankings

| Rank | Theatrical and musical performances | Cinemas | Sport and leisure activities | Restaurants |
|---|---|---|---|---|
| 0 | No such entertainment is available. | The city has no cinemas. | There are no organised sport or leisure activities at all. | There are no restaurants. |
| 2 | Few productions take place, and tend to be of minor interest to foreigners. | Only a very limited number of cinemas can be found in the city, and the movies shown are of minor interest to foreigners. | Organised sport and leisure activities are very limited and of very poor quality. | The choice of restaurants is restricted, and there are problems with quality and service. |
| 4 | The choice of productions is limited, and international talent is very rare. | There is a limited number of cinemas, and the latest movies are rare or highly censored. | Organised sport and leisure activities are limited and of poor quality. | The choice of restaurants is limited, with average quality and service. |
| 6 | There are many local productions but international talent is rare. | There is a selection of cinemas, but latest movies are rare. | Adequate organised sport and leisure activities are available. | A reasonable choice of restaurants is available with good quality and service. |
| 8 | There are many good local productions, but a more limited choice of a high international standard. | The city has many cinemas, and there is a good, but limited, choice of top international movies. | Good quality sport and leisure activities are available. | A very good range of restaurants is available with excellent quality and service. |
| 10 | Productions are numerous, and there is a wide choice of the highest international standard. | The city has numerous cinemas, and there is a wide choice of top international movies. | Excellent quality organised sport and leisure activities are available. | An excellent choice of top-class restaurants is available. |

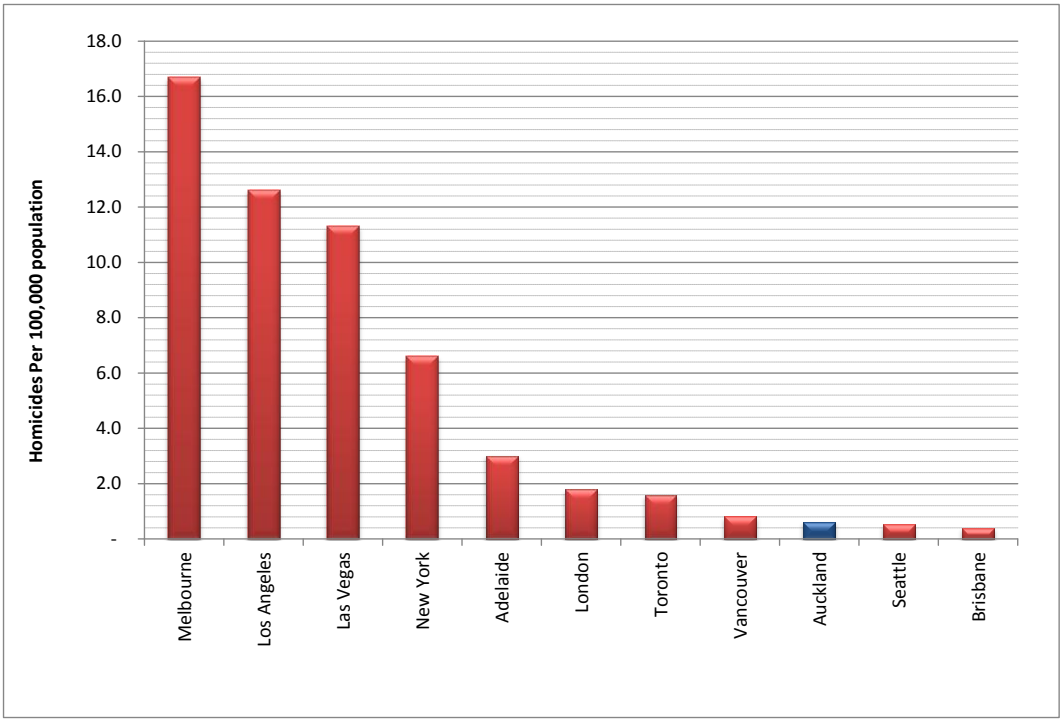
*Source: Mercer Quality of Living Survey* 2010

### 4.6.2 SOCIAL AMENITY - REPORTED CRIME RATES

Feeling safe and secure in one's home, community and urban area is a basic human right. Safety and security is a social amenity. Crime restricts individual's choices about how to live their lives. Crime is directly correlated to economic outcomes, and crime has a direct impact on property – either on the self (the right to life) or material entities (the right to private property). A study of business activity and crime found that when homicides increased, there were significant reductions in the growth rate of new retail and service businesses, and employment in existing businesses (Greenbaum and George, 2004). In addition to the level of crime, perceptions about crime also affect customers' and entrepreneurs' decisions about visiting or investing in a particular area.

Official crime statistics datasets report the number of offences as recorded by the Police. This indicator used reported crimes to Police in the comparator cities. The Police jurisdictions broadly overlap with city boundaries, but tend to be larger. For example, the indicator presented for Auckland is a combination of the Waitemata Policing District and the Auckland Policing District. To be able to compare crime statistics across the international comparator cities the Police jurisdictional delineations were used, and do not strictly align to the city-regions unit of analysis used elsewhere in this study. Data was collected for the most recent publically available timeframe (for either the 2009 calendar year, the 2008/9 or 2009/10 periods), using the reporting period as defined by each Police jurisdiction (which were not always aligned - most areas use an annual cycle, but the start and end dates were not always in tandem). Slight variations in the definitions of crime were also identified across countries, and any measurement bias brought about by the method used to aggregate the raw data to compare datasets is acknowledged.

Figure 4.31: Homicides per 100,000 residents




*Source: Based on police statistics from the relevant policing districts*

The first violent crime indicator is murder/homicide. [43] Murder is generally considered the most reliable indicator of the violent crime situation since most murders come to the attention of police, which is not always the case for under-reported crimes such as robbery or domestic violence. Crime against property and crime against the person offer additional insight into the relative safety in the cities.

The crime levels are expressed in terms of incidences per hundred thousand residents to account for the size of the city. Figure 4.31 provides and Table 4.188 summarises the crime data.

Table 4.18: Crime against property and against persons (per 100,000 population)

| | **Crime against property** | **Crime against persons** |
|---|---|---|
| Auckland | 3,156 | 863 |
| Brisbane | 2,647 | * |
| Vancouver | 6,710 | 1,240 |
| Melbourne | 25,505 | 3,467 |
| Seattle | 859 | 94 |
| Adelaide | 5,359 | 818 |

* Definition issues limit comparability.

*Source: Calculations based on SNZ and Police Statistics*

When measured against the comparator cities, is appears that Auckland is a safe city with low crime rates. Based on New Zealand Police (NZP) statistics, Auckland's homicide rate is 0.9 homicides per 100,000 residents which is low by international standards. Against some of the international cities, this rate lies at the bottom end of the range. A closer inspection of the homicide rate calculated by the NZP reveals that the population totals used are lower than Statistics New Zealand's population estimates. If the NZP statistics are combined with the SNZ estimates then Auckland's homicide rate falls to 0.6. This puts Auckland slightly lower than Brisbane (0.8) and Vancouver (0.8) but marginally higher than Seattle (0.5) in terms of homicides.

An issue with using homicide (and crime rates) at the city level is that it tends to be volatile with large movements. A case in point is Melbourne. Recent data suggests that the city has a high level of violent crime with a homicide[44] rate at over 16 per 100,000 but this rate appears to be higher (almost double) than average rates, using time-series data (6 to 7 homicides per 100,000 residents). Additionally the crime figures may be overstated due to the area (jurisdictions) covered. For example, the police area of Port Phillips (an area associated with Melbourne), with a homicide rate of 2.1 is not included.

Measured against the six comparator cities, Auckland's crime levels (against the person and property) can be described as average ranking 4th out of the six city-regions[45] in terms of crime against property and 4th out of six for crime against the person. Melbourne experiences more crimes per 100,000 than any of the comparator cities.

[43] Definitions of murder vary between countries. In some countries, 'attempted murder' is included, since legally this is deemed equivalent to the completed act, while in others 'culpable' homicides (the killing of another through reckless behavior) are included.
[44] This rate is more than double the homicide rate recorded in preceding years.
[45] The data for Copenhagen appeared unreliable and this city has been excluded from this analysis.

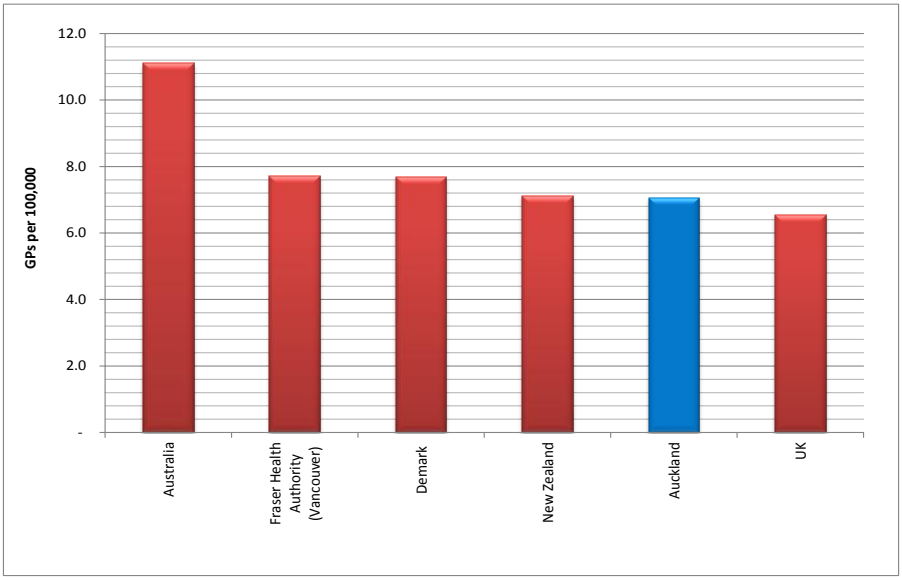
### 4.6.3 NUMBER OF GENERAL PRACTITIONERS PER CAPITA

Good health is critical to wellbeing. Without good health, people are less able to enjoy their lives to the fullest extent and their options are limited. From a government's perspective, maintaining a healthy population is important due to the costs associated with illness/disease, and the loss of productivity if the labour force is incapacitated. Access to health services and general practitioners is used as a proxy indicator for social/health amenity, due to the relative ease of comparability for comparator city-regions. General practitioners (GPs) are part of the front line of primary health care provision. Accessibility to a GP is an important issue in both treatment and prevention of poor health. The number of GPs per city may reflect accessibility to health services. A lower rate of GPs per head of population may result in difficulty accessing primary health care and is associated with higher rates of hospitalisation – lowering wellbeing.

Limitations with the use of this indicator are acknowledged. It is not a measure of the health of a population. Residents may be affected by underlying environmental conditions affecting their health – such as hyper-pollens as in the case of Auckland, increasing the incidence of asthma. Access to health services does not imply use. Affordability of health services could prohibit access, despite availability.

Up-to-date information on the number of GPs per unit of population is predominantly presented at a country level. Based on available information Figure 4.33 was constructed. Note that the data in this figure should be interpreted with caution as it covers different periods.

Figure 4.32: General Practitioners per 100,000




*Source: Country level Statistical Agencies and Health Board Equivalents*

In Auckland, the number of GPs per 100,000 residents reflected in the figure is slightly lower than the levels experienced throughout New Zealand. In New Zealand, there has been a steady decline in the rate of GPs per 100,000 population from 2001 to 2005. This decline is however due to a drop-off in the number of GPS in rural New Zealand. In the 12 large cities in New Zealand the number of GPs per 100,000 has actually increased over time with Auckland City having the highest GP per 100,000 ratio.

### 4.6.4 SIMPLE LOCATION QUOTIENT FOR RETAILING

Retailing is considered a social amenity. The retail sector is an important part of any economy, as it is responsible for a large component of household consumption and expenditure. Retailing also affects the urban form and function, with large urban centres considered important for the retail sector.

This indicator measures the relative importance of retailing in the Auckland region, compared to the rest of New Zealand. The Simple Location Quotient (SLQ) is a measure which compares the relative importance of output of a sector in a region to its relative importance in the nation, in terms of numbers employed.

A SLQ indicator greater than one implies that the sector is more concentrated in the region than in the nation as a whole (effectively that it has the ability to meet regional demand, but also can export the excess to the rest of the nation). In the case of retailing, it would mean that Auckland is an important service centre for retailing, that people come to the region for shopping.

A SLQ less than one indicates less concentration of that industry in the region, compared to the nation as a whole. It implies that the sector cannot meet regional demand, and imports from the rest of the nation (Aucklanders go shopping elsewhere).

Table 4.199 gives SLQ for two years, 2000 and 2009 at six digit ANZSIC level. In 2000, 18 out of 32 retailing industries in Auckland had SLQs greater than one, while there were 17 retailing industries in 2009. The SLQ for Car Retailing and Floor Covering retailing dropped to less than one while Photographic Equipment Retailing's SLQ has increased to above one between those years. The highest retail industry SLQ was for Recorded Music Retailing. Marine Equipment retailing was second, confirming the relative importance of Auckland's marine industry to the rest of the country. Two other retailing sectors had SLQs over 1.2. Electric Household Equipment repair services and Domestic appliance retailing were third and fourth in 2009. For these four retailing industries, over 20 per cent of the total amount of the product sold to customers in Auckland was sold to customers outside of Auckland.

Table 4.19: Location Quotient for Retailing

| Retail industry | LQ 2000 | LQ 2009 |
|---|---|---|
| Recorded Music Retailing | 1.2931 | 1.2554 |
| Marine Equipment Retailing | 1.1932 | 1.2356 |
| Household Equipment Repair Services (Electrical) | 1.0724 | 1.2065 |
| Domestic Appliance Retailing | 1.1091 | 1.2044 |
| Specialised Food Retailing nec | 1.0609 | 1.1946 |
| Fabrics and other Soft Good Retailing | 1.0783 | 1.1945 |
| Clothing Retailing | 1.2776 | 1.1908 |
| Retailing nec | 1.1050 | 1.1879 |
| Toy and Game Retailing | 1.1430 | 1.1727 |
| Watch and Jewellery Retailing | 1.0849 | 1.1135 |
| Footwear Retailing | 1.0112 | 1.1131 |
| Photographic Equipment Retailing | 0.9354 | 1.0891 |
| Smash Repairing | 1.1152 | 1.0887 |
| Newspaper, Book and Stationery Retailing | 1.0488 | 1.0760 |
| Furniture Retailing | 1.0176 | 1.0748 |
| Department Stores | 1.0649 | 1.0180 |
| Household Equipment Repair Services nec | 1.1660 | 1.0064 |
| Pharmaceutical, Cosmetic and Toiletry Retailing | 0.9201 | 0.9775 |
| Automotive Repair and Services nec | 0.9340 | 0.9461 |
| Flower Retailing | 0.9764 | 0.9130 |
| Antique and Used Good Retailing | 0.8458 | 0.8902 |
| Car Retailing | 1.0236 | 0.8883 |
| Automotive Electrical Services | 0.9324 | 0.8768 |
| Sport and Camping Equipment Retailing | 0.9343 | 0.8719 |
| Domestic Hardware and Houseware Retailing | 0.8624 | 0.8553 |
| Tyre Retailing | 0.8262 | 0.8237 |
| Automotive Fuel Retailing | 0.8883 | 0.8222 |
| Floor Covering Retailing | 1.1505 | 0.7981 |
| Trailer and Caravan Dealing | 0.7067 | 0.7722 |
| Garden Supplies Retailing | 0.8274 | 0.7144 |
| Motor Cycle Dealing | 0.4232 | 0.4842 |
| Milk Vending | 0.4531 | 0.1961 |

*Source: Calculations based on SNZ*

### 4.6.5 SPORTING FACILITIES

Sporting facilities provide outlets for individuals and teams to recreate while also enhancing health outcomes. Sporting facilities are increasingly seen as a social amenity, and are important for economic outcomes as they can enable the formation of groups and networks, with the potential of building social capital. The provision of sporting facilities has the potential to engender a sense of identity, as evidenced through supporter's clubs and general community endorsement of sporting activities. Auckland has an array of sporting facilities, and further qualitative and quantitative evidence of the stock of sporting facilities in the region is required.

In late 2009/early 2010, Auckland considered bidding for the 2018 Commonwealth Games. During this process, a stocktake of sporting facilities in the region was undertaken, in the assessment of suitability for hosting the Commonwealth Games. As the Commonwealth games are hosted internationally, this information could provide a useful benchmark to assess the sporting facilities in the region, in comparison to the cities in this study, many of whom have hosted the Games.[46]

A further source of information on sporting facilities in the region could be obtained from SPARC New Zealand. As part of the Auckland Regional Physical Activity and Sport Strategy (ARPASS), there is a goal of developing the regional facilities in Auckland.[47]

### 4.6.6 SYNTHESIS: SOCIAL AND CULTURAL AMENITY

In terms of ranking of recreational amenities, Auckland was on par with Vancouver. The Australian cities ranked higher than Auckland and Vancouver. However, Auckland was above Copenhagen and Seattle, and above the other New Zealand cities in the study. Auckland is a relatively safe city-region in terms of crime rates – ranked fourth out of six of the comparator cities, thus an indicator of good social amenity. Auckland was confirmed as an important location for shopping in New Zealand. This was particularly the case for recorded music selling and marine retailing. Auckland has an array of sporting facilities, although comparison with the other countries requires further investigation. Overall there is evidence of good social and cultural amenity in Auckland.

## 4.7 SYNTHESIS: DISTINCTIVENESS

Distinctiveness, that which sets a city-region apart from others, occurs at many levels. This section has attempted to show some of the characteristics and spark the discussion about what sets Auckland apart from other city-regions. As might be expected, given that the city-regions in this study were selected on the basis of their similarities rather than comparing differences, Auckland compares relatively similarly to the other cities in many respects. Yet, there are characteristics that are associated exclusively with Auckland, and perhaps, given that this is a comparative study, will by definition not be picked up with the indicators selected.

On an international level of brand awareness, Auckland is seen to provide the 'basics'. Auckland does not stand out internationally particularly in terms of brand image. Therefore the unique features are not known, recognised or communicated to the wider international audience. Yet Auckland is seen to have a strong brand in New Zealand, but lags other New Zealand cities in terms of esteem. Auckland is seen by New Zealanders to be unique, dynamic, progressive, energetic, fun, stylish and social – all positive strengths. However, New Zealanders identify arrogance and lack of service as weaknesses for the region.

[46] Note: An attempt was made to access this data, but was not forthcoming at the time of finalising this report.
[47] More information available from www.sparc.org.nz

Nevertheless, Auckland is a desirable place to live, and international quality of life indicators rank Auckland consistently high, amongst the best (4th) in the world as a place to live. Auckland has a young population, particularly as it attracts foreign students, but also due to the proportions of Pacific and Māori peoples living in the region, who have higher fertility rates. Auckland has the greatest diversity of residents of New Zealand cities and towns, and has a high proportion of residents born overseas. This element of migrant communities in Auckland is important, as it means that the sense of identity changes constantly, or perhaps the city region is still in the process of defining itself. This state of flux extends to administrative boundaries, which have also changed in 2010. This affects the identity of the people – as association to place/locality is important for a sense of identity. The age of the city is relatively young, given that the built environment is expanding in response to the waves of population growth and change. The built environment emerged initially around the ports and harbours of former times, and has extended along the transport networks.

By international standards, congestion in Auckland is not as bad as in the comparator city-regions. Auckland has the highest usage of the private motor vehicle as a means of travel to work. It accounts for 90 per cent of journeys to work. As expected, rates of public transport usage for journey to work are comparatively low, given the over reliance on private motor vehicles. Active modes of transport (walking or cycling) account for less than one per cent of journeys. By comparison, one in four journeys to work in Copenhagen are by active mode.

Auckland is relatively isolated in a global context when using the number of airlines that use the airport as an indicator. Auckland's ports play a pivotal role in facilitating the flow of goods and people from New Zealand to the rest of the world. In terms of electronic connectivity, Auckland has relatively high rates (80%) of residents with access to the internet, and 72 per cent connected via high speed connection. Overall, New Zealand has a reasonable, but not overly strong, score on the Networks Connectivity Scorecard for 2010, and the country has recently caught up with the average OECD rates of broadband dissemination, after previously lagging.

New Zealand performs moderately when compared with other English speaking nations in terms of literacy and numeracy. However, an analysis of the figures for the Auckland region reveals some regional imbalances. A substantial literacy and numeracy skill gap exists within Auckland. Forty four per cent of adults had low literacy and 51 per cent low numeracy. This impacts the workforce, and it was found that 56 per cent of the people in Auckland region with low literacy or numeracy are already in work, implying that intervention in the workforce is required to raise levels, rather than relying on the schooling system. There were stark differences across the Auckland region – for example, in five of the new wards of the Auckland Council, more than 20 per cent of the population had no qualifications (a proxy measure for low literacy and/or numeracy), while two of the new wards had more than 30 per cent of the population unqualified. Literacy and numeracy skills are higher in the north and centre of the Auckland region, and lower in the south and west. In Counties Manukau, 58 per cent of adults have low prose literacy, and 65 per cent have low numeracy. Overall the qualification levels for the region as a whole was higher than the New Zealand average. This shows the existence of extremities: high concentrations of highly qualified people, along with concentrations of non-qualified people. The Auckland region had low per capita patent applications, an indicator for innovation (or the ability to capitalise on innovation that exists).

In terms of natural amenities, Auckland has distinctive features. The climatic conditions are favourable for hours of sunshine and rainfall, enabling the functioning of ecosystems. Auckland has the highest levels of access to public spaces/parks of all the international comparator cities, facilitating outdoor recreation which may be an important consideration in choice of residential location. In terms of an eco-city ranking of

the comparator cities, Auckland was on par with Vancouver, and both were behind Adelaide and Copenhagen. However Auckland was ahead of Brisbane and Melbourne. Auckland has good air quality in comparison to the other cities. In terms of topography, Auckland is located on an active volcanic field – which offers economic benefits through rich volcanic soils while also posing an economic threat, should volcanic activity begin.

Overall there is evidence of good social and cultural amenity in Auckland. In terms of ranking of recreational amenities, Auckland was on par with Vancouver. The Australian cities ranked higher than Auckland and Vancouver. However, Auckland was above Copenhagen and Seattle, and above the other New Zealand cities in the study. Auckland is a relatively safe city-region in terms of crime rates – ranked fourth out of six of the comparator cities, thus an indicator of good social amenity.

This section has identified indicators to measure the distinctive features of a city-region. The question still remains unanswered as to how distinctiveness manifests in economic activity, whether it influences the structuration of industry and business activities. This requires further analysis, and requires input from/interviews with each industry, to gauge how they critically understand their geographical location in Auckland and assess their connection to the region.

# 5 CITY REGION FACTOR ENDOWMENTS

The underlying critical determinants of city-regional performance are the quantity, quality and cost of factors of production that exist within or can be drawn upon in the city-region. The factor endowments of a city-region are usually established at the time of emergence of the urban settlement, or the early logic of the settlement is determined by available factor endowments. In former times, towns and cities grew to service the dominant activities and industries which were normally agriculture, or based on natural resources. Thus in early urban and geographic theories, a strong connection existed between the city-region and its natural environ. In more recent times, this direct connection was somewhat overlooked, as the focus on the functioning of the city-region tended to focus on competitive economic factors, irrespective of their grounding. Cities were explained in terms of the logic of economies of scale, with scale extending to the global level; or partially analysed in terms of their labour component – the human component of the production process. A more holistic approach views a city-region as a system: a complexity involving the integration of all economic, social and ecological factors, with dependencies inherent. Thus what the city-region uses from its natural environment is important: for example a city-region requires water for its functioning and has to source this, either from within its bounds, or from available neighbouring sources. This chapter explores these endowments – the factors a city-region is bestowed with, and the extent to which this shapes economic outcomes. In addition to land, water and energy, it also considers labour, capital, entrepreneurship and the inherited industry structure as factor endowments.

## 5.1 LAND, WATER AND ENERGY

Land and water are two fundamental factor endowments required for city-regions' functioning. Land was traditionally seen as a factor of production in economic theory, particularly in agricultural economics. This section looks at the price of land as an international comparator, while recognising that it gives little insight into quality of land, or its use. The relative scarcity of water is also explored, given that the world's supply of freshwater is declining. Domestic use is used as an indicator, due to its relative comparability. This does not detract from the importance of water to industry, which is the biggest consumer of water, and in New Zealand's unique case, the high rates of water-use embodied in energy generation, with hydro-electricity. Thus water is a fundamental component of Auckland and New Zealand's economic functioning. The economic system is increasingly reliant on reticulated energy sources for effective operation. Disruption to energy supply has severe impacts on all kinds of activity, including economic production and consumption. The security of energy supply is examined as an indicator in this section also.

### 5.1.1 PRICE OF LAND

Land is a factor endowment, which can be used for productive purposes. Land is an immobile factor, and its non-substitutability can lead to high prices. This is especially the case for a growing city-region, where land is consumed by the urban area. This concept attempts to evaluate the cost of land in Auckland relative to the comparator cities. A problem exists with the definition, as traditionally the price of agricultural land would be considered in the factor mix. In urban areas, the land factor endowment includes *real estate* or the buildings on which the land is built.

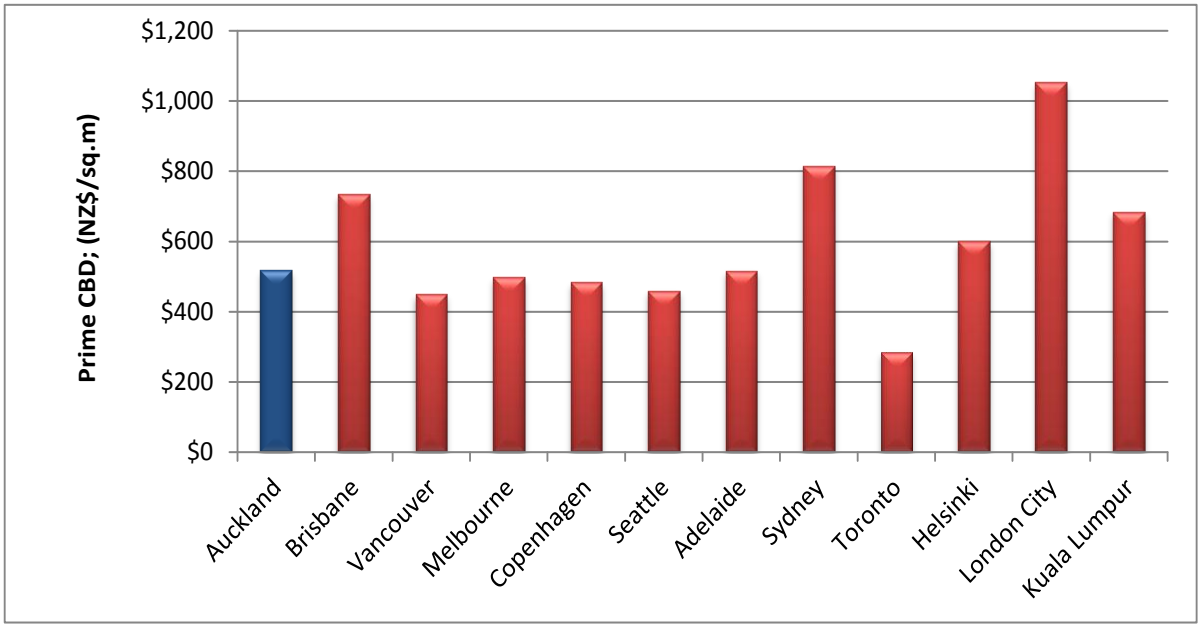
A substantial body of literature is published on the state of the real estate and property markets. The main sources consulted were all developed and based on research undertaken by global property firms such as

Cushman & Wakefield, Colliers International, CBRE and Frank Knight. The data and information presented in the reports produced by these parties were generally consistent and in only a small number of instances they did not provide sufficient information to complete the comparison. In these instances, smaller local real estate offices published sufficient information to develop a complete dataset. The main weakness in the data is that it tended to focus solely on prime (A+ grade) properties and averages were presented for the wider market. Considering that the property market has substantial variances, using the top-end of the market for comparison removes a great deal of variability enabling a better comparison.

The indicator chosen was rent per square metre. While rental arrangements only cover a portion of the useable space, it is assumed that owner-occupiers have the same investment motives as the owners of rental properties. Different regions have different characteristics and a range of real estate options exist for office and industrial users. The options are influenced by the location of the real estate, the grading as well as length of tenancies and incentives offered by the realtor. For the purpose of this study, prime (A+-Grade) Central Business District (CBD) locations were used for office space (Appendix 4 provides the NZ Property Council's Office Grading Matrix). With reference to the industrial component, again the 'prime' grade was used.

Rentals were expressed in the local currency and floor space units (imperial or metric) and had to be converted. A summary of the rental levels for both prime office and industrial space is presented Figure 5.1: and Figure 5.2. In addition, a summary of rent per square metre for a selection of cities is presented in Table 5.1 and also shows Euro equivalents.

Figure 5.1: Office Rent levels (NZ$: Q4 – 2009)



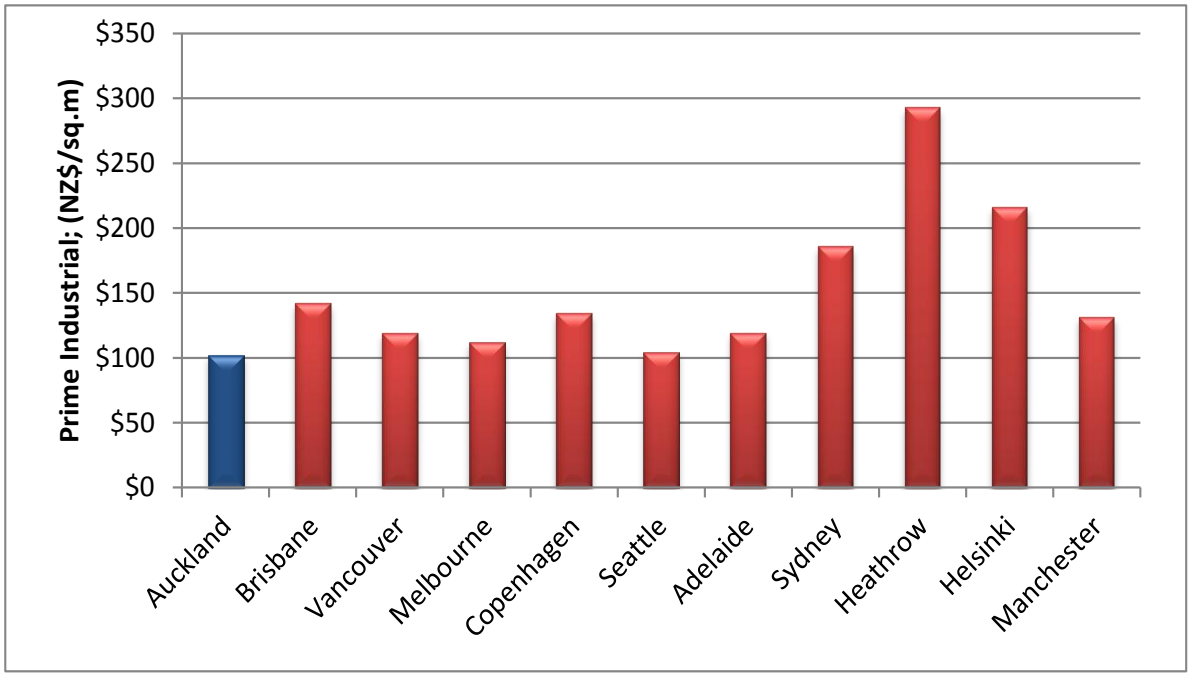

*Source: Cushman & Wakefield, 2010*

Prime industrial space in Auckland is cost competitive when measured against the comparator cities and is the cheapest at around NZ$100/m$^2$.[48] At this cost, Auckland's prime industrial space costs the same as

[48] Cushman & Wakefield Global Real Estate Solutions: Industrial Space across the World 2010.

space in Seattle. Prime industrial is around 10 per cent less than Melbourne and up to 40 per cent cheaper than Brisbane. This cost competitiveness is a positive feature and has the potential to support the continued growth of Auckland's high technology activities.

Figure 5.2: Industrial Rent levels (NZ$: Q4 – 2009)




*Source: Cushman & Wakefield, 2010*

Table 5.1: Comparative Rental Levels (Q4: 2009)

| | Prime Industrial Rent | | | Prime (CBD) Office Rent | |
|---|---|---|---|---|---|
| | €/m² | NZ$/m² | | €/m² | NZ$/m² |
| Auckland | € 51 | $102 | Auckland | € 258 | $516 |
| Brisbane | € 71 | $142 | Brisbane | € 368 | $734 |
| Vancouver | € 59 | $119 | Vancouver | € 225 | $449 |
| Melbourne | € 56 | $112 | Melbourne | € 249 | $498 |
| Copenhagen | € 67 | $134 | Copenhagen | € 242 | $483 |
| Seattle | € 52 | $104 | Seattle | € 230 | $459 |
| Adelaide | € 60 | $119 | Adelaide | € 258 | $515 |
| Sydney | € 93 | $185 | Sydney | € 408 | $815 |
| Heathrow | € 147 | $293 | Toronto | € 143 | $285 |
| Helsinki | € 108 | $216 | Helsinki | € 300 | $599 |
| Manchester | € 66 | $131 | London City | € 527 | $1,052 |
| | | | Kuala Lumpur | € 342 | $683 |

*Source: Cushman & Wakefield*

Prime CBD office rentals in Auckland are relatively high. At $516/m$^2$ prime office space in Auckland is more expensive than in Melbourne ($497/m$^2$). Brisbane has the highest prime office rentals and is 42 per cent

more expensive than Auckland. In the New Zealand context, a recent Colliers International report estimated that average office rent in Auckland is almost 10 per cent cheaper than in Wellington. As with all parts of the economy, the global financial crisis caused a slowdown in the real estate markets. The impact of the slowdown on rentals is summarized in the text box.

**The global financial crisis and rent levels**

Global real estate markets experienced significant downturns during 2009, as the global recession impacted negatively on industrial production, consumer behaviour and office occupancies. Auckland's real estate fared comparatively well with industrial rents down 6 per cent compared to a 7 per cent decline in both Vancouver and Seattle. These declines are modest when compared to Melbourne (-22%), Dublin (-20%) and Amsterdam's Schiphol Airport (-11%). Comparatively, office rentals in Auckland remained robust and declined only 4 per cent against 20 per cent in Melbourne and 23 per cent in Seattle. Other international cities experienced significant contractions in rental levels. For example Dublin International Financial Service Centre rents dropped by 38 per cent and in London's West End prime office rents declined by 25 per cent. Prime office rent in Dubai CBD recorded a substantial drop and contracted by 35 per cent.

The slower decline in the rentals points to a more stable real estate market. The large downward adjustments of rents do not necessarily translate into a 'better situation' for tenants and businesses as the reduced rentals negatively impact on re-investment trends. Similarly the lower rentals (and higher vacancies) imply that there are fewer businesses in operation that want to occupy space. The recent tax changes (removing the ability to offset depreciation against taxable income) will have an impact on the real estate market, rental yields and investment trends but the magnitude of these impacts and the mechanism through which they will be transferred are not known at this stage.

### 5.1.2 SECURITY OF LAND SUPPLY

It is anticipated that the Auckland regional population and economy will continue to grow in the foreseeable future. [49] This growth will create on-going demand for housing and commercial space. A good understanding of future land supply, type and location is essential in our ability to ensure efficient resource management and provision of infrastructure. This indicator measures the amount of residential and business land available in the region for future development and the number of years of demand that this capacity will satisfy. Data was collected under the Auckland Regional Council: Capacity for Growth survey.

As at March 2006, the residential land capacity in the Auckland region was estimated at 14 to 20 years of supply. That is, available land could meet demand until 2026. The business land capacity was estimated at 13 years of supply, out to 2019, while rural land residential capacity was estimated at 30 years of supply.

[49] This indicator was taken directly from the Auckland Regional Council's published indicators, available at http://monitorauckland.arc.govt.nz/built-environment/capacity-for-growth/capacity-for-growth.cfm

### 5.1.3 WATER QUALITY AND USE

In former times, the potable water for use in Auckland was sourced locally, usually from private springs. Between 1877 and 1906, water was taken from Western Springs for the central city area, while Lake Pupuke supplied Devonport and the North Shore. The Waitakere catchment was first used in 1902, and gradually it replaced local sources. Dams were built in the Hunua ranges from the 1950s onwards. In 1994 and 1998 there were severe water shortages in the Auckland region, and a pipeline was opened from the Waikato River to the south, and now supplies around 10 per cent of metropolitan Auckland's drinking water needs.[50]

Water quality and availability of water for domestic and industrial use is fundamental to the functioning of a city. The availability of supply is dependent on water reserves (underground aquifers and over ground reservoirs), rainfall, and the infrastructure (either built or natural) that distributes the water. The water industry has environmental, social, cultural and economic implications. It takes water - a natural resource and eco-system services - supplies it for use, collects and treats the used wastewater and returns it and the by-products of treatment, as well as storm water, back to the environment. This indicator looks at domestic use of water across the comparator cities, to gauge the average per capita water consumption (litres per person per day).

This indicator is estimated for the cities from available official documents – but the measurement of water consumption is subject to measurement errors, given that not all water used is from reticulated sources (e.g. some households use tank water). High levels of water consumption can place stress on the supply, affecting continuity and availability. However, it must also be recognised that water is used by industry, and can be substantially greater than the domestic use. This is particularly the case in New Zealand where the use of water in the electricity generation industry is not captured in the reticulated water use, yet an integral eco-system service of the hydro-electric industry.

Table 5.2: Estimated average per capita daily domestic water use

| | **Litres per day** | **Year calculated** |
|---|---|---|
| Auckland | 180 | 2008 |
| Copenhagen | 147 | 2007 |
| Seattle | 382 | 2006 |
| Vancouver | 295 | 2007 |

Various Sources[51]

From the available comparable data of average daily per capita water use, it can be seen that Auckland people used significantly less water than Seattle and Vancouver, but 20 per cent more per capita than residents in Copenhagen. For the Australian cities, comparable per capita data was not available exclusively for domestic use. The available per capita consumption of water included industrial use Table 5.3, and thus figures are much higher than the previous table showing domestic use only. As a comparison, the equivalent average estimate for Auckland was 300 litres per person per day, although caution is warranted with direct comparison with the Australian data, given different methodology in the estimation, as a cross-check of all sources of water consumed for the two countries has not been undertaken. Differences

[50] See http://watercare.co.nz/ and Auckland Regional Council (2010)

[51] Auckland Regional Council (2010) State of Environment Report; http://www.watersupplyforum.org/assets/outlook/reports/2009/chapters/Chapter%2005.pdf; http://www.canada.com/vancouversun/news/story.html?id=5aa2b764-ed43-4096-892e-1b4e0a5d1ce5

between the Australian cities are evident however, with Brisbane having the highest average per capita daily consumption (501L/day). The Gold Coast and Melbourne had the lowest amounts of the Australian cities (347L/d and 378L/d respectively). The consumption figures are dependent on numerous factors, such as industries in operation and their water requirements, the availability and capacity of supply to meet the demand amongst others.

Table 5.3: Average per capita daily consumption domestic and industrial

| | Year | Average per capita daily consumption |
|---|---|---|
| Adelaide | 2004 | 454 |
| Brisbane | 2004 | 501 |
| Canberra | 2004 | 443 |
| Gold Coast | 2004 | 347 |
| Melbourne | 2004 | 378 |
| Newcastle | 2004 | 430 |
| Perth | 2004 | 408 |
| Sydney | 2004 | 413 |
| **Auckland*** | 2010 | 300 |

*Source: Australian Government: State of Environment 2006[52] and *Auckland Regional Council: State of Environment 2010*

**Global Perspective – OECD and environmental monitoring of water**

'Who uses most of the water? Not households for a start; they account for just 8 per cent of global water abstraction. The heaviest water user globally is agriculture, which is responsible for about 69 per cent of total freshwater abstraction (of which 45 per cent accrues to the 30 OECD countries). Worldwide agricultural demand for water will continue to grow, but industry is likely to be the fastest growing water user overall, particularly in developing countries. For most countries, irrigation water represents over 80 per cent of total agricultural water use. Water use for irrigation continues to grow.

Industry accounts for 23 per cent of global water abstraction. It is the fastest growing user of freshwater worldwide and demand is expected to more than double over the next two decades. Industrial abstraction has declined in OECD countries thanks largely to efficiency gains. The most water-intensive industries include pulp and paper, chemicals, food and beverages.

One consequence of this rising demand is scarcity. The global per capita availability of freshwater has dropped from 17,000 $m^3$ a year in 1950 to 7,300 $m^3$ in 1995. There are now more people in the world, of course, but there has also been a decline in available uncontaminated freshwater resources. This scarcity is not just on the surface; groundwater abstraction is beginning to exceed replenishment in some locations. Add to this the specter of pollution from industry, mining and farming around the world, including the major cities, and the picture worsens.'

Taken from http://www.oecdobserver.org/news/fullstory.php/aid/935/Water_crisis_.html

Overall the quality of Auckland's freshwater is under pressure from the growth in population in the region. However, the deep confined aquifers in the region generally contain old groundwater and are relatively well protected from surface contamination and generally have excellent water quality. The State of the Environment report on freshwater (Auckland Regional Council, 2010) noted that most of the rivers, lakes

[52] http://www.environment.gov.au/soe/2006/publications/drs/indicator/335/index.html

and shallow unconfined aquifers in the Auckland region are degraded to some extent, although the recreational water quality in the lakes is generally good. There is a wide variation in the water quality of the rivers that drain catchments. More than 60 per cent of the rivers in the Auckland region flow through rural catchments. The rivers that drain forested catchments (particularly native forest) have excellent water quality while rivers that drain urban catchments typically have poor water quality. There have been notable improvements in some aspects of freshwater in recent years – particularly the urban streams.

### 5.1.4 SECURITY OF ENERGY SUPPLY

The availability of energy for businesses and households is increasingly becoming important, given the switch away from carbon based energy sources. Availability of energy supply is dependent on the resilience of the network and continuous supply of energy.

The indicator selected was the national average number of system outages and the average duration of outages. This indicator deals with the network component of energy supply.

This national level indictor was developed by the Ministry of Economic Development, up until 2005. No regional level indicator is available. Potential regional indicators or data may be available from the Auckland Engineering Lifelines Group (www.aelg.org.nz).

Table 5.4: New Zealand's energy reliability

| Year | System interruption duration | System interruption frequency | Customer interruption duration |
|---|---|---|---|
| | | National weighted average | |
| 1996 | 209.68 | 3.14 | 66.77 |
| 1997 | 207.30 | 3.49 | 59.36 |
| 1998 | 179.96 | 2.60 | 69.23 |
| 1999 | 185.23 | 2.62 | 70.83 |
| 2000 | 125.50 | 2.05 | 61.27 |
| 2001 | 142.13 | 2.07 | 68.55 |
| 2002 | 129.09 | 2.03 | 63.65 |
| 2003 | 159.35 | 2.17 | 73.33 |
| 2004 | 174.08 | 2.23 | 77.13 |
| 2005 | 139.96 | 1.97 | 69.40 |

*Source: New Zealand Energy Indicators, Ministry of Economic Development.*

New Zealand's average energy reliability appears to be improving, with the average duration and frequency of interruptions experienced by New Zealand's energy systems reducing (see Table 5.4). However, the average duration of interruption in 2005 was 69.40 min just above the 1996 time (66.77 min). While no data is available for the Auckland region, it is estimated that interruption frequency and duration are more acute in the region. The worst, the 1998 power outage lasted for five weeks in the central business district of Auckland, halting production, reducing services in the health sector and disrupting many businesses. A power cut in 2006 affected some 230,000 customers in Auckland and interrupted many public services, traffic lights, hospitals, radio transmission while causing failure to the mobile phone and telephone service networks. The most recent power cut in January 2010 showed the vulnerability of the electricity system, and the interdependencies between regions, as electricity is transmitted to Auckland from other regions.

### 5.1.5 SYNTHESIS: LAND WATER AND ENERGY

It is estimated that available residential land in the Auckland region will be supplied until 2026, and that there is enough land to meet business demand until 2019. Aucklanders use significantly less water domestically than the domestic use in Seattle and Vancouver, but more than the average daily domestic use in Copenhagen. Estimated average daily consumption of combined domestic and industrial water use was much lower in Auckland than the comparator Australian cities. However, this does not take into account the amounts of water embodied in the energy system, through hydro-electric power in New Zealand. The quality of Auckland's freshwater varies, between relatively pristine water quality in native forested catchments, through to the degraded rivers and streams that traverse the urban areas. However a notable improvement in urban streams is evident in recent years. The average energy reliability for New Zealand appears to be improving, in terms of a lessening of system interruption duration and frequency.

## 5.2 LABOUR - SUPPLY, MOBILITY AND QUALITY

The people in a region provide a factor endowment to industry, in terms of their labour input. The availability of suitable labour contributes to the competitiveness of a region. Talented people are the source of new ideas and drive innovation. The labour force is a locally specific resource for a city-region. A proxy indicator for the quality of the labour force is highest qualification attained, but this is not the only consideration of the labour stock. The supply of labour results from the collective action of individuals, who make independent choices and decisions about where they get best return for their labour and whether a particular location is suitable to their lifestyle. This section explores a number of indicators of labour, focusing on the supply and mobility. It also looks at two indicators for labour utilisation – overwork and under-employment.

### 5.2.1 OVERWORK

Overwork is defined as any hours in excess of 50 hours worked, per week. This cut-off point is used by the Ministry of Social Development and the Department of Labour to define long working hours. Overwork affects work life balance, and it also can be an indicator of skills shortage, if there is no redundancy in the workplace. The negative consequences that may result from overwork are similar in nature to those caused through no work or not enough work, such as poor physical and mental health and increased stress on family life. According to one perspective, 'having people work long hours is neither good for the health and safety of the workforce, nor does it help increase GDP per capita in a suitable way. The key to sustainable growth is, instead, raising productivity' (Career Services, 2006).

Using the Statistics New Zealand Household Labour Force Survey dataset, workers grouped in the 'working 50 hours and over' category for their primary job have been counted as overworked. For the ten years between 1999 and 2008, the number of overworked people for both Auckland and New Zealand were extracted from a customised Statistics New Zealand Household Labour Force Survey dataset.

Figure 5.3: Overworked people Auckland and New Zealand


*Source: Market Economics and SNZ*

In Figure 5.3 it can be seen that the number of overworked people in Auckland was relatively static over the period from 1998 to 2004, with a slight annual average growth rate of 0.2 per cent. However the following year saw a 4.8 per cent increase of overworked people (to 2005) from 115,300 to 120,900 in Auckland. While for the same period (1998-2005), the number of overworked people in the nation had been growing slowly at 0.8 per cent. From 2005, both Auckland and New Zealand experienced a declining trend in overworked people. This rate of fall was greater for Auckland - overworked people dropped at a rate of 5.6 per cent, compared to 4.3 per cent nationally. Additionally, there seems to have been some shift towards more flexible working conditions during this period (Career Services, 2006). Auckland had a slightly lower share of the country's total overworked people (28 per cent in 2008) than its share of the total number employed nationally (31 per cent in 2008), indicating that the overwork situation is worse outside Auckland (Table 5.5). No data was available for the comparator cities.

Table 5.5: Overworking in Auckland and New Zealand

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Auckland | 114,000 | 110,100 | 115,500 | 115,800 | 117,200 | 114,300 | 115,300 | 120,900 | 111,200 | 107,700 | 101,600 |
| New Zealand | 372,700 | 385,500 | 396,900 | 390,500 | 394,900 | 395,500 | 394,200 | 395,900 | 381,000 | 373,900 | 363,200 |
| Auckland overworked / NZ overworked | **31%** | **29%** | **29%** | **30%** | **30%** | **29%** | **29%** | **31%** | **29%** | **29%** | **28%** |
| Auckland emp/NZ emp | **31%** | **31%** | **30%** | **31%** | **31%** | **30%** | **30%** | **30%** | **31%** | **31%** | **31%** |

*Source: SNZ*

### 5.2.2 UNDER-EMPLOYMENT

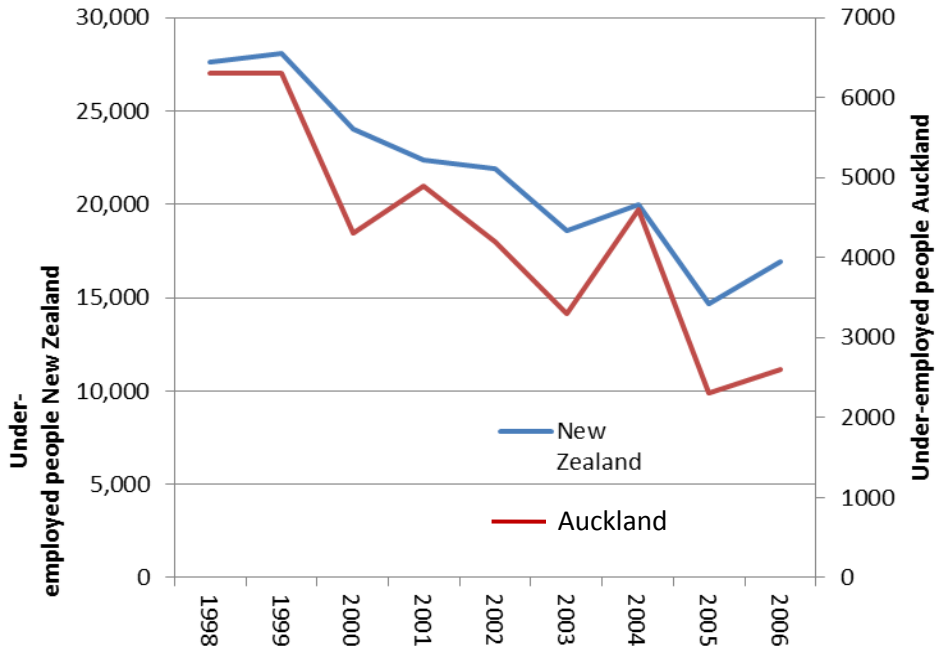
Under-employment refers to workers who, though employed, would like to increase their working hours. It measures those part time employees looking for full time work. Under-employment leads to involuntary leisure hours and can result in a loss of economic output when labour is not fully utilised due to the unavailability of suitable jobs. It can also lead to a deterioration of human capital.

Under-employment population statistics were taken from the Auckland Regional Genuine Progress Indicator report[53], which used a customised Statistics New Zealand regional Household Labour Force Survey dataset. For the years 1990–2006 the number of part-time workers (those people working less than thirty hours per week), were calculated for both Auckland and New Zealand. The number of people under-employed has been declining in the period between 1998 and 2006, in Auckland and New Zealand (Figure 5.4).

In 1998 there were 6,300 Auckland workers who would like to increase their working hours. This dropped to 2,600 in 2006. This data does not cover the recession of 2008 and 2009, but it would be interesting to see whether these under-employed became unemployed, or whether there was an increase in under-employed during this time (people retained their job, but with reduced hours). The figure for New Zealand as a whole also decreased from 27,600 in 1998 to 16,900 in 2006. Interestingly, Auckland only had a share of 23 per cent of the country's total under-employed in 1998, even though it had 31 per cent of the total number employed nationally (Table 5.6).

[53] McDonald, G., Forgie, V., Zhang, J., Andrew, R. and Smith, N. (2009) A Genuine Progress Indicator for the Auckland Region: Valuation Methodology. Prepared by the New Zealand Centre for Ecological Economics and Market Economics for the Auckland Regional Council. ARC Technical Report 2009/101 http://www.arc.govt.nz/plans/technical-publications/technical-reports/technical-reports-2009/technical-reports-101-150.cfm

Figure 5.4: Under-employment in Auckland and New Zealand.




*Source: SNZ*

Table 5.6: Underemployment

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|
| Auckland | 6,300 | 6,300 | 4,300 | 4,900 | 4,200 | 3,300 | 4,600 | 2,300 | 2,600 |
| New Zealand | 27,600 | 28,100 | 24,000 | 22,400 | 21,900 | 18,600 | 20,000 | 14,700 | 16,900 |
| **Auckland under-employ/ NZ under-employment** | **23%** | **22%** | **18%** | **22%** | **19%** | **18%** | **23%** | **16%** | **15%** |
| Auckland employment/ New Zealand employment | **31%** | **31%** | **30%** | **31%** | **31%** | **30%** | **30%** | **30%** | **31%** |

*Source: SNZ*

### 5.2.3 LABOUR MIGRATION

Labour mobility is important for an economy, as the logic of comparative advantage requires that factors of production can be switched at low/minima cost. Four types of positive effects are generated by migrants including the provision of a more elastic labour supply; ability to relieve bottlenecks by bringing in appropriately skilled labour in short supply; facilitating trade relations with source countries; and benefits from cultural diversity in the economy alongside the 'enterprise' traditionally associated with immigrant families. In practice there are constraints on the level of labour mobility, due to: differing legislative constraints; barriers due to cultural factors such as language; and social factors such as reluctance to leave/abandon established networks for work.

Migration is a two-way flow. Migrants can be a valuable source of labour to an economy. However, outmigration can be a drain on resources, particularly if it is skilled migration and considerable investment is spent on that skill (the so called 'brain-drain').

Migration has been historically important for the growth of Auckland (Section 4.1.4). Auckland is the main entry points for new migrants to New Zealand (Section 4.1.1). The Department of Labour (International Migration, Settlement and Employment Dynamics – IMSED Research) collects data on New Zealand's migration trends.

People who wish to migrate permanently to New Zealand have the option of applying under one of four streams of the Residence Programme, to be legally entitled to work in New Zealand. There is a proportional allocation process for each category/stream. Migrants can come in under a skilled/business capacity (60 per cent of all migrants allocated under this stream); uncapped family sponsored (21 per cent allocation); parent sibling adult child (11 per cent allocation); or international/humanitarian stream (8 per cent allocation). This allocated ratio remains the same, while the total number of resident applications allowed each year varies. Thus, the focus of migration policy is clearly on the skilled/business category (Table 5.7).

Table 5.7: Number of migrants approved for residence in New Zealand (Approvals by Steam)

| Stream | Jul-May 2008 | Jul-May 2009 | Jul-May 2010 | % change from previous year |
|---|---|---|---|---|
| Total | 42,532 | 41,588 | 41,466 | -0.3 |
| Business / Skilled | 25,064 | 25,594 | 25,776 | 0.7 |
| Uncapped Family Sponsored Stream | 8,671 | 7,964 | 8,959 | 12.5 |
| Parent and Sibling / Adult Child Stream | 4,979 | 4,811 | 4,358 | -9.4 |
| International / Humanitarian | 3,818 | 3,219 | 2,373 | -26.3 |

*Source: Department of Labour*

For this reason, the share of Auckland's migrants that do not have a formal secondary level qualification is lower than most of the comparator cities but slightly higher than Vancouver. Almost forty per cent of people born overseas have a secondary level qualification (again this proportion is increased by international students meaning that the size of this category may be overstated). Around one in four (23.4%) of Auckland's foreign born population has a degree or higher qualification. This level compares relatively well with the comparator cities[54] and is the same level as recorded in Adelaide. A third of Melbourne's immigrants have the degree level qualifications compared to Brisbane's 20 per cent and Copenhagen's 14 per cent.

The Department of Labour (2005) found that migrants are consistently lost from New Zealand over time, indicating limited success in successful long term settlement in New Zealand.[55] Furthermore, there is no indication of the extent that Auckland is losing its skilled labour force to international city-regions. A potential indicator for Auckland's/New Zealand's skill out-migration could be to trace New Zealand student loans. The Inland Revenue Department has data on the mobility of students, until the student loan is paid off. Also, taxes paid by migrants could also be tracked via the Inland Revenue Department data to analyse long-term outcomes of migrants in New Zealand.

### 5.2.4 EASE OF FINDING SKILLED LABOUR

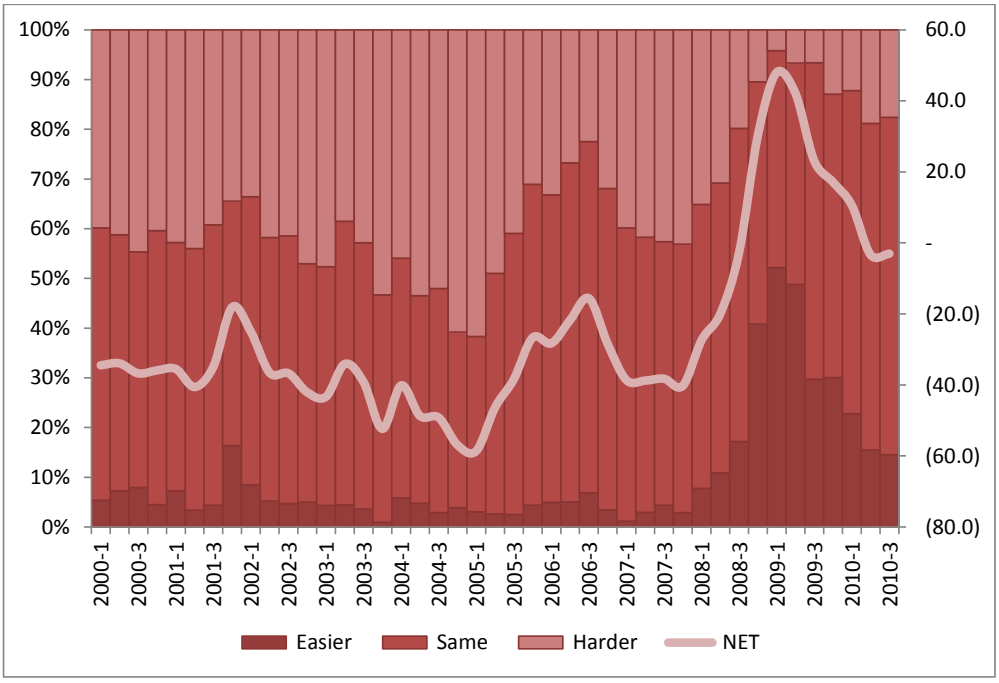
The difficulties that businesses face in terms of finding appropriate labour for their operations can be a major impediment to growth, ultimately affecting productivity and innovation performance. An inability to

[54] This interpretation is based on the same datasets used in other sections of the report but focuses on slightly different parameters within the datasets
[55] Shorland. P. (2006) People on the Move: A study of migrant movement patterns to and from New Zealand. Wellington: Department of Labour.

find skilled labour can result in overwork, if skills redundancy (having enough people to complete tasks) within workplaces does not take place, and existing workers substitute by working longer hours.

NZIER run a Quarterly Survey of Business Opinion, producing indicators that assess the current state of the economy. One particular indicator is the business confidence rate in finding skilled and unskilled labour, compared with the previous three months. They conduct this for the upper north island, which is a larger geographic region than Auckland. The ability of firms in the Upper North Island to find both skilled and unskilled labour changed dramatically with the onset of the recession (Figure 5.5). After a prolonged period of skill shortage (which peaked in 2005), the majority of firms reported the easiest recruiting conditions in the first quarter of 2009, since the series began in 1990. However it appears that this trend is changing, and it is becoming more difficult to find skilled labour as growth returns after the slowdown.

Figure 5.5: Business confidence index for finding skilled labour, Upper North Island




*Source: NZIER, Quarterly Survey of Business Opinion*

It is notable that in 2006 employers were experiencing significant difficulty in finding both skilled and unskilled labour at a time when unemployment was present in a number of parts of Auckland region. The simultaneous occurrence of unemployment and labour shortages indicates a problem in the matching skills supply and demand (Infometrics, 2009). The mismatch may occur for a number of reasons, including the geographical separation of jobs and job seekers and differences in the skills and attributes of job seekers and those required by employers.

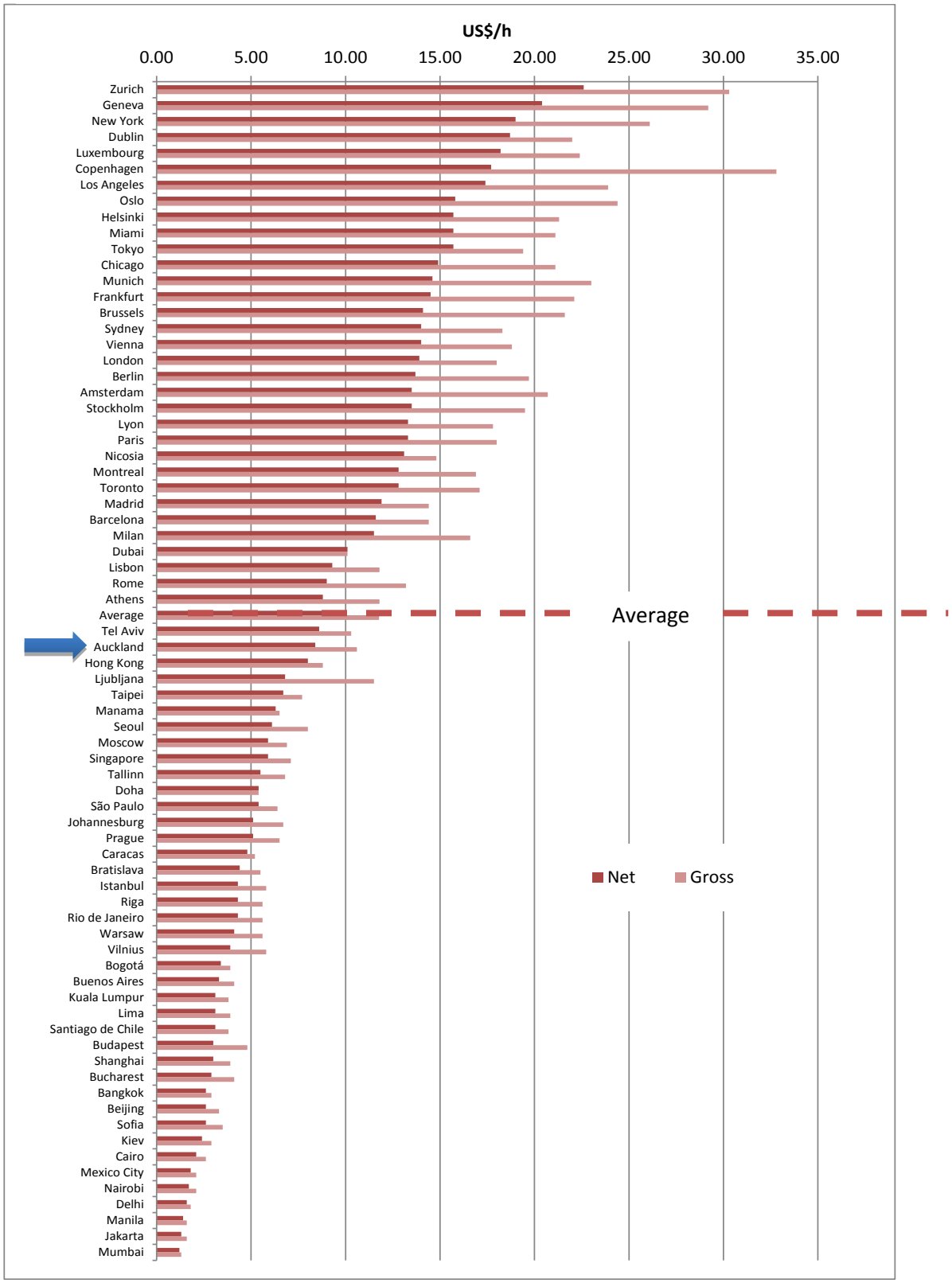
### 5.2.5 AVERAGE WAGE RATES

Labour is a key input into any production process and comparing wages across regions and countries involves a substantial level of uncertainty, while collecting relevant data can be difficult. UBS undertakes an annual survey and compares prices and wages across cities.[56] The UBS salaries and wage information is based on comparable occupations. A key issue faced for this comparison is the influence of exchange rate

[56] The report does not contain sufficient information to evaluate the specific boundaries of the areas included (or excluded) in each city and therefore the city boundaries may not align with the boundaries used in other parts of the city.

fluctuations and UBS addresses this by using an average exchange rate for the period reviewed. The results as published by UBS are shown in Figure 5.6. Average gross (before tax) and net (after tax) incomes for 73 global cities are shown. The average wage (as defined and calculated by UBS) for Auckland was estimated at US$8.4 per hour which is below the average net hourly rate for the comparator cities included in this report.

Figure 5.6: Wage Comparison - Gross and net hourly pay in USD




*Source: UBS, 2009*

### 5.2.6 SYNTHESIS: LABOUR

Auckland has a robust labour market, with respect to the rest of New Zealand. The issue of overwork is accentuated outside of Auckland, and the rate of underemployed is greater in the rest of New Zealand. Auckland has the largest labour market in the country, and with such a concentration of employment, opportunities emerge for employees. There was evidence of some structural problems in the supply of labour. There was a prolonged period of skill shortage in the upper north island, peaking in 2006. This was during a time with relatively high unemployment, indicating a skills mismatch. In terms of international labour mobility into Auckland, the average skill level of migrants was higher than the comparator cities. This is due to 60 per cent of migrants entering New Zealand under the skilled business capacity, resulting in not so many new migrants with no to low qualifications. There is little evidence of migration of labour out of Auckland, although there is evidence of problems with the long term settlement in New Zealand of international migrants. The causal reasons for this longer term problem were not explored in the indicators above, but the lower than average wage rates in New Zealand could contribute.

## 5.3 CAPITAL

Capital is treated in economic analysis either as a stock or a flow. Capital stock is one of the main inputs into production, while capital assets are also consumed in the production process. Regional data on capital stocks and flows are not readily available. This section looks at three distinct aspects of capital only: (1) Productive capital stock for New Zealand over a three year period; (2) A proxy indicator on technology use to gauge whether there is any indication of under-investment in capital stocks for businesses production processes; and (3) A proxy indicator on capital mobility, looking at trends in foreign direct investment and venture capital.

### 5.3.1 PRODUCTIVE CAPITAL STOCK

Productive capital stock consists of all capital goods in operation in the economy, adjusted for their loss in efficiency. The constant price productive capital stock is used in productivity analysis and provides a practical means of estimating the flows of real capital inputs in the production process (Statistics New Zealand, 2009). Statistics New Zealand publishes this information at a New Zealand level only, disaggregated by industry. The data comes from the National Accounts (See Table 5.8).

Table 5.8: Productive capital stock by industry 2005 – 2007 (Constant price at 1995/6 NZ$$_m$$)

| | 2,005 | 2006 | 2007 | Annual Average Growth Rate |
|---|---|---|---|---|
| Agriculture, Fishing and Forestry | 16,327 | 16,735 | 17,216 | 2.7% |
| Agriculture | 13,952 | 14,281 | 14,743 | 2.8% |
| Forestry and Logging | 1,393 | 1,458 | 1,458 | 2.3% |
| Fishing | 982 | 996 | 1,015 | 1.7% |
| Mining | 6,045 | 6,204 | 6,795 | 6.0% |
| Manufacturing | 34,068 | 34,537 | 34,855 | 1.1% |
| Food, Beverage and Tobacco Manufacturing | 11,937 | 12,178 | 12,452 | 2.1% |
| Textile and Apparel Manufacturing | 1,002 | 995 | 926 | -3.9% |
| Wood and Paper Products Manufacturing | 5,103 | 5,154 | 4,995 | -1.1% |
| Printing, Publishing and Recorded Media | 2,532 | 2,609 | 2,600 | 1.3% |
| Petroleum, Chemical, Plastic and Rubber Product Manufacturing | 4,375 | 4,338 | 4,407 | 0.4% |
| Non-metallic Mineral Product Manufacturing | 1,138 | 1,210 | 1,326 | 7.9% |
| Metal Product Manufacturing | 3,719 | 3,729 | 3,744 | 0.3% |
| Machinery and Equipment Manufacturing | 3,549 | 3,616 | 3,707 | 2.2% |
| Furniture and Other Manufacturing | 713 | 708 | 697 | -1.1% |
| Electricity, Gas and Water Supply | 22,313 | 23,400 | 24,198 | 4.1% |
| Construction | 6,206 | 6,817 | 7,509 | 10.0% |
| Wholesale Trade | 8,687 | 9,117 | 9,242 | 3.1% |
| Retail Trade | 7,832 | 8,279 | 8,763 | 5.8% |
| Accommodation, Restaurants and Bars | 4,985 | 5,319 | 5,562 | 5.6% |
| Transport and Storage | 15,168 | 16,599 | 17,305 | 6.8% |
| Communication Services | 10,051 | 10,352 | 10,526 | 2.3% |
| Finance and Insurance | 7,621 | 7,684 | 7,879 | 1.7% |
| Property Services | 74,711 | 77,077 | 78,709 | 2.6% |
| Ownership of Owner-occupied Dwellings | 123,338 | 127,122 | 130,720 | 2.9% |
| Business Services | 8,038 | 8,620 | 9,322 | 7.7% |
| Central Govt Administration and Defence | 16,917 | 18,021 | 19,121 | 6.3% |
| Local Govt Administration | 21,198 | 22,373 | 23,617 | 5.6% |
| Education | 14,624 | 15,141 | 15,525 | 3.0% |
| Health and Community Services | 10,340 | 10,763 | 11,492 | 5.4% |
| Cultural and Recreational Services | 8,074 | 8,265 | 8,255 | 1.1% |
| Personal and Other Community Services | 3,003 | 3,206 | 3,396 | 6.3% |
| Total All Published Aggregates | 419,545 | 435,633 | 450,005 | 3.6% |

*Source: SNZ – National Accounts*

For the period from 2005 to 2007[57], total productive capital stock for total industry rose by 4 per cent from $419 billion to $450 billion. The productive capital stock of all primary industries increased in the same period, especially for the mining industry with an average annual growth rate of 6 per cent. Manufacturing industry has been growing at a relatively slow rate of 1.1 per cent per year on average. However, growth has varied considerably among the sub-categories of manufacturing.

There is a rapid growth in the non-metallic mineral product manufacturing from $1,318m to $1,326m, an average growth rate of 7.9 per cent, whereas textile and apparel manufacturing declined at -3.9 per cent per annum. Both wood and paper products manufacturing and furniture and other manufacturing showed a negative trend at -1 per cent per year. Construction, business services, transport and storage industries had the highest growth in capital stock, with annual growth rate of 10.0 per cent, 7.7 per cent and 6.8 per cent respectively (Statistics New Zealand, 2009).

### 5.3.2 USE OF TECHNOLOGY

Looking at capital stock levels in an economy in isolation does not provide a full picture of the capital, or whether that capital stock is obsolete by international standards of production. Use and appropriateness of technology are more elusive concepts within an analysis of economic outcomes.

To gauge the appropriateness of the capital stock, a question from the Statistics New Zealand's Business Operation's Survey[58] can be used as a proxy measure. The question of 'how does this business's core equipment (that is used in the production of this business's main goods or services) compare with the best available technology?' is asked, and is a good indicator for the under-utilisation of available capital (see Table 5.9).

For all businesses, 50 per cent reported they were fully up to date with regards to best available technology. Twenty seven per cent reported they were up to four years behind the best available, with 6 per cent of businesses reporting up to ten years behind and 2 per cent more than 10 years behind the best available technology. There were some industries that were clear leaders in technology uptake – the Professional, scientific and technical services have 67 per cent of businesses up to date with best available technology, Rental, hiring and real estate services (64%), the construction industry (63%) and Healthcare and social assistance industry (60%). On the other hand, 22 per cent of manufacturing firms and 15 per cent of transport, posting and warehousing reported being more than four years behind

Overall, three quarters of New Zealand's core business equipment was acquired within four years of the best available technology, indicating high levels of investment in new technology, and good technology adoption. As half the businesses reported they were not up to date with regard to the best available technology, it shows that there is either a high turnover rate of technology in 25 per cent of businesses, or that they did not invest in the best available technology within the previous four years.

[57] Productive capital stock was obtained from SNZ National Account 2009. (Statistics New Zealand, 2009)

[58] The Business Operations Survey is run annually, covering all areas of New Zealand, across all industries. The survey population size was 36,347 in 2009 comprised of enterprises, as defined in SNZ's Business Frame, being entities that have an annual turnover greater than $30,000.

Table 5.9: Comparison with Best Commonly Available Technology

**Last financial year at August 2008 and 2009**

| | Total number of businesses[1] | | Core equipment comparison | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fully up to date | | Up to 4 years behind | | Up to 10 years behind | | More than 10 years behind | |
| | 2008 | | 2009 | 2009 | 2008 | 2009 | 2008 | 2009 | 2008 | 2009 |
| **Business size[3]** | | | | | | | | | | |
| 6–19 employees | 26,538 | 26,817 | 48 | 49 | 27 | 27 | 5 | 5 | 2 | 2 |
| 20–49 employees | 6,270 | 6,243 | 51 | 53 | 28 | 25 | 6 | 6 | 2 | 2 |
| 50–99 employees | 1,779 | 1,749 | 51 | 50 | 27 | 28 | 6 | 6 | 2 | 2 |
| 100+ employees | 1,485 | 1,539 | 46 | 46 | 33 | 34 | 8 | 6 | 2 | 4 |
| **Industry** | | | | | | | | | | |
| Agriculture, forestry & fishing | 3,039 | 3,132 | 47 | 50 | 24 | 28 | 8 | 5 | 2 | 1 |
| Mining | 105 | 108 | 43 | 50 | 26 | 31 | 14 | 6 | 3 | 0 |
| Manufacturing | 5,343 | 5,292 | 33 | 34 | 31 | 30 | 14 | 16 | 5 | 6 |
| Electricity, gas, water & waste services | 105 | 120 | 45 | 43 | 25 | 28 | 8 | 5 | 3 | 5 |
| Construction | 3,786 | 3,801 | 63 | 63 | 18 | 22 | 0 | 1 | 1 | 1 |
| Wholesale trade | 2,955 | 2,958 | 39 | 49 | 32 | 20 | 5 | 6 | 2 | 2 |
| Retail trade | 4,335 | 4,296 | 47 | 51 | 20 | 27 | 7 | 3 | 2 | 2 |
| Accommodation & food services | 4,140 | 4,260 | 40 | 35 | 37 | 40 | 6 | 4 | 3 | 1 |
| Transport, postal & warehousing | 1,419 | 1,425 | 49 | 48 | 32 | 24 | 6 | 11 | 0 | 4 |
| Information media & telecommunications | 357 | 345 | 54 | 52 | 34 | 35 | 3 | 4 | 1 | 2 |
| Financial & insurance services | 552 | 504 | 56 | 52 | 28 | 26 | 3 | 5 | 1 | 1 |
| Rental, hiring & real estate services | 954 | 927 | 60 | 64 | 26 | 24 | 2 | 0 | 0 | 0 |
| Professional, scientific & technical services | 3,501 | 3,504 | 63 | 67 | 30 | 25 | 0 | 2 | 0 | 0 |
| Administrative & support services | 1,374 | 1,365 | 53 | 49 | 27 | 25 | 3 | 4 | 0 | 0 |
| Education & training | 645 | 699 | 63 | 54 | 21 | 24 | 0 | 3 | 0 | 1 |
| Health care & social assistance | 1,944 | 2,103 | 61 | 60 | 24 | 23 | 1 | 3 | 0 | 0 |
| Arts & recreation services | 474 | 483 | 38 | 43 | 32 | 27 | 7 | 6 | 2 | 3 |
| Other services | 1,044 | 1,032 | 53 | 56 | 26 | 25 | 5 | 6 | 1 | 0 |
| **Overall** | **36,075** | **36,348** | **49** | **50** | **27** | **27** | **6** | **6** | **2** | **2** |

*Source: SNZ*

### 5.3.3 FOREIGN DIRECT INVESTMENT AND VENTURE CAPITAL

Foreign direct investment is any investment emanating offshore from either individual investors or multinational corporations. Venture capital is typically private equity capital provided to early stage companies seen as having high earning potential and can be a component of FDI or sourced domestically. Both are important as they bring technology to an existing local enterprise, stimulate competition and may spur higher productivity through lower cost or higher quality intermediate goods, access to new markets or access to new knowledge.

The Global Financial Crises and the global economic recession of 2008-2009 changed the economic environment in a dramatic way and the environment is also markedly different for the venture capital industry. Six years ago the venture capital community was recovering from the technology bubble bursting and was just beginning to see a move towards globalisation of the venture capital industry. Venture capital is more attuned to the global economy, to emerging disciplines (including clean technologies and life sciences) and to sectors such as semiconductors and telecommunications. Venture capitalists have adjusted their decision-making to cope with lingering uncertainties and are opting for fewer but more capital efficient opportunities. The New Zealand Venture Capital Industry also experienced difficult trading during the 2008-09 global slowdown, and, according to the New Zealand Venture Capital Association (2009) the

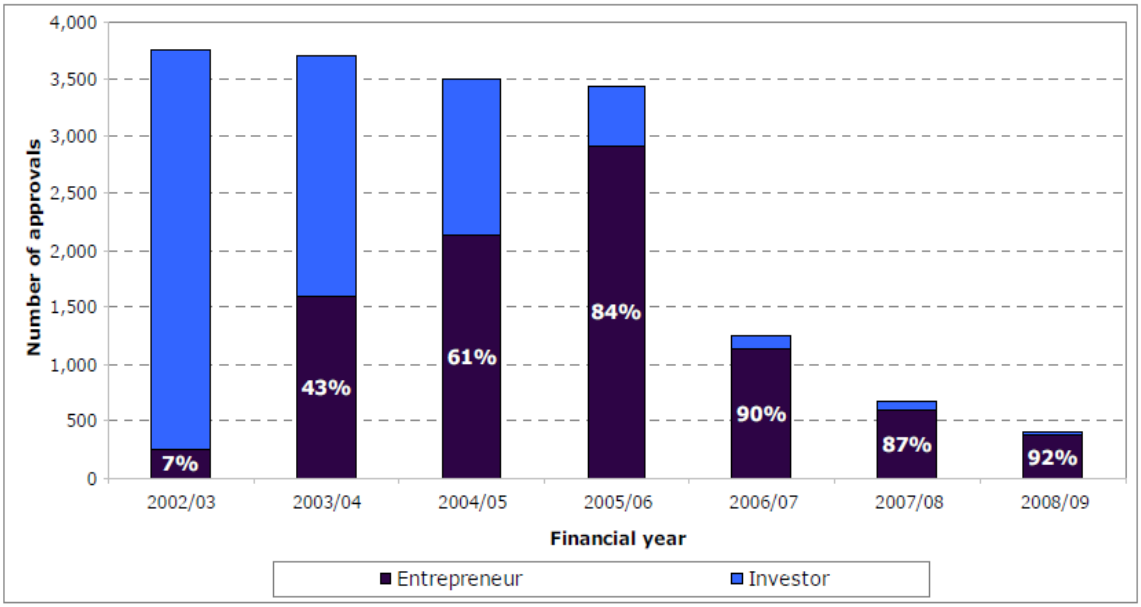
New Zealand capital market landscape was fundamentally changed by the global events of the last two years.

New Zealand's immigration policy acknowledges the importance of FDI and aims to enhance New Zealand's economic growth by increasing levels of human and investment capital, encouraging enterprise, innovation and enhancing international links.[59] As part of this policy, residency is granted to individuals who classify under one of three categories: the Entrepreneur Category; Employees of a Relocating Business Category (negligible amount in this category); or the Active Investor Migrant Policy. As seen from Figure 5.7 the numbers of migrant approvals have been declining for this Business Immigration Category, from 3,500 in 2002/03 to just under 500 in 2008/09. Interestingly the active investor category dominated the approved Business Immigration category between 2002 and 2004, but is has decreased to 10 per cent and under in the last three years, indicating declining foreign direct investment.

In broad terms the venture capital industry performed relatively well during the slowdown and the make-up of investments in New Zealand during 2009 was similar to that seen in 2007 and 2008. The sectors that benefitted from venture capital activity were:

- Health and biosciences investments,
- Food and beverage investments, and
- Technology investments.

Figure 5.7: Business Immigration Policy Approvals 2002/03 – 2008/09




*Source: IMSED (2009; Department of Labour)*

During 2009, investments totaled $177.6m which was similar to levels seen during 2008 but still only a fraction of the NZ$1.2bn seen during 2007. However the sector make-up was different with health and bioscience investments capturing around 30 per cent of investment in 2009 compared to around 40 per

[59] IMSED (2009) Migration Trends and Outlook. Wellington: Department of Labour. Available from http://www.dol.govt.nz/publications/research/migration-outlook-200809/migration-trends-outlook-200809.pdf

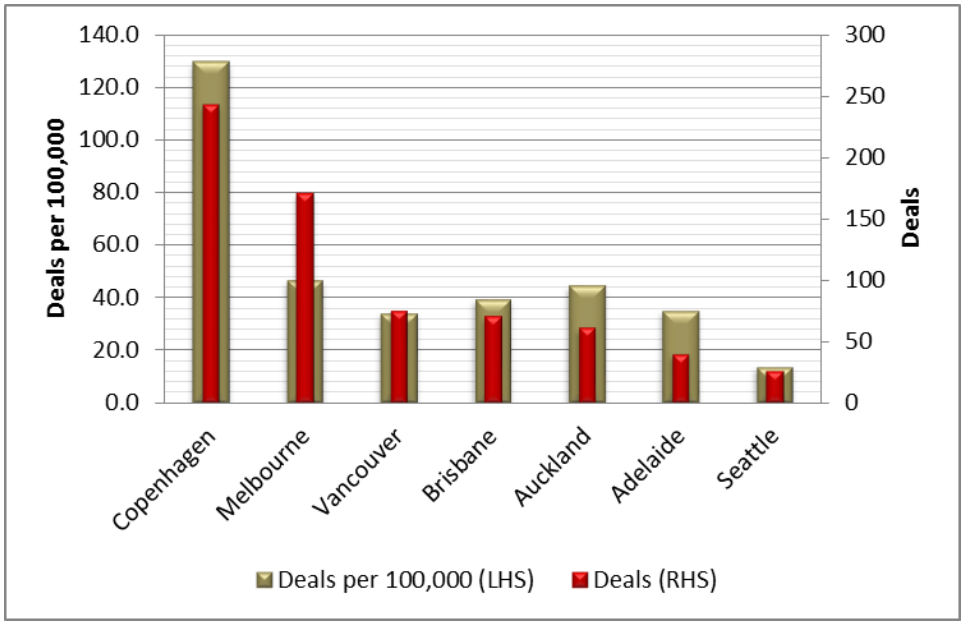
cent in 2008. More than half of New Zealand's foreign direct investment (FDI) was made in Auckland between January 2003 and May 2009 (just over 55 per cent).[60] A once-off study into the FDI trends in Auckland in 2009 identified the key features of Auckland's attractiveness as a destination for FDI as: the existing dominance of investments related to establishment sales and marketing[61], rather than for higher economic impact of research and development. This would mean that FDI is used to access New Zealand market channels, rather than deeper penetration into the industrial development of the economy.

The restructuring and opening up of telecommunication infrastructure (such as local loop unbundling) and the size of the Auckland market have been cited as key reasons for concluding investment in Auckland. Other favourable characteristics of Auckland's ICT investment market include:

- The strong demand for integrated ICT security offerings,
- A large population of mid-market firms with a strong presence in Auckland as favourable characteristics.

A summary of Auckland's FDI performance against the comparator cities is presented in Figure 5.8. Copenhagen has the best relative performance and is significantly higher than any of the other cities. Melbourne captures a large number of deals but when expressed in terms of the population size, Melbourne is only marginally better than the other comparator cities. If the deals are expressed in terms of population size, then Auckland's performance is 4th out of seven and is only marginally lower than Melbourne. In terms of the number of deals, Auckland compares well against Vancouver, Brisbane, Adelaide and Seattle.

Figure 5.8: FDI Comparison




*Source: Calculations based on ARC (2009)*

At a sector level, Auckland's international performance was relatively high in biotechnology and pharmaceuticals R&D, software and information technology, financial and banking services, and multimedia and 3D visualisation. While the deal flows show that Auckland's position is tenable compared to the other cities, it does not reveal the value of the overall investment.

[60] Venture Capital is included in FDI as defined by the research used for this section.
[61] Auckland Regional Council (2009) Understanding Auckland's role in New Zealand's Global Engagement: Foreign Direct Investment. ARC October 2009

### 5.3.4 SYNTHESIS: CAPITAL

There is a lack of detailed regional disaggregated data on capital stocks and technology use in New Zealand. For the country as a whole, productive capital stock grew by 4 per cent, between 2005 and 2007. The productive capital stock of all primary industries also increased over this period, markedly with the mining industry having a 6 per cent growth rate. Growth in manufacturing stock was 1.1 per cent, but this growth varied considerably among the sub-categories of manufacturing. From a national survey of businesses, overall three quarters of New Zealand's core business equipment were within four years of the best available technology, indicating high levels of investment in new technology and good technology adoption. Certain industries led technology uptake including: Professional, scientific and technical services rental; Hiring and real estate services; the construction industry; and healthcare and social assistance industry. In comparison manufacturing firms and firms in transport, posting and warehousing reported that they were behind in the best available technologies for their industries. This is somewhat alarming, given that transport and warehousing are important for the overall supply chain, and may indicate hidden barriers to efficiencies in these sectors, worthy of further investigation.

There is evidence of declining rates of foreign direct investment into New Zealand, as a result of the global financial crisis, prompting a major change in the capital market landscape. Approvals for residency into New Zealand on the basis of the 'active investor category' have declined by 10 per cent in the last three years. Sectors that benefitted from continued venture capital investment were the health and biosciences, food and beverage and technology industries. More than half of New Zealand's foreign direct investment was made in Auckland between 2003 and 2009. The key features of Auckland's attractiveness as a destination for FDI were the existing dominance of investments related to sales and marketing, rather than deeper permeation into the economy, through for example R&D. This concentration points to a potential reason for concluding the FDI – to access the New Zealand market channels. In terms of assessing Auckland's FDI performance against the comparator cities, expressing deals in terms of population size, Auckland is 4$^{th}$ out of the 7 and is only marginally lower than Melbourne. In terms of the number of deals, Auckland compares well against Vancouver, Brisbane, Adelaide and Seattle, although this does not indicate the value of deals.

## 5.4 ENTREPRENEURSHIP

Entrepreneurship is important for economic growth, productivity, innovation and employment. The changing economic landscape coupled with technological change creates uncertainty in the economy and entrepreneurship offers ways to help to meet new challenges. Entrepreneurs drive innovation, they speed up structural changes in the economy and they force old incumbent companies to shape-up, thereby making an indirect contribution to productivity. It is widely accepted that high-impact entrepreneurs make large contributions to job creation. Entrepreneurship shows itself in many different ways with different definitions emerging to delineate it. However, no single definition has been generally agreed upon (OECD, 2009). The OECD and Eurostat have tried to combine conceptual definitions[62] of entrepreneurship with (available) empirical indicators and offer the following definitions:

- *Entrepreneurs* are those persons who seek to generate value through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.

[62] The OECD and EuroStat work builds on various theories and contributions. For a detailed discussion of the approach followed, the reader is referred to the OECD-Eurostat Entrepreneurship Indicators Programme

- *Entrepreneurial activity* is enterprising human action in pursuit of the generation of value through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.
- *Entrepreneurship* is the phenomenon associated with entrepreneurial activity.

This section uses two traditional indicators of entrepreneurship: firm births and deaths in Auckland and New Zealand, and working proprietors as a proportion of those employed as proxies for New Zealand entrepreneurship. These two measures are only partial measures of entrepreneurship, capturing certain aspects of the concept. As part of their Entrepreneurship Indicators Programme (EIP) the OECD and Eurostat reviewed the concepts and data used across countries, and found a number of inconsistencies that limited a direct comparison of entrepreneurship using enterprise births and deaths. The main areas of concern raised by the OECD-Eurostat study revolved around, firstly the unit of analysis and its definition and secondly, the fact that the data is most 'administrative' and (most likely) does not capture the consequences of mergers and acquisitions and reactivations. The 'harmonisation' of business registrations has not yet been achieved making is difficult to use this type of data to compare different countries. A comparable international study of the 'Global Entrepreneurship Monitor' has been completed, and is used here as a third indicator to assess Auckland and New Zealand's relative ranking on an entrepreneurial scale.

### 5.4.1 BIRTH AND DEATH RATES OF FIRMS

Rates of entry and exit to an industry or economy show an element of dynamism in that industry or economy. The method used to define the birth of a firm in New Zealand are aligned with OECD and Eurostat recommendations, and is based on a combination of factors of production (land, labour, capital). A birth is an assembly of new factors of production. A death is a disassembly of factors of production. In practice the information that is used as proxies for these factors of production to identify continuing businesses are[63]:

- whether a business holds a majority of its original geographic units (business locations),
- if a business keeps the same trading name,
- if a business is in the same industry,
- if a business continues to operate from the same location,
- whether a business continues to employ most of its former employees.

Attempts are made by Statistics New Zealand to link continuing businesses over time, even if their identifiers change in the source data – for example through a merger, split off, take over or restructuring. These could result in the issuing of a new unique identifier. Statistics New Zealand presents business births and deaths on an annual basis, at February. Table 5.10 and Figure 5.9 shows the business birth and death rates for Auckland and New Zealand.

Over the nine years, there is a similar trend in the birth and death rates for the Auckland region and the country as a whole – with little variation in Auckland's proportion of the country's business birth and death rates (between 34 and 37 per cent).

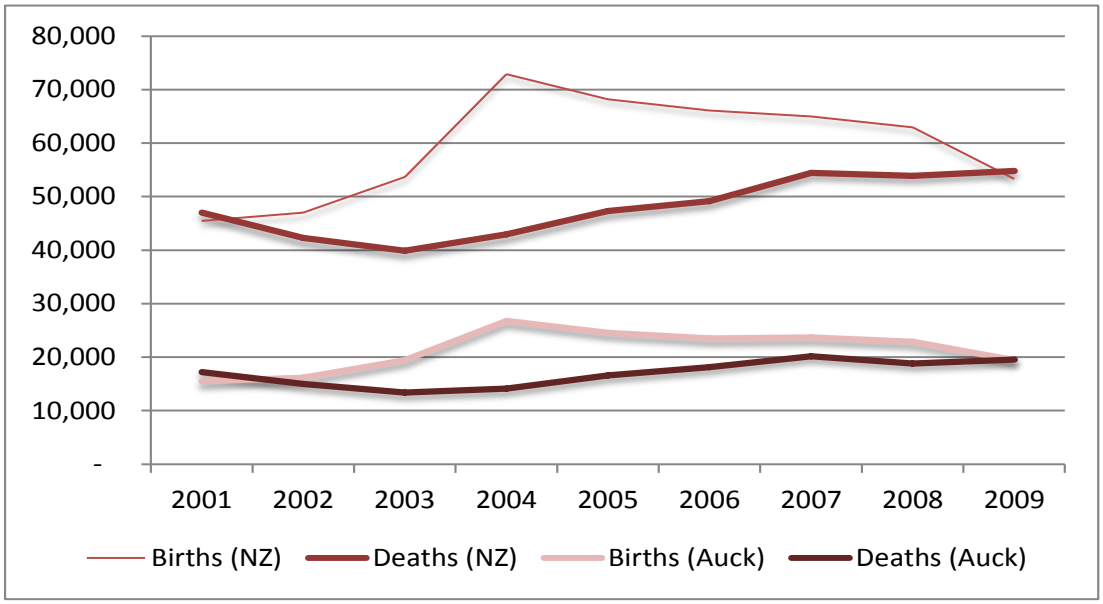
[63] Statistics New Zealand (no date) Business Demographic Statistics. Technical notes. http://www.stats.govt.nz

Table 5.10: Business Births and Deaths

| Year | Total businesses | Total New Zealand | Auckland Region | Auckland as % of NZ |
|---|---|---|---|---|
| 2001 | Birth | 45,432 | 15,486 | 34% |
| | Death | 46,920 | 17,214 | 37% |
| 2002 | Birth | 47,016 | 16,134 | 34% |
| | Death | 42,171 | 14,973 | 36% |
| 2003 | Birth | 53,655 | 19,458 | 36% |
| | Death | 39,867 | 13,398 | 34% |
| 2004 | Birth | 72,843 | 26,793 | 37% |
| | Death | 42,849 | 14,115 | 33% |
| 2005 | Birth | 68,166 | 24,543 | 36% |
| | Death | 47,238 | 16,578 | 35% |
| 2006 | Birth | 66,054 | 23,469 | 36% |
| | Death | 49,110 | 18,102 | 37% |
| 2007 | Birth | 64,953 | 23,676 | 36% |
| | Death | 54,420 | 20,196 | 37% |
| 2008 | Birth | 62,928 | 22,854 | 36% |
| | Death | 53,823 | 18,816 | 35% |
| 2009 | Birth | 53,280 | 19,455 | 37% |
| | Death | 54,801 | 19,533 | 36% |

*Source: Statistics New Zealand Business Demography Statistics*

Figure 5.9: Births and Deaths (Business)

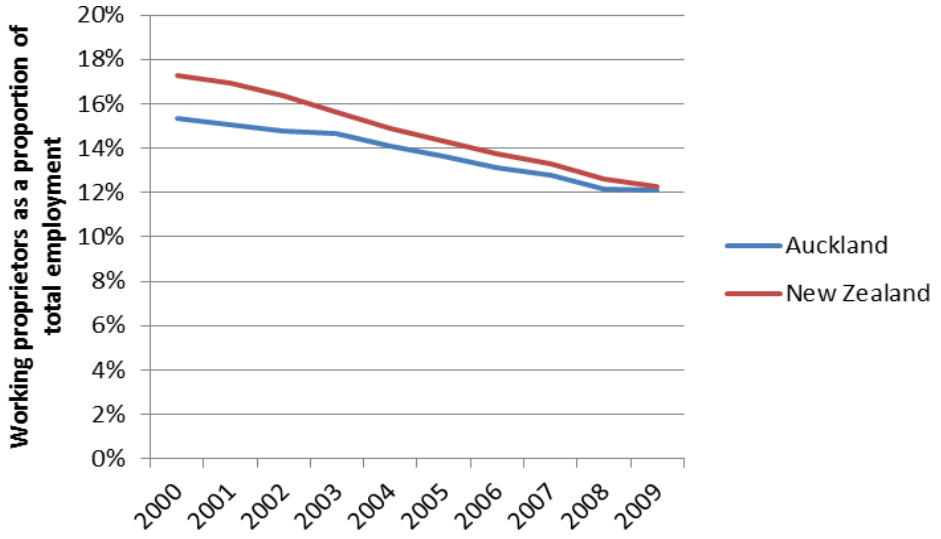



*Source: SNZ*

### 5.4.2 WORKING PROPRIETORS AS PROPORTION OF WORKING POPULATION

For Statistics New Zealand, a working proprietor is defined as either a sole proprietor or partner who is actively engaged in the business or a shareholder in a limited liability company actively engaged in its management and classified by the respondent as a working proprietor consistently across survey periods. Market Economics adjusts SNZ data to capture working proprietors (as estimated by Market Economics based on SNZ information).

Figure 5.10: Working proprietors as a proportion of working population




*Source: Statistics New Zealand and Market Economics*

From Figure 5.10 it is clear that in 2000 that Auckland was lagging behind New Zealand in terms of proprietors. Seventeen per cent of people employed in New Zealand were working proprietors, whereas the figure was only 15 per cent for Auckland (significant, given that Auckland usually leads the national trend, given that one third of the population is located in the Auckland region). A convergence between the proportions was evident in 2009. This could either be seen as an increase in entrepreneurial activity (as measured by this indicator) in Auckland, or a relative decrease for the country as a whole, but also could be resulting from economies of scale with large urban areas.

When looking at industry breakdown, it is clear that there are a high number of working proprietors in certain industries. Table 5.11 shows the industries that have higher than the regional average proportions of working proprietors. It is clear that there are a large proportion in the agricultural sector (excluding horticulture and fruit growing) and fishing. It would be expected that construction (29%) and real estate (55%) industries would have high rates, given the structure of New Zealand's tax system which leads to high numbers of self-employed in these sectors. The oil and gas industry had a high proportion (43%) of working proprietors. Other industries of interest in terms of high proportions of working proprietors were services to finance and investment (19%) and business services (17%); the cultural and recreational service industry also had 17 per cent.

Caution is warranted with aligning this indicator directly to entrepreneurship. If the proprietor is simply working long hours and tolerating a low standard of living, it does not constitute the self-employed person as an entrepreneur. The distinction between an entrepreneur and non-entrepreneur becomes apparent

only when the business succeeds, and the sole working proprietor's income levels and leisure time increase (Casson, 2005).

Table 5.11: Working Proprietors as a proportion of total employed by industry

| Sector/Industry | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| Horticulture and fruit growing | 20% | 18% | 17% | 16% |
| Livestock and cropping farming | 73% | 74% | 71% | 72% |
| Dairy cattle farming | 58% | 54% | 56% | 50% |
| Other farming | 38% | 36% | 36% | 37% |
| Services to agriculture, hunting and trapping | 19% | 19% | 18% | 15% |
| Forestry and logging | 32% | 30% | 25% | 25% |
| Fishing | 54% | 54% | 49% | 58% |
| Oil and gas exploration and extraction | 47% | 18% | 13% | 43% |
| Furniture and other manufacturing | 13% | 13% | 13% | 13% |
| Construction | 32% | 30% | 28% | 29% |
| Road transport | 20% | 20% | 19% | 20% |
| Services to finance and investment | 19% | 19% | 16% | 19% |
| Real estate | 57% | 58% | 58% | 55% |
| Business services | 17% | 17% | 16% | 17% |
| Cultural and recreational services | 26% | 28% | 28% | 27% |
| Personal and other community services | 18% | 18% | 16% | 17% |
| Total Industry | 13% | 13% | 12% | 12% |

** Industry with % that is higher than regional average

*Source: Statistics New Zealand and Market Economics*

A 2010 study on the structure and dynamics of SMEs in New Zealand revealed that survival rates for small firms are lower than for large firms. This is consistent with international studies. Forty nine per cent of firms with 1-5 employees born in 2001 survived into 2009 compared to 50 per cent of firms with 100-499 employees at birth surviving into 2009. One hundred per cent of firms that had 500+ employees when born in 2001 survived to 2009 (MED, 2010). The MED analysis showed that small and medium-sized firms, particularly those with fewer than 5 employees, are more likely to stay with the same size category over time than large firms which confirms the perceptions about growing firms to over 10 employees. Thus, due to the multifaceted nature of entrepreneurship and the difficulty with attributing singular indicators to a complex concept, a broader measure of entrepreneurship was sought.

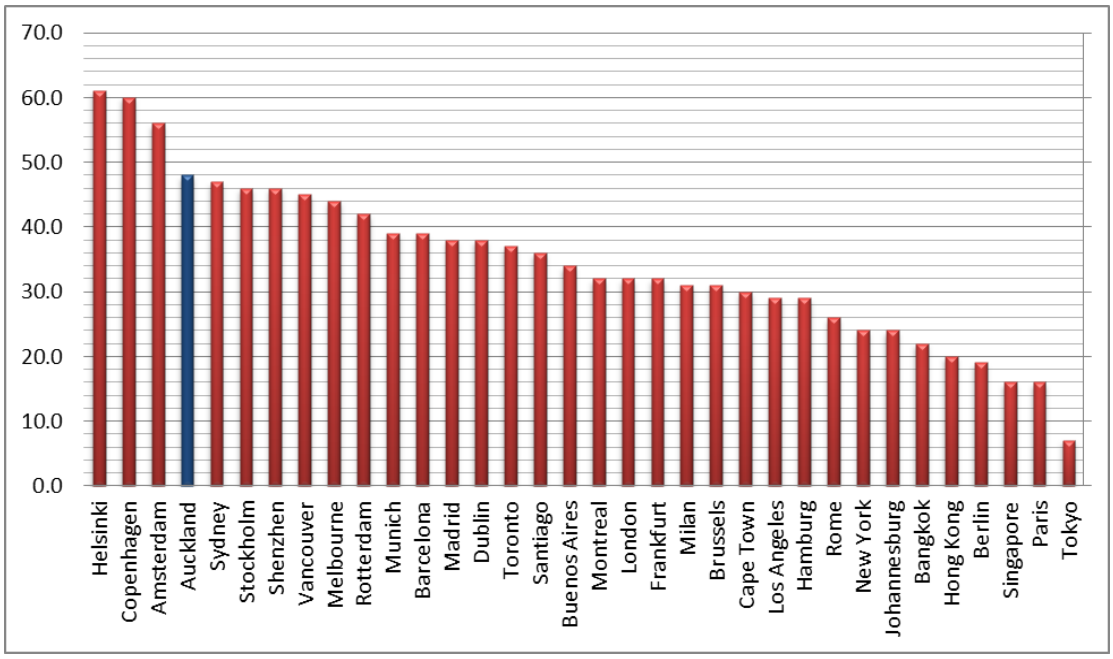
### 5.4.3 GLOBAL ENTREPRENEURSHIP MONITOR

Global Entrepreneurship Monitor (GEM) programme was set up between the London Business School and Babson College in 1999, to generate information about entrepreneurship activity at a city level, given that little was known about entrepreneurial activity across global cities. The GEM research programme is an annual assessment of the national level of entrepreneurial activity, conducted using an adult population survey. The research program, based on a harmonized assessment of the level of national entrepreneurial activity for the participating countries, involves exploration of the role of entrepreneurship in national

economic growth.[64] The GEM programme collects data on entrepreneurial attitudes, activity and aspirations and used this data to complete assessments of the entrepreneurial sector across countries. The GEM report evaluates 34 global cities based on the results of surveys completed in each city. Auckland is one of the global cities included in GEM.

According to the 2008 GEM report, Auckland is one of the most entrepreneurial cities in the world and is on par with Vancouver, Melbourne, Los Angeles, Sydney and New York. A key driver of Auckland's entrepreneurial performance may be due to entrepreneurial perceptions and the perceived risks and rewards of entrepreneurship relative to job opportunities. Aucklanders were deemed to have a particularly strong self-belief in their ability to capitalise on opportunities and the city was ranked first in this category. Figure 5.11 to Figure 5.13 summarise the perceived opportunities, perceived capabilities and the percentage job growth orientation of respondents the 34 GEM cities.

Figure 5.11: Global Entrepreneurship Monitor: Perceived Opportunity Index




*Source: Global Entrepreneurship Monitor, 2008*

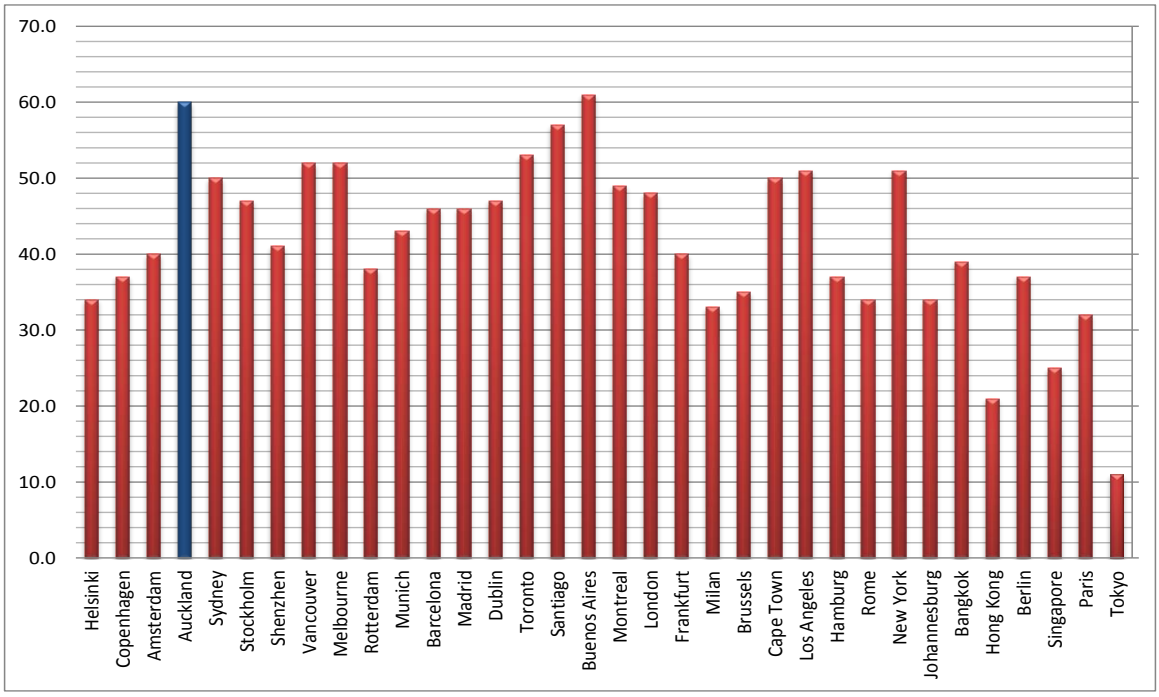
In terms of the perceived opportunities, Auckland ranked fourth behind Amsterdam, Copenhagen and Helsinki but ahead of Sydney. In terms of the perceived capability in each city, Auckland ranked the second highest. By combining these scores, the perceived opportunity cost of entrepreneurial activity is revealed. The larger the gap the larger the associated opportunity costs for entrepreneurship. Auckland has the lowest gap of all the GEM cities.

Auckland was placed third overall in terms of early-stage entrepreneurial activity and was ranked first for Early Stage Entrepreneurial Activity (ESEA) against cities in developed countries pointing towards a favourable risk-reward balance and make-up in the City and details early stage entrepreneurial activity. Auckland recorded relatively strong performance in most of the entrepreneur dimensions included in the

[64] More information is available from http://www.gemconsortium.org/

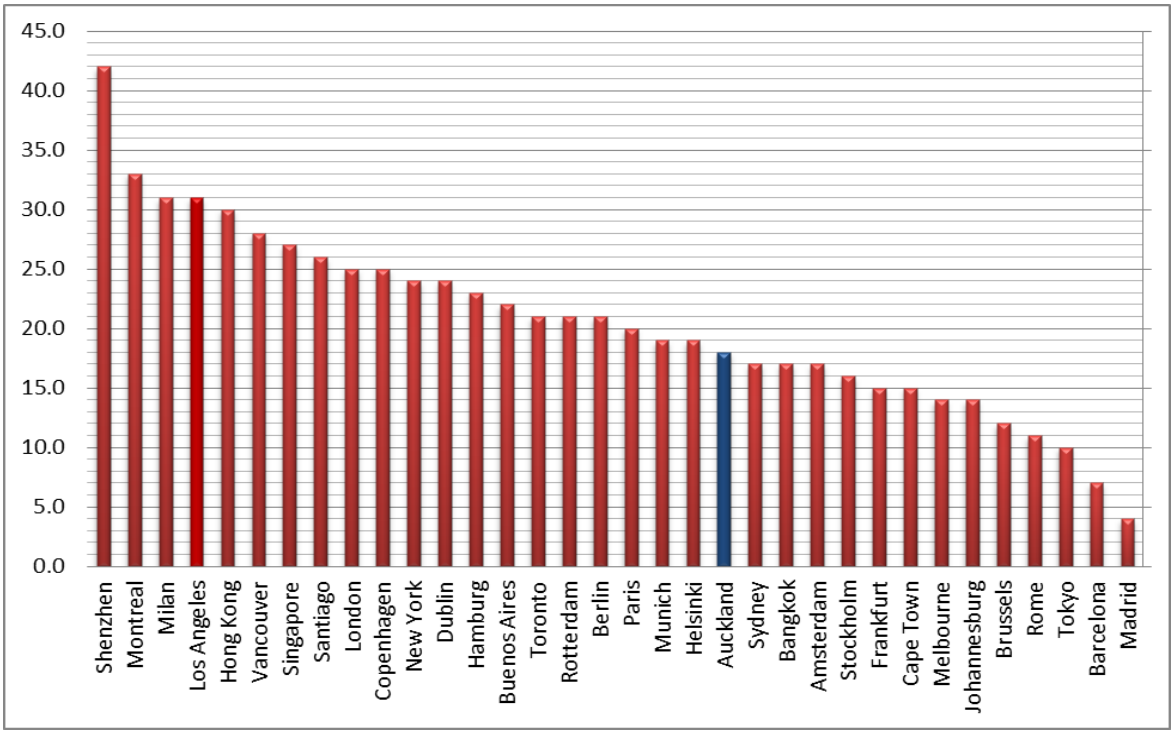
GEM assessment, the proportion of entrepreneurs that had the intention to grow their business beyond 10 employees in 5 years is relatively low with less than a fifth (18%) of the respondents (in the GEM survey) indicating that they wish to grow beyond this threshold. This places Auckland 21 out of 34 and in the same territory as Bangkok and Amsterdam. In Copenhagen and Vancouver the comparable values are 25 per cent and 28 per cent respectively.

Figure 5.12: Perceived Capabilities




*Source: Global Entrepreneurship Monitor, 2008*

Figure 5.13: Percentage job growth oriented respondents




*Source: Global Entrepreneurship Monitor, 2008*

### 5.4.4 SYNTHESIS: ENTREPRENEURSHIP

There was little notable difference between the birth and death rates of businesses in Auckland and New Zealand over the last ten year period. Auckland however had lower rates of working proprietors as a proportion of the total working population. According to an international study, Auckland is one of the most entrepreneurial cities in the world, and on par with Vancouver, Melbourne, Los Angeles, Sydney and New York. Auckland respondents were deemed to have a particularly strong self-belief in their capabilities. Auckland ranked first in this category for the comparator cities, and only Buenos Aires had a higher rank globally. Auckland ranked fourth in terms of perceived opportunities. Auckland scored lower than the comparator cities in terms of entrepreneur's intentions to grow their business beyond 10 employees, perhaps indicating a need to look at business aspirations and intentions as a contributing factor to entrepreneurship. Therefore it seems there is a 'can-do' attitude with regard to the decision to establish a business entity in Auckland, yet an inability to grow these businesses beyond a certain size/number of employees. The initiative exists within Auckland to establish entities of a small size, but barriers exist to their expansion.

## 5.5 INDUSTRY STRUCTURE

New Zealand's exports are dominated by activities related to the natural base and primary sectors, mainly agriculture. There is a perception that Auckland is primarily an inward-focused city, with an economy driven by consumption, real estate, and domestically-focused services. The purpose of this section is not to describe Auckland's economy in general,[65] but to explore and identify key sectors for Auckland's economy. The purpose of this section is to develop an evidence base about Auckland's key sectors, using a variety of economic analyses and techniques. The main steps of this process are outlined in the following Envelope.

**Envelope 1: Process to select the Key Sectors.**

The first step of this process involved a multi-criteria filter that ranked sectors based on characteristics such as employment, employment growth, number of business units, weighted average business size (based on employment), changes in business size, location quotients and revealed competitive advantage. The information was packaged in an Excel dataset which enabled a 'filter' to be applied to 477 economic sectors (6 digit Australia New Zealand Standard Industrial Classification). This dataset was augmented with information reflecting characteristics such as connectedness and strategic linkages. The principle sources for this dataset are Statistics New Zealand's Business Frame and LEED databases alongside information derived from the Auckland Regional Input-Output Tables.[66]

The filter was used to test different weightings for different criteria (25 criteria were used - see Appendix 1) and scenarios were created to investigate the relative rankings of sectors. These scenarios were designed to emphasise different inter-industry characteristics[67] and sector relatedness[68]. The outputs of the scenario runs were extracted and put into a matrix that enabled further analysis. In effect, the matrix had isolated important sectors under different policy settings (such as a focus on exports, relative size and growth). A second layer filter was then applied to the results and a preliminary shortlist selected. The principle focus during the final selection stage was export size, revealed comparative advantage, value added per sector and location quotients. Export size was a key determinant and only the largest export sectors were included – a threshold of around $20m was set (equal to ±80 percentile). The sector shortlist was then reviewed against previous research, existing national datasets and information on industries in which New Zealand exhibits a revealed comparative advantage which resulted in further refinements and revisions of the sectors. A sector short list was defined and sectors were grouped together into the following eleven key groups/sectors:

- Business Services
- Metals and Metal Products
- Electronics and Electrical
- Machinery
- Marine
- Health
- Tourism
- Technical Services
- Food
- Transport Services
- Paper Products

A breakdown of the sectors (6D ANZSIC) that make up these sectors is presented on the following page. Note also that some key sectors (such as marine) include only one six digit ANZSIC class (in this case boatbuilding), whereas others (for example food) is a composite of many 6D classes. Two additional sectors (export education and screen production)[69] were also considered outside the formal filtering process due to their future growth potential in Auckland and their importance to the national Economic Growth Agenda. These sectors were not the focus of the study, but were included to enable constructive comparison.

[65] The Knowledge Auckland website contains a variety of economic reports on different parts of Auckland's economic landscape. http://www.knowledge auckland.org.nz

[66] These IO Tables were generated by Market Economics using the GRIT technique to regionalize the tables.

[67] Such as demand drivers the share of demand that comes from exports, domestic or intermediate demand and the demand mix.

[68] Including economic linkages; 'sphere of influence' analysis

[69] The screen industry was based on the MED classification and was composed of P911100 Film and video production and P911300 Motion Picture exhibition. The export education sector was composed of a proportion of N842200 Secondary Education, N842300 Combined primary and secondary education, N842400 Special School education, N843100 Higher education, N843200 Technical and further education and N844000 Other education. The portions were based on Infometrics *et al.* 2008 and Ministry of Education (2009).

| Key Sector | 6D Code | 6D Description | | |
|---|---|---|---|---|
| Business Services | L784200 | Accounting Services | | |
| | L785100 | Advertising Services | | |
| | L785400 | Business Administrative Services | | |
| | L785500 | Business Management Services | | |
| | L786900 | Business Services nec | | |
| | L784100 | Legal Services | | |
| Metals and Metal Products | C271100 | Basic Iron and Steel Manufacturing | | |
| | C276900 | Fabricated Metal Product Manufacturing nec | | |
| | C275900 | Sheet Metal Product Manufacturing nec | | |
| | C274900 | Structural Metal Product Manufacturing nec | | |
| | F452200 | Metal and Mineral Wholesaling | | |
| | C276200 | Spring and Wire Product Manufacturing | | |
| Paper Products | C233900 | Paper Product Manufacturing nec | | |
| | F479500 | Paper Product Wholesaling | | |
| Electronics and Electrical Equipment | C285400 | Electric Light and Sign Manufacturing | | |
| | F461500 | Electrical and Electronic Equipment Wholesaling nec | | |
| | C285900 | Electrical Equipment Manufacturing nec | | |
| | C284900 | Electronic Equipment Manufacturing nec | | |
| | C285100 | Household Appliance Manufacturing | | |
| | C283900 | Professional and Scientific Equipment Manufacturing nec | | |
| | F473100 | Household Appliance Wholesaling | | |
| Machinery | C286400 | Machine Tool and Part Manufacturing | | |
| | C286600 | Pump and Compressor Manufacturing | | |
| | C286900 | Industrial Machinery and Equipment Manufacturing nec | | |
| | C286300 | Food Processing Machinery Manufacturing | | |
| | C286500 | Lifting and Material Handling Equipment Manufacturing | | |
| | F461900 | Machinery and Equipment Wholesaling nec | | |
| Food | C215200 | Cereal Food and Baking Mix Manufacturing | C218400 | Spirit Manufacturing |
| | C217200 | Confectionery Manufacturing | C218300 | Wine Manufacturing |
| | C217900 | Food Manufacturing nec | F471500 | Fruit and Vegetable Wholesaling |
| | C212200 | Ice Cream Manufacturing | F471100 | Meat Wholesaling |
| | C212100 | Milk and Cream Processing | F471700 | Liquor Wholesaling |
| | C218100 | Soft Drink, Cordial and Syrup Manufacturing | F471900 | Grocery Wholesaling nec |
| Marine | C282200 | Boatbuilding | | |
| Health | C283200 | Medical and Surgical Equipment Manufacturing | | |
| | C254300 | Medicinal and Pharmaceutical Product Manufacturing | | |
| | F479600 | Pharmaceutical and Toiletry Wholesaling | | |
| Tourism | I640300 | Non-Scheduled Air and Space Transport | | |
| | I640200 | Scheduled Domestic Air Transport | | |
| | I640100 | Scheduled International Air Transport | | |
| | I664100 | Travel Agency Services | | |
| Technical Services | L783400 | Computer Consultancy Services | | |
| | L782300 | Consultant Engineering Services | | |
| | L781000 | Scientific Research | | |
| | L785300 | Market Research Services | | |
| | L782900 | Technical Services nec | | |
| | F461200 | Professional Equipment Wholesaling | | |
| | F461300 | Computer Wholesaling | | |
| | J712000 | Telecommunication Services | | |
| Transport Services | I664200 | Road Freight Forwarding | | |
| | I611000 | Road Freight Transport | | |
| | I630100 | International Sea Transport | | |
| | J711200 | Courier Services | | |
| | I664300 | Freight Forwarding (except Road) | | |
| | I664900 | Services to Transport nec | | |
| | I662900 | Services to Water Transport nec | | |

### 5.5.1 KEY SECTORS: RELATIVE IMPORTANCE

The key sectors capture an increasing share of employment in the Auckland region with almost a quarter of Auckland's jobs provided by these sectors. Employment was dominated by business services, technical services, food and related sectors. Business services and technical services also experienced strong growth in the past decade. It is important to realise that this growth reflects changing conditions in the domestic as well as the export market. The share of Auckland's employment (i.e. the percentage of total employment in each sector and in total) as well as the average annual growth rate of employment, underscores the scale and importance of these sectors. Employment in each sector is shown in Table 5.12.

Table 5.12: Employment – Selected years

| | 2001 | 2005 | 2009 | Growth ('00-09) |
|---|---|---|---|---|
| **Business Services** | 29,600 | 35,100 | **43,100** | 5.4% |
| **Metals and Metal Products** | 7,000 | 8,100 | 7,600 | -0.1% |
| **Electronics and Electrical Equipment** | 9,200 | 9,800 | 9,700 | 0.8% |
| **Machinery** | 8,600 | 9,200 | 9,400 | 1.6% |
| **Food** | 13,000 | 14,600 | **15,300** | 2.3% |
| **Marine** | 2,000 | 1,900 | 2,000 | 1.3% |
| **Health** | 4,700 | 5,900 | 6,900 | 4.9% |
| **Tourism** | 8,800 | 9,700 | 9,600 | 1.0% |
| **Technical Services** | 23,900 | 27,600 | **31,700** | 4.9% |
| **Transport Services** | 11,000 | 13,000 | 13,600 | 3.3% |
| **Paper Products** | 3,000 | 2,400 | 2,300 | -4.0% |
| **Total Key Sectors** | 120,800 | 137,300 | 151,200 | 3.3% |
| **Total Auckland Region** | 519,300 | 599,500 | 621,100 | 2.3% |

*Source: Calculations based on SNZ Business Directory; Rounded*

All the key sectors have high skills occupations associated, and it is clear that the scale of the labour force and skills requirements are substantial for them. More than one third of Auckland's employment growth was in the key sectors and a quarter (24%) of the regional growth was in the business services and technical services. The importance of the sectors to the functioning of Auckland is clear. This importance, however, extends beyond their employment and wealth creation characteristics. These sectors are also the main sources of export earnings for the region with an estimated 66 per cent of Auckland's (international) exports generated by these sectors. In comparison, in 2001 the key sectors captured 65 per cent of Auckland's exports. The slightly increased concentration implies that the firms/businesses associated with the key sectors are growing their exports (values) faster than other Auckland exporters. Exports from the key sectors grew by 4.1 per cent compared to 4.0 per cent for all regional exports between 2001 and 2007.[70]

Most of the key sectors grew their exports by more than the Auckland rate, the exception being Marine, Electronics and Electrical Equipment and Transport services. The strong performance of business services and technical services is shown in the Figure 5.14 which shows the relative performance of the key sectors against each other, in terms of value added (horizontal axis) and their export growth (vertical axis). More

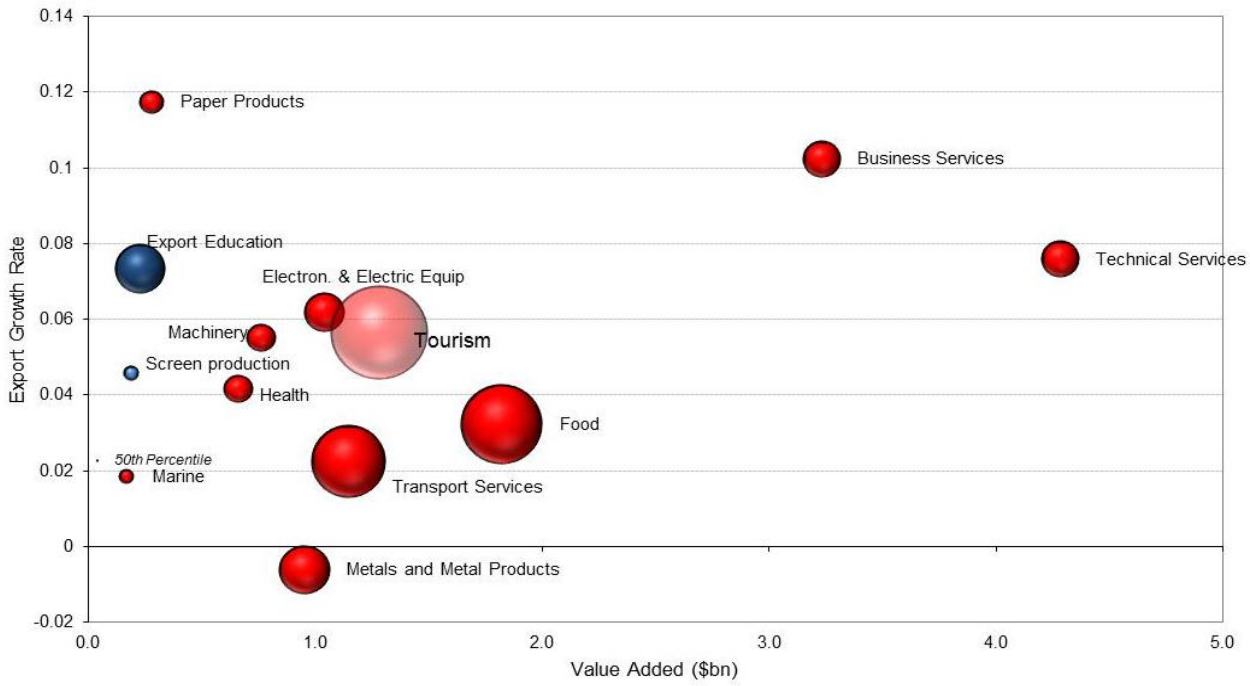
[70] These figures are based solely on StatsNZ's Annual Enterprise Survey and work completed as part of research into Auckland's International Engagement (see McDonald, Zhang and Smith, 2010) and may be overstated due to some confidentiality issue associated with the AES.

important than growth in employment is the relative performance of exports, due to the association of exports and a sector's international competitive advantage. On Figure 5.14a and b, the relative size of exports is shown by the size of the bubble (the actual values associated with these figures are presented in Appendix 6). The key sectors that were selected through the filter process are shown in red, while the additional two sectors of interest are shown in blue. The sectors that had the greatest actual dollar value of exports were:

1. Tourism[71]
2. Food
3. Transport services
4. Metals and metal products
5. Electronics and Electrical Equipment

In addition, the value of export education to the region is of comparable size to the metals and metal product manufacturing industry, and justifies its inclusion at this juncture (despite it not emerging from the key sector filtering process).

Figure 5.14a: Relative performance of key sectors




*Note: Key sectors selected through the filter process are shown in red, while the two additional sectors of interest given current policy focus are shown in blue for comparison. Note also, the position of the 50th percentile, or median for all 477 industries.*

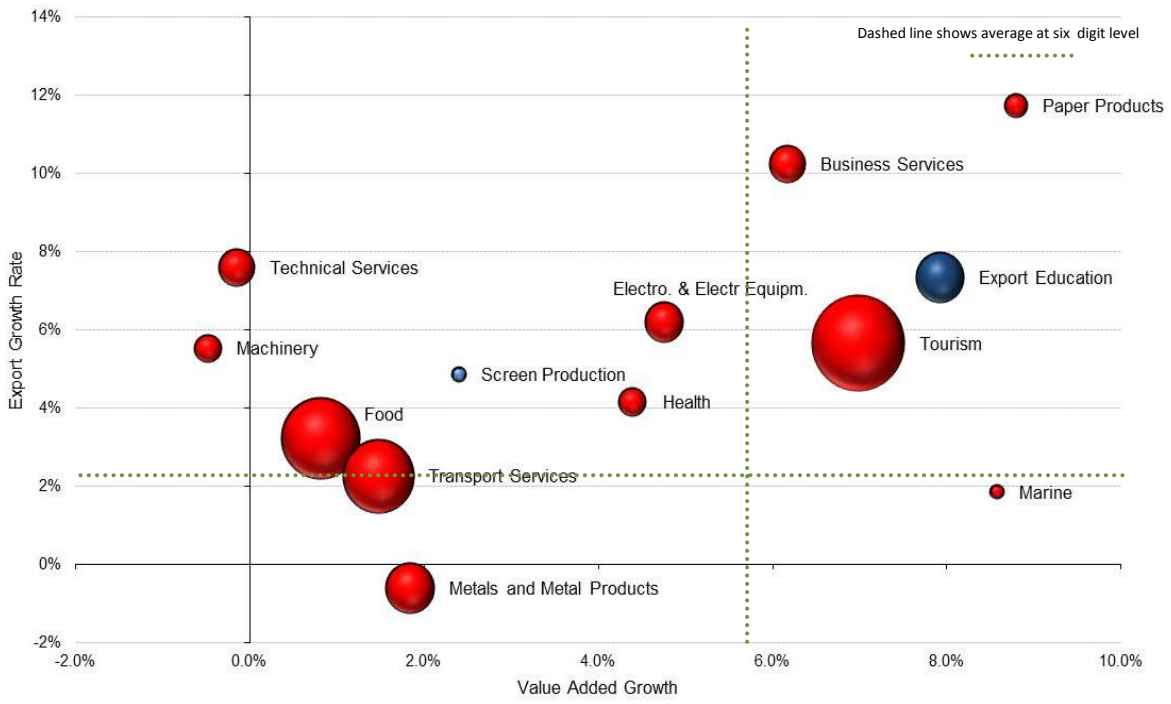
*Source: Calculations based on SNZ and Market Economics database*

Figure 5.14b is very similar to figure 5.14a, but shows the growth in value added for the period between 2002 and 2007, for the key sectors of the study. The dashed green line shows the average for all 477 sectors (not the average for the key sectors). The key sectors' contributions towards Auckland's exports

[71] Note Tourism is defined narrowly here, as per definition on page 111 relating largely to air transport. This definition differs from broader 'visitor economy' definitions, as per appendix 5, which were also explored.

remained relatively stable, with food and tourism capturing an increasing share of the region's exports. Business and technical services' contribution also increased. The different key sectors have varying levels of exposure to exchange rate and demand fluctuations that will have an impact on total business output, determining the potential impact of international shocks (such as the Global Financial Crises) on the wider Auckland economy. Tourism is a key export earner but is slowly being demoted (relatively) as other sector's exports are growing comparatively faster. However, due to the size of this sector it will remain an important exporter. Food and related activities have become more important during the past decade, capturing an increasing share of total exports. Conversely, transport services have lost ground in terms of their relative importance. Most of the key sectors grew their exports by more than the average six digit Auckland rate (dashed green line), with Paper Products an emerging key sector, with the highest export growth rate. As mentioned earlier, this rate is from a low starting base, but the exceptionally high rate (over 11 per cent per annum between 2002 and 2007) warrants further investigation, despite its relatively small scale with regard to the other key sectors. At present, little is known about this sector, and further research is needed.

Figure 5.14b: Relative performance of key sectors 2002-2007




*Source: Calculations based on SNZ and Market Economics database*

Business services and technical services experienced strong export growth but from a low base. 'Goods'-based exports play an important role and are generally focused around high technology content associated with electronics and electrical equipment, marine and machinery. Some of the 'goods-based' exports are also associated with more basic (lower technology) manufacturing such as the metals and metal products manufacturing.

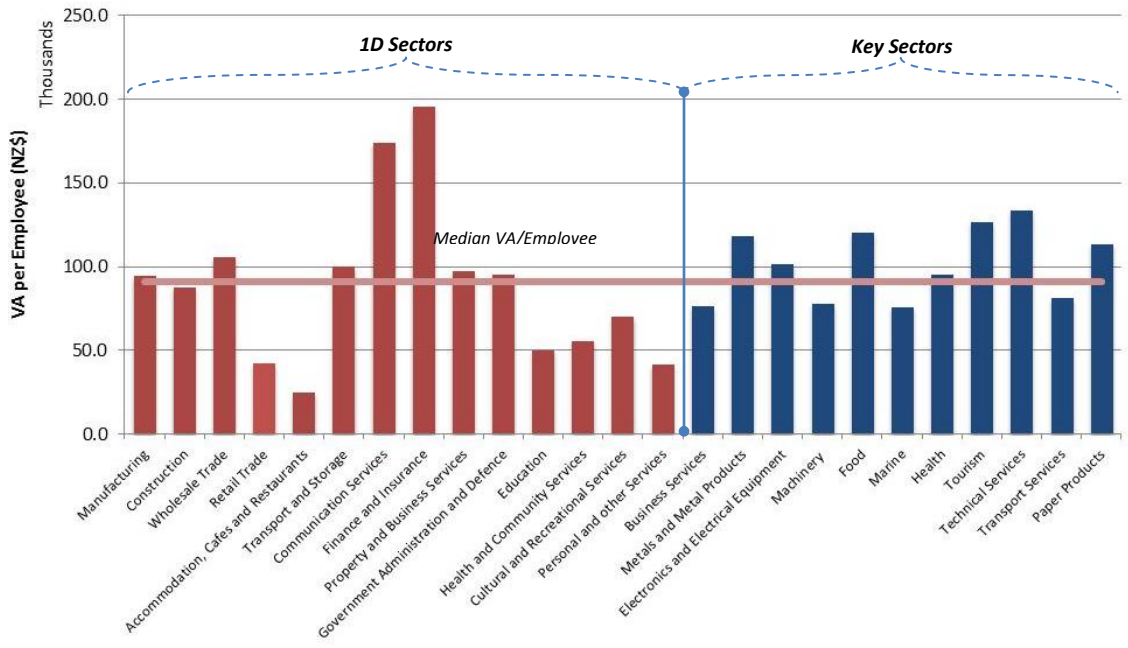
Service-base exports are core to Auckland's economy. These services include those associated with tourism activities (air transport services, and travel agency activity as well as the ancillary services such as accommodation, restaurants and bars and cultural and recreational services). These ancillary (retailing) services have been excluded from the analysis as they are dominated by domestic activity. The exclusion of the retail component of the tourism sector here means that the sector is slightly understated. However, the

exports associated with the education industry (foreign students) is included. The methodology used to calculate the value of export education is different from that used for other sectors: a multiplier analysis was employed, using the most up to date figures for foreign income spent in New Zealand by international students, from the Ministry of Education. The value of export education can be analysed as the additional value to the Auckland economy of having foreign students living and studying here.[72]

Transportation also features strongly as it services the different industries. Wholesaling plays an important role in the distribution of goods throughout the economy and, while it is only a 'flow through' sector, improving efficiencies in this sector could lead to lower costs, reduced lead-times and improved cost competitiveness for goods delivered to final demand. From a production-process perspective, wholesaling was included in the key sectors as it plays a role in the handling of materials and goods passing through the economy.[73] With reference to the key destinations of Auckland's goods and services, Australia is the most prominent trading partner for commodity exports. The countries receiving an increasing share of exports include Denmark, Malaysia and Sri Lanka. Service exports are focused at the major training partners including Australia, the United States and the United Kingdom (McDonald, Zhang and Smith, 2010).

In terms of the relative size of the key sectors selected in this study, value added per number of employees was calculated for each key sector, and plotted against the value added for the industry sectors at a 1 digit level. This is presented in Figure 5.15, with the median value added (for the six digit level industries) shown by the red line. The key sectors are subsectors of the 1 digit sectors, so give a better breakdown of their relative importance. These calculations could be interpreted as a proxy indicator for productivity. However such an interpretation should be treated with caution, as it is based on modelled data, with accompanying limitations. As discussed in section 3.1.2, a measure of labour productivity requires detailed analysis of firm level data. Figure 5.15 uses modelled data, and hence averaged figures for the key sectors.

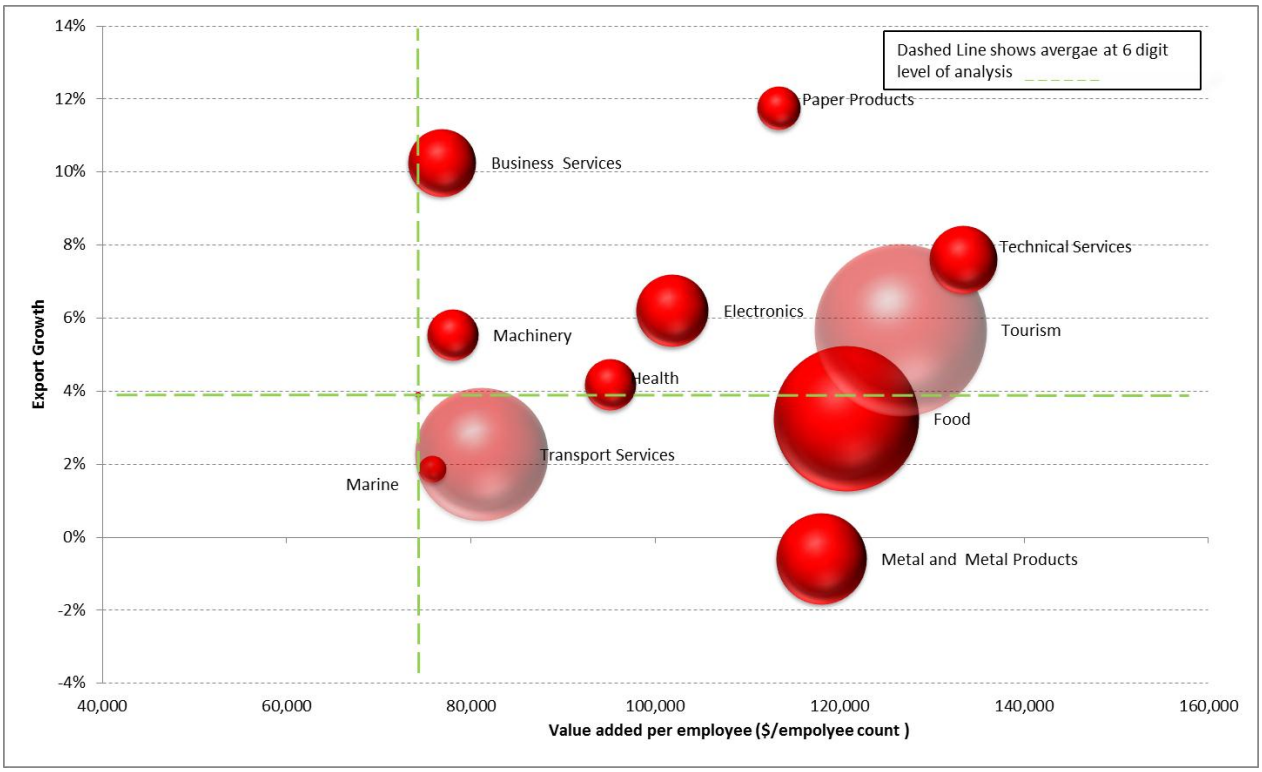
Figure 5.15: Relative size of key sectors




*Source: Calculations based on SNZ and Market Economics database*

[72] The value added figure for export education was apportioned based on the share of international students to total students in the tertiary sector.
[73] Wholesaling was included on request of the Ministry of Economic Development

Figure 5.16: Value added per employee and export growth for key sectors 2002-2007




*Source: Calculations based on SNZ and Market Economics database*

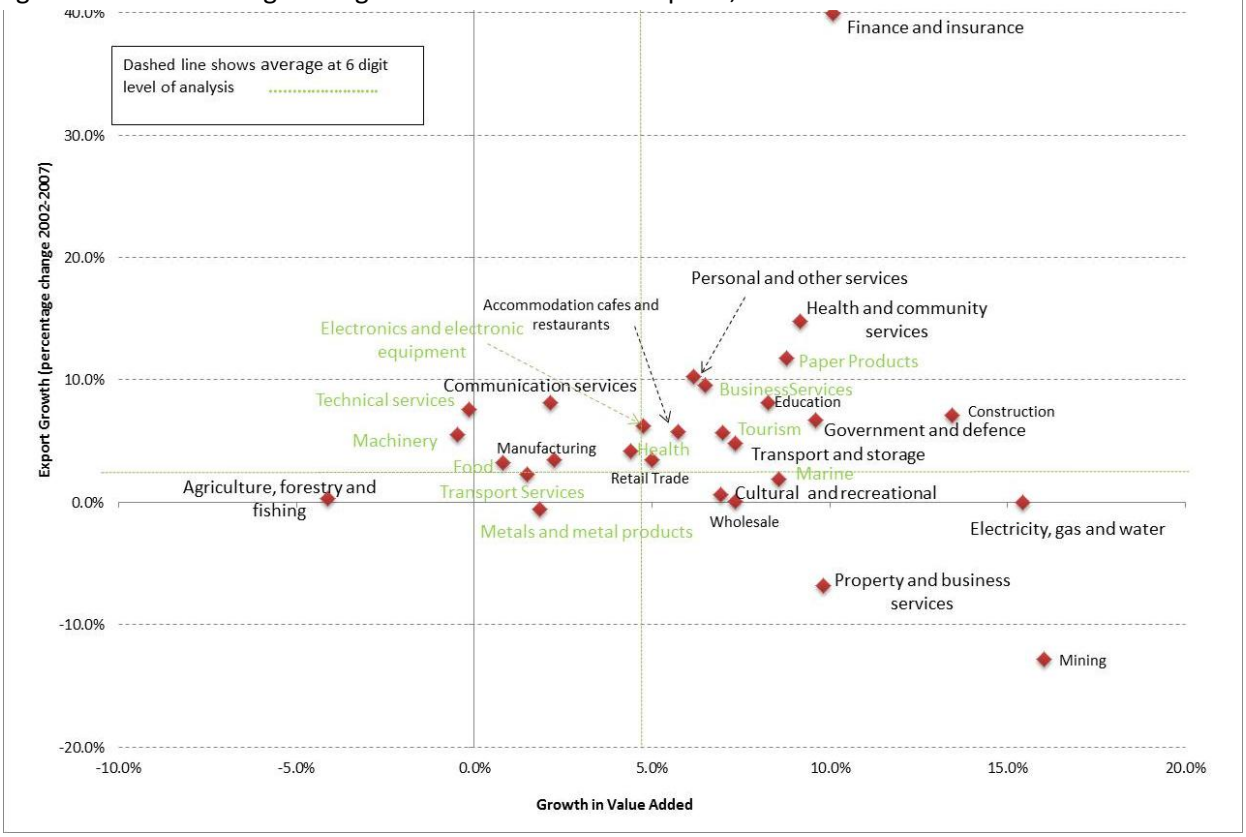
Figure 5.16 plots the data for the key sectors in terms of value added per employee on the horizontal axis, with the rate of export growth on the vertical axis. Again, the size of the bubble represents the relative size of exports, in dollar terms. The dashed green line represents the average for all industries, when calculated using the 477 industries, at a 6 digit level.

Figure 5.17 presents a scatter graph, showing the change in value added and exports for the period between 2000 and 2007 for the key sectors (identified by green labels) and other selected 1 digit industries. The dashed green line shows the average growth for all industries, calculated for the 6 digit level. There are some outliers evident in Figure 5.17, which warrant further analysis. The level of exports in Finance and Insurance grew by 40 per cent over this period, much larger than the other sectors. A cursory examination of the underlying data shows a large jump in 2007, which elevates the calculated export growth rate for the period. If the 2007 data point is adjusted to show trend growth, the average growth is in line with the underlying trend for the one-digit sectors.

Exports in the mining industry and property and business services declined from Auckland in this period, despite the relatively high growth in value added for the mining industry. For Auckland, exports of agriculture, forestry and fishing was stagnant over this period, accompanied by a decline in value added.

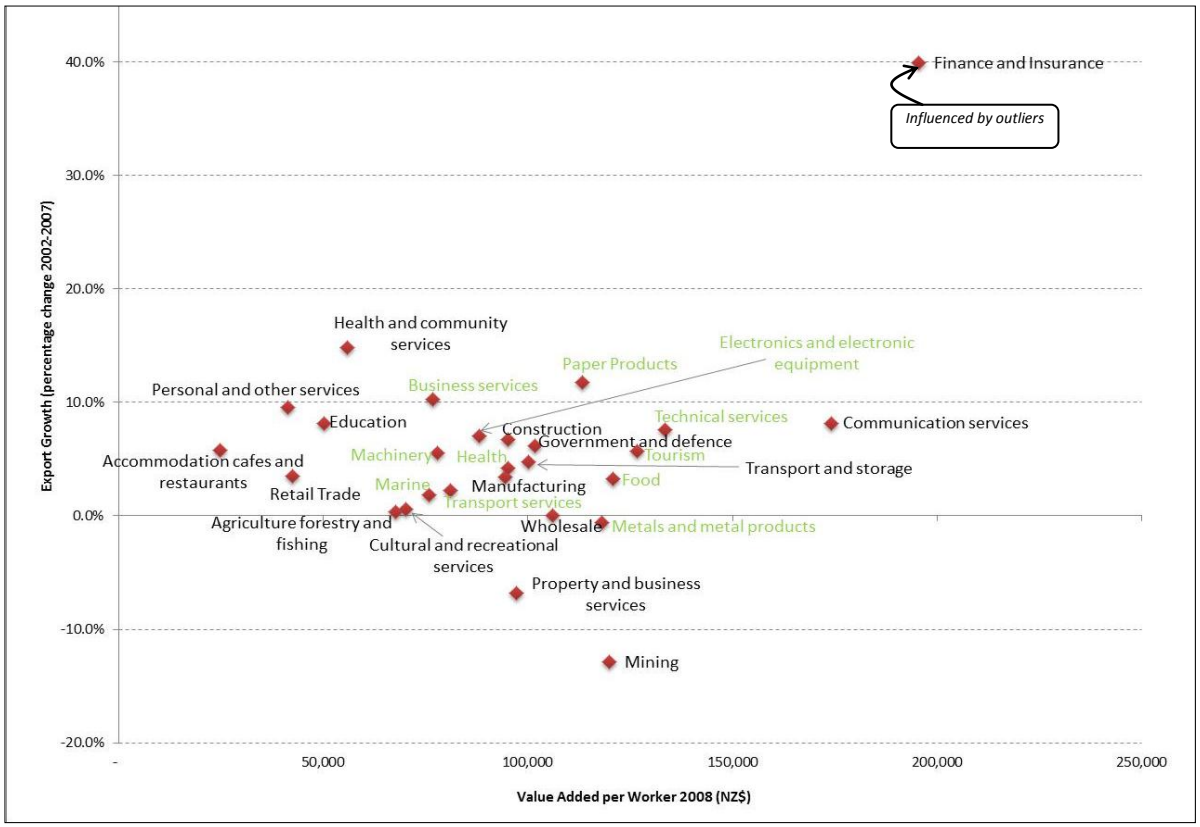
Figure 5.18, similar to 5.17, plots the percentage export growth between 2002 and 2007 against the value added per worker. Although somewhat crowded, these scatter graphs visually show the key sectors of interest and the 1 digit industries, to give a relative comparison of the sectors importance in the Auckland economy.

Figure 5.17: Percentage changes in Value Added and Exports, 2002-2007




*Source: Calculations based on SNZ and Market Economics database*

Figure 5.18: Value added per employee and export growth, key sectors and 1 digit ANZSIC




*Source: Calculations based on SNZ and Market Economics database*

### 5.5.2 LOCATION QUOTIENTS

Location quotients for Auckland's key sectors were calculated, based on the modified employee counts, which capture 'normal employees' as well as working proprietors. As discussed elsewhere, the location quotient provides an indication of the comparative advantage of sectors as measured against a benchmark economy (the New Zealand economy in this case). The employment location quotients for the key sectors are shown in Table 5.13.

Table 5.13: Location Quotients (based on Modified Employee Counts)

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| Business Services | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Metals and Metal Products | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Electronics and Electrical Equipment | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Machinery | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 |
| Food | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Marine | 1.4 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Health | 1.7 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.8 | 1.7 | 1.7 |
| Tourism | 1.3 | 1.3 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Technical Services | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Transport Services | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| Paper products | 1.3 | 1.4 | 1.3 | 1.4 | 1.3 | 1.2 | 1.3 | 1.3 | 1.3 |

*Source: Market Economics calculations based on SNZ*

Most of the key sectors have a comparative advantage in terms of employment with location quotients of more than 1. Food has the lowest location quotient and this is a reflection of the nature of this industry where production is distributed throughout New Zealand. The rest of the key sectors have a location quotient larger than one with the exception of machinery manufacturing and transport services. However the location quotients of these sectors are only marginally below 1. Recall that these sectors were selected based on various criteria and that location quotient was only one criteria.

### 5.5.3 NUMBER OF BUSINESSES AND AVERAGE SIZE

The number of business units (termed geographic units by Statistics New Zealand) and the average size of these businesses that make up Auckland's key sectors are covered in this section. The number of businesses and the average size of businesses within a market result in the level of demand for products and the relative cost and profitability to businesses in meeting this demand. A concentration of business units are an indication of agglomeration effects (discussed in Section 3.5). The number of units per key sector as well as the weighted average number of employees in each key sector is shown in Table 5.14.

There were 13,800 'business services' units in operation in 2009. This is the key sector with the greatest number of businesses. This was an increase of nearly 50 per cent from the 9,340 business units in 2002. During this expansion, the size (weighted average number of employees per geographic unit) did not change. The second largest key sector in terms of business numbers is technical services with 7,700

businesses. This sector also had significant increases in terms of the number of registered businesses over this period.

Table 5.14: Number of Business Units & Employment

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | % Change 02-09 |
|---|---|---|---|---|---|---|---|---|---|
| **Number of Business Units** | | | | | | | | | |
| Business Services | 9,340 | 10,030 | 11,110 | 11,990 | 12,740 | 13,070 | 13,480 | 13,800 | 48% |
| Metals and Metal Products | 800 | 820 | 850 | 870 | 860 | 830 | 810 | 810 | 1% |
| Electronics and Electrical Equipment | 1,010 | 1,020 | 1,070 | 1,090 | 1,080 | 1,090 | 1,100 | 1,080 | 7% |
| Machinery | 1,730 | 1,730 | 1,760 | 1,750 | 1,740 | 1,710 | 1,720 | 1,720 | -1% |
| Food | 1,120 | 1,180 | 1,240 | 1,250 | 1,270 | 1,270 | 1,250 | 1,260 | 13% |
| Marine | 320 | 340 | 330 | 350 | 360 | 350 | 340 | 340 | 6% |
| Health | 360 | 380 | 390 | 410 | 430 | 440 | 440 | 450 | 25% |
| Tourism | 840 | 880 | 910 | 920 | 920 | 920 | 920 | 930 | 11% |
| Technical Services | 6,020 | 6,290 | 6,780 | 7,110 | 7,240 | 7,490 | 7,690 | 7,700 | 28% |
| Transport Services | 2,970 | 3,030 | 3,250 | 3,340 | 3,320 | 3,170 | 3,150 | 3,130 | 5% |
| Paper Products | 280 | 270 | 260 | 260 | 260 | 250 | 260 | 260 | 1% |
| **Size (Weighted Average Employees per Geographic Unit)** | | | | | | | | | |
| Business Services | 2.6 | 2.6 | 2.6 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 0% |
| Metals and Metal Products | 6.8 | 7.3 | 7.5 | 7.6 | 7.7 | 7.8 | 8.1 | 8.3 | 22% |
| Electronics and Electrical Equipment | 8.7 | 8.3 | 8.4 | 7.9 | 8.0 | 8.5 | 8.6 | 8.8 | 1% |
| Machinery | 5.5 | 5.8 | 5.9 | 5.8 | 5.9 | 5.8 | 6.0 | 6.3 | 15% |
| Food | 12.0 | 12.2 | 12.0 | 11.3 | 11.4 | 10.9 | 11.6 | 11.9 | -1% |
| Marine | 5.8 | 6.4 | 6.0 | 5.6 | 5.5 | 4.8 | 5.1 | 5.7 | -2% |
| Health | 13.4 | 14.0 | 13.9 | 13.7 | 13.1 | 13.3 | 12.7 | 12.6 | -6% |
| Tourism | 6.7 | 6.3 | 6.5 | 6.3 | 6.1 | 6.2 | 6.0 | 6.2 | -7% |
| Technical Services | 3.5 | 3.6 | 3.5 | 3.4 | 3.5 | 3.6 | 3.6 | 3.7 | 6% |
| Transport Services | 4.3 | 4.5 | 4.7 | 4.3 | 4.3 | 4.5 | 4.8 | 4.7 | 9% |
| Paper Products | 4.1 | 4.1 | 4.1 | 3.9 | 3.8 | 3.8 | 3.8 | 3.8 | -7% |

*Source: Statistics New Zealand, Business Demographics*

The key sector of health grew the number of business units by 25 per cent, between 2002 and 2009. The number of business units in the Machinery sector was the only key sector to decline in this period. However there is evidence of consolidation in this industry, as the weighted average number of employees per geographic unit increased significantly, by 15 per cent. Other industries that showed evidence of consolidation were the metal and metal product sector (22 per cent change in the weighted average number of employees per geographic unit), and transport services – 9 per cent increase. There was evidence of fragmentation of businesses in four of the key sectors – tourism, health, marine and food (falls of 7 per cent, 6 per cent, 2 per cent and 1 per cent respectively in the weighted average employee numbers per geographic unit) – indicative of smaller newcomers to these industries. Data relating to the total numbers employed in each key sector are given in Appendix 6. In terms of size, the food and related sector and health sectors have the largest size firms, in terms of number of employers per firm. On average they have consistently employed more than 10 people per business unit, since 2002.

### 5.5.4 SPECIALISATION AND REVEALED COMPARATIVE ADVANTAGE

Capturing regional dynamics and calculating levels of specialisation is dependent on information availability. New economic geography theorists have borrowed analytical tools from endogenous growth theory and their models are based on explicit assumption of increasing returns to scale (Dimitris, Georgios,

George; 2004: 30). A number of indicators could be used to estimate the level of specialisation and include Herfindahl Index, Krugman Dissimilarity Index, and Specialisation Index and the Index of Regional Diversification. Due to the data requirements of these indices, only the Regional Diversification and Specialisation Indices were calculated. The regional diversification index is estimated by using the Theil entropy index. This index is an absolute measure of regional diversification. An index of 0 implies complete specialisation and an index of 1 implies complete diversification.

In terms of the key sectors, the region is relatively specialised (using employment, employee counts as measure) whereas an analysis of all sectors together shows diversification. The trends in the regional diversification indices are shown below for the key sectors (against Auckland) and the wider Auckland economy (against New Zealand) in Table 5.15.

Table 5.15: Regional Specialisation (Theil index of regional diversification)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Region** | 0.867 | 0.856 | 0.853 | 0.860 | 0.862 | 0.865 | 0.866 | 0.864 | 0.863 | 0.852 |
| **Key Sectors** | 0.356 | 0.364 | 0.359 | 0.358 | 0.356 | 0.360 | 0.370 | 0.366 | 0.371 | 0.377 |

0 (completely specialized) to 1 (completely diversified)

*Source: Market Economics Calculation*

At the key sector level Auckland region is specialised and the Theil index has remained relatively stable since 2000. At the key sector level, only a limited degree of concentration has taken place between 2000 and 2009.

At the individual sector level, a specialisation index was calculated. This indicator expresses the relationship between imports and exports at the regional (or country level) as an index where a value greater than 1 signifies that the region is relatively more specialised in a particular sector (i.e. relative share of exports is larger than the relative share of imports). As no detailed published data exists on these sectors, import and export estimates were obtained from the Market Economics' Auckland region GRIT model. Imports and exports were apportioned according to the make-up of the key sectors (i.e. relating the 6D ANZSIC classifications with the 123-IO Sector). The results are shown in Table 5.16.

Table 5.16: Specialisation Index

| Food | Marine | Electronics and Electrical Equipment | Metals and Metal Products | Machinery | Paper Products | Health | Transport Services | Tourism | Business Services | Technical Services |
|---|---|---|---|---|---|---|---|---|---|---|
| 4.2 | 3.39 | 2.03 | 2.02 | 1.86 | 1.5 | 1.37 | 1.06 | 0.96 | 0.59 | 0.42 |

*Source: Market Economics Calculation*

Business and technical services have low specialisation indices. A possible reason for this is the relationship of these sectors to the domestic market with a comparatively lower level of exports (as a share of output) recorded by these sectors. In addition to the specialisation index the Revealed Comparative Advantage indicator uses imports and exports to provide insight into different sector's competitive advantages. As

mentioned earlier limited regional level data about these transactions is available and these estimates were based on information derived from modelling. The RCA trends for the key sectors are shown in Table 5.17.

Table 5.17: Revealed Comparative Advantage - selected years

| KEY SECTOR | 2001 | 2004 | 2007 | Average (00-07) |
|---|---|---|---|---|
| Business Services | 1.3 | 1.3 | 1.2 | 1.3 |
| Metals and Metal Products | 1.4 | 1.5 | 1.2 | 1.4 |
| Electronics and Electrical Equipment | 1.5 | 1.4 | 1.4 | 1.5 |
| Machinery | 1.2 | 1.1 | 1.0 | 1.2 |
| Food | 1.2 | 1.1 | 1.0 | 1.2 |
| Marine | 1.7 | 1.4 | 1.3 | 1.5 |
| Health | 1.9 | 1.9 | 1.8 | 1.9 |
| Tourism | 1.9 | 1.7 | 1.6 | 1.8 |
| Technical Services | 1.3 | 1.3 | 1.1 | 1.3 |
| Transport Services | 1.8 | 1.7 | 1.6 | 1.8 |
| Paper Products | 1.7 | 1.7 | 1.4 | 1.6 |
| Total Key Sectors | 1.6 | 1.5 | 1.4 | 1.5 |

*Source: Market Economics calculations based on SNZ datasets*

All the key sectors recorded a positive RCA with some variations over time. Health and transport services recorded the largest RCA index at 1.9 and 1.8 respectively and were followed by tourism and paper products with RCAs at 1.76 and 1.65. This is followed by four sectors[74] with RCA in in the 1.4-1.55 range.

The main forces that have contributed to driving the changes in the RCA in the past are expected to remain for the foreseeable future. The improvement of trade relationships and the lowering of trade barriers will assist in growing exports. The opening up of Asian economies offers unique opportunities (and challenges) to Auckland. While it appears that the core benefits of the trade agreements will be in relation to the export of primary sector commodities, the growing business and technical services will also be able to benefit from the new markets. Similarly growth in the Asian markets will also translate into growth potential for tourism (which already has a high RCA). The opening of these market may act as a catalyst for the export education sector (this sector is not one of the key sectors; Export education was excluded as there has been a sharp decline in the value of education services post 2005[75] reflecting a significant decline in the numbers of Chinese students electing to study in New Zealand).

The relatively high positions of health and transport services are related to the number of firms within these sectors concentrating in Auckland. With reference to paper products, 60 per cent of the firms associated with this key sector are located in Auckland – and this is up from the 50 per cent in 2000. More than 40 per cent of firms associated with the health sector are situated in Auckland. However this concentration has declined from over 55 per cent in 2000. Apart from metals and metal products, all key sectors capture a disproportionately large share of business units (larger than the average share of national business units located in Auckland – 31.4 per cent. In total, 42.6 per cent of firms associated with the key sectors are located in Auckland.

[74] Business services, Metal and Metal Products, Electrical and Electronic Products, and Marine
[75] Auckland Regional Council: International Engagement Study; 2009.

### 5.5.5 GROWTH OUTLOOK

Based on historic trends and updated regional Input-Output Tables, it is possible to develop a growth outlook for the key sectors out to 2031.[76]

This is done using the Economic Futures Model, and applying a 'business as usual' scenario, which includes settings (and assumptions) about the basic structure of the economy, export growth projections, multi-factor productivity estimates and population growth projections.

The key sectors are expected to play a central role in the city-regions' future growth and are expected to become more important to the regional economy, increasing their current contribution from around 20 per cent to over 22 per cent of regional value added. Similarly, employment in the key sectors is expected to increase by 370,000 employees (Employee Counts) increasing concentration in these sectors from 19.9 per cent to 21.9 per cent (see Figure 5.19).

The strongest growth (in terms of value added) is expected in the business services sector which is projected to grow at around 2.8 per cent per annum compared to 2.0 per cent for the regional economy. Other strong growth is expected in electronics and electrical equipment (2.8%); machinery (2.8%) and health (2.3%). The remainder of the key sectors are projected to expand at between 1.5 per cent and 2.0 per cent between 2007 and 2031. The share of Auckland's employment and value added concentrated in the key sectors is illustrated in the figures.

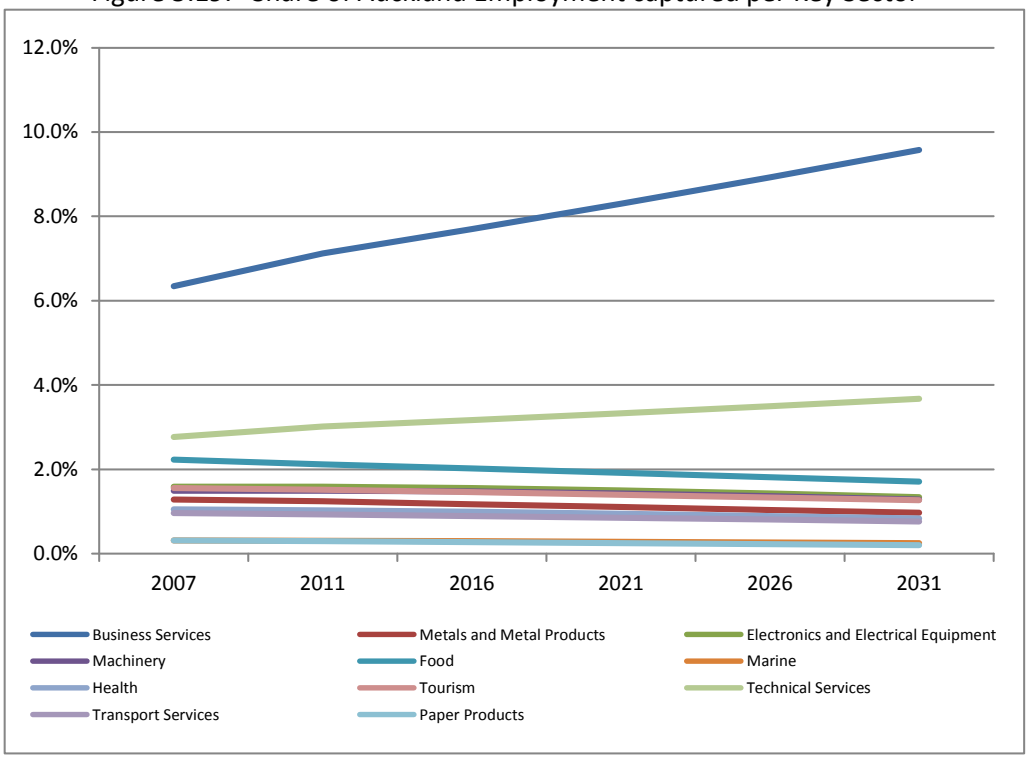
Business services are expected to continue to be a dominant sector in the Auckland context providing an estimated one in ten jobs by 2031. This sector is also expected to dominate value added.

The other key sectors (excluding business services) are expected to continue to grow faster than the wider economy but their relative concentration is expected to decrease out to 2031. In contrast, the proportion of the value added of these sectors to the regional economy will continue to increase. Note however, this is the increase in share of value added; concurrently all the key sectors' value added is projected to expand. This growth is expected to be driven by an increase in Electronics and Electrical Equipment, Machinery, Health, and Technical Services. Essentially these are the (currently) smaller sectors and it is possible for them to record strong growth off a lower base. These sectors may also face 'scale' related issues hampering their ongoing and future growth; turning these into substantial exporters may need special assistance.

In some of the key sectors, the share of value added is expected to increase while the share of employment declines. This implies that the productivity (labour and multi-factor productivity) in these sectors causes value added to grow faster than the employment requirements (i.e. the relationship between value added and employment is not linear; the sector may also experience returns to scale). The sectors showing these features include: Metals and Metal Products, Electronics and Electrical Equipment, Machinery, Marine and Health.

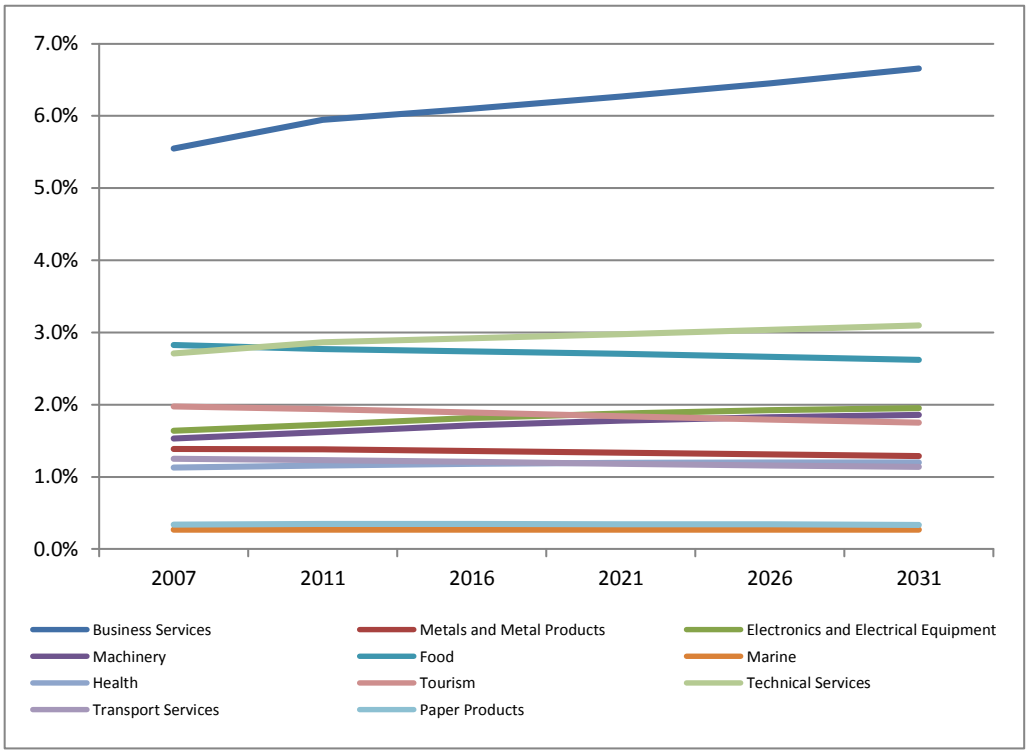
[76] This is done using the Economic Futures Model and the Business as Usual scenario.

Figure 5.19: Share of Auckland Employment captured per Key Sector




*Source: Economic Futures Model – Business as Usual Scenario*

Figure 5.20: Share of Auckland Value Added captured per Key Sector




*Source: Economic Futures Model – Business as Usual Scenario*

### 5.5.6 SYNTHESIS: INDUSTRY STRUCTURE

The costs of inputs used in any business are a source of advantage if they can be kept down, and availability of input affects quality or contributes towards a favourable value proposition. These inputs are more than just the tangible inputs identified as factors of production, but include the overall business environment. A little explored area of economic analysis is to what extent a physical geography, in this case the city-region, is an input into the production process. This can only be answered by industry players/agents themselves, as an analysis of data and trends, as undertaken in this study, does not reveal this dependency. A possible focus area of the sector engagement may be on developing an understanding of the drivers and determinants of industry inputs, and how these are transformed. This however implies that the backward linkages need to be identified and described. Apart from the cost of inputs, firms prefer a low inflation environment. New Zealand offers a favourable macro environment and consistently scores high in indicators that measure the ease of doing business. This is a strong point that transfers to and is experienced by Auckland firms. Input (producer's) price inflation in New Zealand is on the high side when compared against other OECD countries but some of this price inflation may be 'imported', as a result of exposure to exchange rate fluctuations.

Detailed data on the demand conditions for each key sector is highly limited and proxies were used to provide some indication of the wider conditions influencing the demand conditions. Exporting is a key policy area and the demand conditions that exporters experience in foreign markets is a function of the economic climate in the target country. Increasing market penetration and sales into overseas markets is heavily reliant on understanding and responding to 'local conditions'. Most of Auckland's key sectors have grown their exports (a basis on which the key sectors were selected) which could be interpreted as successfully interpreting the market signals about demand in the overseas markets. Sector specific research is required that will clarify the micro-decisions taken by the firms and agents, in their choice of expanding their markets off-shore. Understanding the demand conditions, and using such an understanding to capture an increasing market share, will assist in overcoming barriers (e.g. small scale and distance from key markets) faced by some of Auckland's key sectors. Establishing formal links with firms in foreign markets is a proven way to gain access and exposure to markets and international business practice. Auckland is well placed to capitalise on such opportunities, given the high levels of residents that were born overseas. However, indications are that there is significant scope to improve the international relationships of firms, but this requires further enquiry.

# 6 INDUSTRY SOURCES OF ADVANTAGE

The key sectors described in the previous section are vital to the overall performance of the economy and they can be regarded as important building blocks of Auckland's economic performance. These sectors were identified during an iterative process.

In this section, the four areas under industry sources of advantages align broadly with Porter's (1990) work around competitive advantage. The competitive forces framework provides a basic structure that can be used to investigate the dynamic pressures faced by business in a competitive environment. Thinking about competitive forces has evolved considerably since Porter's Five Force Framework (first outlined in his 1979 Harvard Business Review article). Essentially, Porter conceived competition as involving competitive 'forces' that impinge on the firms and drive down its profits. These forces emanate from other firms in the industry (rivals), from suppliers, from customers, from potential new entrants utilizing the same technology, and from firms bringing substitutes. This raises the question about where (how) industries create and maintain a competitive advantage.

After an extensive literature search, a number of indicators were defined that could shed light on industry sources of advantage.

## 6.1 DEMAND CONDITIONS

The demand conditions faced by industry are important and refer to the nature of consumer preferences. Three aspects of demand conditions are important: firstly the size of the demand for a particular product or services, the rate at which the demand is growing and finally the heterogeneity of that demand across customer segments. These conditions influence the performance of the industry and have been shown to have a positive effect on new firm performance, leading new firms to perform better in larger markets.

### 6.1.1 PREFERENCE FOR PRODUCT

The preference for a particular product by a particular consumer segment over substitute products offers insight into the level of success that a particular industry has achieved in the past in penetrating and capturing market share. The preference for a particular good/service is typically embodied in the value proposition put forward by the product (e.g. the spectrum along which the preferences are based can be expressed as low cost, value-for money or a premium product and is critical in determining the final *value* of a product; Kotler and Armstrong; 2001).

#### *6.1.1.1 BRANDING AND REPUTATION*

The strength of a brand and the reputation of a particular industry is a function of the firms within the particular industry as well as the collective value proposition and how clients perceive the service of a particular sector compared to similar industries in different locations. Branding is applied to a wide range of products and services, firms and regions.

Like the brand concept in the marketing, a regional brand transmits the basic attribute of product, offers difference value to specific users, and represents the quality commitments and prestige assurance that producers offer to users. From a region perspective the brand perspective has three core characteristics:

1. **Public product characteristic**: Enterprise brand is built by enterprise itself and has exclusiveness on ownership. However, the regional brand is not owned by an enterprise. Many enterprises in a

particular area own the regional brand and can benefit from it together. Hence the regional brand is a common asset that has been developed by the firms collectively.

2. **Region border characteristic**. The regional brand is generally limited in the range of an area or a city and has strong region characteristics. What the regional brand means is transmitted through general product (or service) information as well as information of the production area, especially where the industries are globally (or regionally) competitive. *Therefore a regional brand is not about choosing a product but more about valuing a productive area.*
3. **Industrial advantage characteristic**. A regional brand is the famous brand which has high market share and influence, and is owned by all enterprises in the regional competitive industry. This competitive industry is the material base and value foundation on which the regional brand is founded. Without the specific industries it is unlikely that a regional brand will be developed.

A regional brand has specific history, culture, geography or industry background, and a specific industry cannot create a regional brand overnight. A strong regional brand typically helps the industries associated with the area to interact with its client base. However the regional brand remains an intangible asset that is difficult to measure or value making it difficult to compare across industries, regions and countries.

Little public information exists on the branding and reputation of Auckland's key sectors in the export market and this gap will need to be addressed through sector engagements.

#### *6.1.1.2 EXPORT GROWTH*

Many economists believe that exports are the engine of economic growth in the sense that they can contribute to a more efficient allocation of resources within countries as well as transmit growth across countries and regions. Exports also assist in introducing new technologies and are a channel for learning and diffusing technological breakthroughs. Further, export growth also, plays a major part in the growth process by stimulating demand, encouraging savings and capital accumulation, and, exports increase the supply potential of the economy (Asian Development Bank, 2005). The rate of export growth can also be used as an indicator of the relative success of a group of sectors as it reflects the rate at which it expands in a foreign market. Note that the export growth needs to be viewed together with the share of the global market as discussed in the next section.

There is little official information about Auckland's performance and productivity necessitating the use of basic data has to be modelled to obtain useable information about sector level performance. Recent modelling and research[77] showed that while strong growth was experienced in some export sectors, Auckland as a whole, did not experience a broadening of its export base. This research also showed that the economic importance to Auckland of its exports have declined during the last decade when measured in terms of value added and employment impacts.

Exports per sector and the change over time (2001 to 2007) is the principle indicator[78] used with two features of growth covered; the rate of change and the percentage change are presented in Table 6.1 and the associated values of the sub-sectors (at a 6D ANZSIC level) are presented in Appendix 6. Importantly, exports and export growth points to the performance of the local sector into the international market and does not explain the demand conditions in the recipient markets. However, this indicator sheds light on

[77] Understanding Auckland's Role in NZ Global Engagement; Auckland Regional Council. 2009.

[78] The main source of this information is McDonald, Zhang and Smith (2010) on Auckland's international engagement, where estimates of exports were calculated for both services and goods. A detailed description of the methodology and limitations of the project can be found in Appendix A (pages 49-58) of the International Engagement Report, which is available from http://knowledgeauckland.org.nz/.

the degree to which a particular sector successfully interacts with (and addresses) demand conditions in foreign markets.

Table 6.1: Export Growth

| Sector | Estimated value $'m 2001 | Estimated value $'m 2007 | Percentage Change (2001-2007) | Compound Growth (2001-2007) |
|---|---|---|---|---|
| Business Services | 491 | 854 | 74% | 8.2% |
| Metals and Metal Products* | 813 | 784 | -4% | -0.5% |
| Electronics and Electrical Equipment | 630 | 904 | 44% | 5.3% |
| Machinery | 270 | 374 | 38% | 4.7% |
| Food | 1,321 | 1,622 | 23% | 3.0% |
| Marine | 156 | 175 | 12% | 1.6% |
| Health | 249 | 318 | 28% | 3.6% |
| Tourism | 3,588 | 4,995 | 39% | 4.8% |
| Technical Services | 489 | 759 | 55% | 6.5% |
| Transport Services | 2,258 | 2,693 | 19% | 2.5% |
| Paper Products | 193 | 348 | 80% | 8.7% |

*Source: Auckland Council; Market Economics Calculations*

**The 2007 value is understated due to data (confidentiality) issues associated with basic iron and steel manufacturing meaning that positive growth was potentially recorded but not reflected*

All the key sectors apart from metals and metal products[79] increased their exports over the period mentioned above. The two largest export sectors are tourism and transport services. These two sectors are both reliant on the availability of high quality infrastructure. Tourism is particularly dependent on the airport and port facilities. With reference to the transport sector, it is important to realise that the economic activity is supported by transport (and wholesaling). Importantly, the wholesale and transport sectors can be viewed as 'pass-through' sectors and not as producing or consuming sectors.[80]

The key sectors increased their exports, and this also means that the regional economy became more integrated into the global supply chains. This exposes the Auckland economy to worldwide economic conditions and shocks, such as the Global Financial Crisis. The recent slowdown has had a severe impact on business activity around the globe and by implication/through connection on Auckland's key exporting sectors. Additional research is required on the demand conditions for each key sector experienced in each export market. This research will need to investigate the market situation in destination markets and examples of variables that will need to be looked at are outlined inTable 6.2.

Table 6.2: Key sector's demand condition investigations

| Variable | Spatial focus |
|---|---|
| Key location | Per location |
| Market share | Per location |
| Growth rate | Per location |
| Competitors (selling into same market) | Identify origin market |
| Market volatility and demand drivers | Per location |
| Exposure to exchange rate volatility | Per destination (currency) |

[79] However this sector's exports are potentially understated due to confidentiality issues in the dataset and has in all likelihood recorded an increase in exports.

[80] For a detailed description of the logic behind this, the reader is referred to Millar and Blair, Input-Output Analysis. Foundations & Extensions. 2nd Ed, 2009. p. 146.

These sector based investigations will need to be undertaken in close consultation with the relevant sector bodies, such as the Marine Industry Association and NZTE, after the completion of qualitative research on the firms within each key sector.

### 6.1.2 MARKET ACCESSIBILITY

New Zealand's small size and distance from key markets makes it challenging to break into new markets and to compete in global markets. The distribution of goods (as inputs into final markets) adds to the production cost, lowering any price advantages. Similarly the small scale of operations reduces the ability to create economies of scale in the domestic market and also weakens the bargaining positions. These challenges make it imperative that the firms respond to demand conditions in destination markets in a timely manner.

Market accessibility can be measured along a range of dimensions. Three areas are covered, firstly the legal level covers aspects such as free trade agreements. Secondly the exposure and integration of firms via their global partnerships is captured and finally, physical connections are considered.

#### *6.1.2.1 NUMBER OF GLOBAL PARTNERS*

Businesses may choose to operate in different countries in four distinct ways: through trade, investment, strategic alliances, and licensing or franchising. Global links can be established in a number of ways, including foreign direct investments and portfolio investments or through forming alliances or affiliations within international companies. Alliances and affiliations can take many forms but the main motivation for establishing these ties are to bypass some of the difficulties associated with trading across international borders while gaining access to new markets. This indicator, the number of global partners, is about the number of ties that New Zealand firms have with international companies. At the Auckland level, information is limited and we used the BOS to provide some indication on the number of international arrangements. This data however only reflects 'overseas holdings' (i.e. Equity) and only covers international partnerships of ownership and does not include non-equity or strategic-cooperation alliances.

Based on the latest BOS, 4 per cent of New Zealand businesses have overseas holdings, which equals about 1,090 companies. Larger companies are more likely to have overseas holdings with 12 per cent of businesses with 100+ employees having them, compared to 3 per cent of businesses with 6-19 employees. At a sectoral level the information media and telecommunications sector is the industry with the greatest proportion of businesses with overseas holdings, with 11 per cent of businesses in the sector having international equity owners (note however that comparatively this is an industry with a small number of firms). The financial and insurance services sector has the next greatest proportion of businesses with overseas holdings (8%) followed by the manufacturing sector and the wholesale trade sector (each with 7%) and the professional, scientific & technical services sector (6%).

In terms of overseas holdings the BOS is slightly higher than estimates presented in the Business Demographic Statistics. Table 6.3 offers the share of businesses with international equity by ownership band for a number of years.

Table 6.3: Level of overseas owned equity by ownership band

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Less than 1% | 98.12% | 98.09% | 98.09% | 98.13% | 98.21% | 98.22% | 98.18% | 98.13% | 98.11% |
| 1 to 24% | 0.22% | 0.25% | 0.24% | 0.25% | 0.26% | 0.25% | 0.26% | 0.28% | 0.30% |
| 25 to 49% | 0.13% | 0.15% | 0.15% | 0.14% | 0.11% | 0.13% | 0.13% | 0.13% | 0.13% |
| 50% or more | 1.52% | 1.52% | 1.53% | 1.48% | 1.42% | 1.41% | 1.43% | 1.46% | 1.46% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*Source: Statistics New Zealand*

According the BDS the bulk of New Zealand firms do not have overseas ownership, with less than 2 per cent of firms having any overseas ownership. Where equity is held by offshore entities, it is predominantly by way of a controlling stake (i.e. >50%). The specific level of international exposure of Auckland's key sectors will need to be qualified and the exact nature of the international links and partnerships investigated to ensure that the key sectors are well connected, with global partnerships.

### 6.1.3 SYNTHESIS: DEMAND CONDITIONS

Detailed data on the demand conditions for each key sector is highly limited and proxies were used to provide some indication of the wider conditions influencing the demand conditions. Exporting is a key policy area and the demand conditions exporters experience in foreign markets is a function of the economic climate in the target country. Increasing market penetration and sales into overseas markets is heavily reliant on understanding and responding to 'local conditions'. Most of Auckland's key sectors have grown their exports which could be interpreted as meaning that they are successfully interpreting the market signals about demand in the overseas markets. Sector specific research is required that will need to shed light on the drivers and determinants of demand in the export markets. Ideally (and subject to budget constraints) this research will be undertaken for each of Auckland's key sectors. Understanding the demand conditions, and using such an understanding to capture an increasing market share will assist in overcoming barriers (e.g. small scale and distance from key markets) faced by some of the Auckland's key sectors. Establishing formal links with firms in foreign markets is a proven way to gain access and exposure to markets and international business practice. However, indications are that there is significant scope to improve the international relationships of firms.

## 6.2 INDUSTRY INPUTS

The inputs used by industry in any city region are dependent on available resources to the industry, and their relative price. This section explores further the relative price of inputs into the production process as it directly affects the price competitiveness goods (and services) produced. Basic economic theory identifies the main inputs as labour, entrepreneurship, capital and land and the relative price of labour and land. Some input costs have been covered in other sections of this report. Proxies for the cost of land – rental levels of residential and industrial land – are discussed in section 5.1.1, but are also a factor for choice of industry location. Entrepreneurship was covered in Section 5.4. This section looks also at wage rates by sector, commodity prices as well as recent input price movements and a more qualitative index of the cost of doing business, using OECD comparisons.

### 6.2.1 SECTOR WAGE RATES

Wage and salary income makes up almost 70 per cent of total income received by the working age population of New Zealand (SNZ, 2010). Statistics New Zealand publishes the Quarterly Earnings Survey. This indicator shows the average weekly earnings per sector.

This income is generated in different sectors of the economy and the cost of labour (referring to staff compensation[81] in this case) varies by sector as well as the occupations within each sector. This average reflects the remuneration to labour and reflects ordinary hours, overtime and extra payments and. Table 6.4 provides the average earnings for selected years between 2000 and 2010 (Q2 but information for each quarter is available).

Table 6.4: Average Weekly Earnings by Industry (NZ$, June Quarter)

| Main Industry | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 |
|---|---|---|---|---|---|---|
| Forestry and Mining | 742.6 | 828.1 | 842.6 | 1,031.9 | 1,077.3 | 1,092.9 |
| Manufacturing | 689.5 | 754.1 | 794.7 | 829.8 | 922.7 | 967.4 |
| Electricity, Gas, Water and Waste Services | 862.0 | 913.4 | 996.6 | 1,074.5 | 1,163.1 | 1,217.6 |
| Construction | 692.8 | 700.7 | 768.1 | 823.4 | 944.7 | 947.8 |
| Wholesale Trade | 752.5 | 813.6 | 828.8 | 938.0 | 999.1 | 1,039.1 |
| Retail Trade | 454.1 | 490.2 | 520.7 | 561.4 | 612.4 | 635.3 |
| Accommodation and Food Services | 414.2 | 431.3 | 433.2 | 454.2 | 490.7 | 562.1 |
| Transport, Postal and Warehousing | 652.1 | 681.3 | 698.9 | 782.5 | 825.2 | 983.5 |
| Information Media and Telecommunications | 846.2 | 891.6 | 925.3 | 963.2 | 1,021.7 | 1,171.6 |
| Financial and Insurance Services | 887.1 | 938.9 | 1,087.9 | 1,117.9 | 1,190.2 | 1,322.0 |
| Rental, Hiring and Real Estate Services | 663.2 | 694.0 | 742.7 | 804.1 | 855.5 | 924.8 |
| Professional, Scientific, Technical, Admin. & Support Services | 742.2 | 778.0 | 835.1 | 907.1 | 970.7 | 1,072.3 |
| Public Administration and Safety | 804.2 | 858.9 | 933.4 | 978.6 | 1,052.3 | 1,176.7 |
| Education and Training | 740.7 | 806.4 | 878.7 | 955.4 | 1,008.5 | 1,079.8 |
| Health Care and Social Assistance | 636.7 | 692.7 | 756.2 | 849.1 | 992.7 | 1,019.2 |
| Arts, Recreation and Other Services | 556.7 | 573.8 | 608.3 | 616.8 | 642.5 | 764.9 |
| Total All Industries | 670.1 | 712.9 | 765.3 | 820.7 | 897.0 | 965.3 |

*Source: Statistics New Zealand (QES; August 2010, Table reference: QEX004AA)*

Employees in financial and insurance services have the highest average weekly earnings and are followed by Electricity, Gas, Water and Waste Services, Public Administration and Safety. Employees in Accommodation and Food Services, Retail Trade and Arts, Recreation and Other Services have the lowest average weekly earnings.

In terms of refining indicators, and indicator development, it would be useful if Statistics New Zealand were able to provide additional sector and spatial resolution of wage rates. In addition, it could be possible to add a third dimension to the data to capture occupations per sector. This information could then be used to define a new indicator that shows the average cost per sector and the occupations per sector (for Auckland's key sectors). It is however not possible to calculate such an indicator based on current publically available information for SNZ.

### 6.2.2 PRODUCERS PRICE INDEX

The cost of raw materials and goods used during the production process could be a potential source of advantage for local businesses. However it is not practical to investigate all the commodities used in all production processes to determine whether a cost advantage exists. Instead it is advisable to look at the

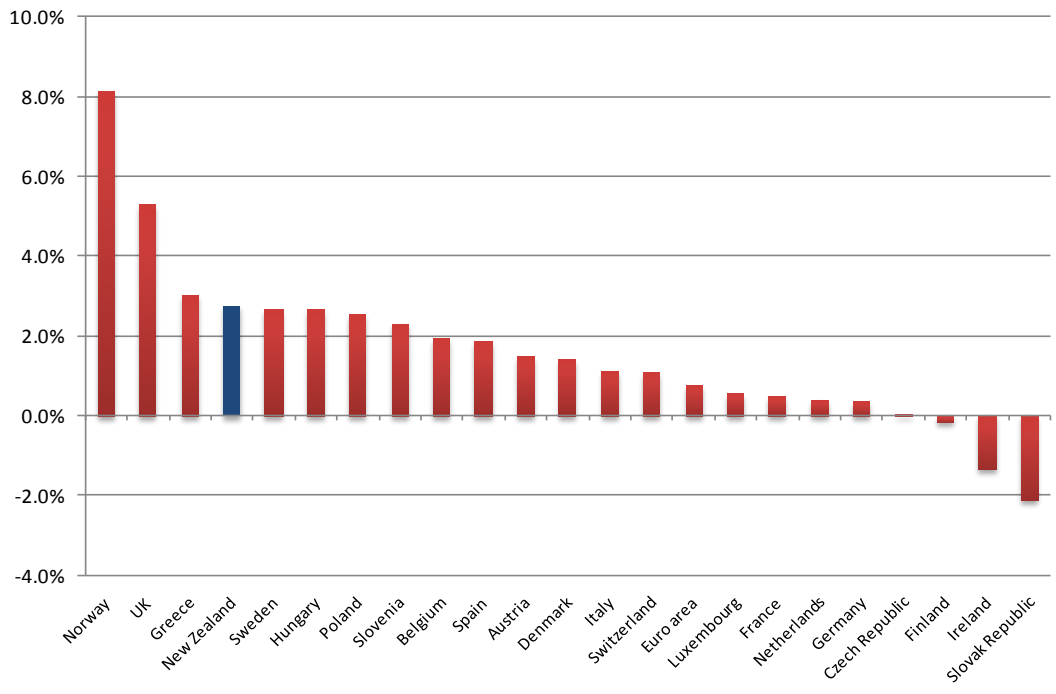
[81] Factors such as sex, age, industry, occupation, qualifications obtained, labour force status, part-time and full-time status, where people live, and ethnicity are all associated with the income people and households receive and the influence of these factors is already included in the above.

change over time of producers' prices by using an indexed value that shows the relative trends over time and the Producers Price Index (PPI) is a useful indicator of such price movements[82].

According to the OECD, changes in PPIs provide an indication of the change in the prices received by domestic producers for their *outputs* or of the change in prices paid by domestic producers for their *intermediate inputs*. International comparability of PPI data is largely affected by how each country addresses the key methodological issues (these issues are discussed at length in the Manual on Producers' Price Indices for Industrial Goods, published by the United Nations Statistics Division in 1979) and the dataset that the OECD was used in this indicator. The Producer Price Index (PPI) is a weighted index of prices measured at the wholesale, or producer level. All of the physical goods-producing industries that make up the economy are usually included, but imports are not.

The average PPI (output) for a number of countries is presented in Figure 6.1. This figure shows the average annual change between 2006 and 2009. A detailed breakdown of the index per country for 2006, 2007 and 2008 can be found in Appendix 7. This appendix also shows the quarterly movements during 2009 and the latest monthly data.

Figure 6.1: Average PPI (year on year 2006-2009)




*Source: OECD; 2010*

Apart from the 'outlier' countries, it appears that New Zealand's change in PPI is on par with Sweden, Hungary and is well below the changes in the United Kingdom. Detailed sector level inflation figures (PPI input and output) are not available at a regional level and will be necessary to work with the key sectors in Auckland as well as with Statistics New Zealand to develop industry specific PPI indicators that can be tracked over time.

[82] PPIs can also be used as a deflator of nominal values of output or intermediate consumption for the compilation of production volumes and for the deflation of nominal values of capital expenditures and inventory data for use in the national accounts

Table 6.5: Doing Business 2010

| Influence on the cost of doing business | Indicator | New Zealand | OECD Average |
|---|---|---|---|
| | **Starting a Business** | | |
| Short | Procedures (number) | 1 | 5.7 |
| Short | Time (days) | 1 | 13.0 |
| Short | Cost (per cent of income per capita) | 0.4 | 4.7 |
| Short | Min. capital (per cent of income per capita) | 0.0 | 15.5 |
| | **Dealing with Construction Permits** | | |
| Indirect | Procedures (number) | 7 | 15.1 |
| Indirect | Time (days) | 65 | 157.0 |
| Indirect | Cost (per cent of income per capita) | 37.3 | 56.1 |
| | **Employing Staff** | | |
| Ongoing | Difficulty of hiring index (0-100) | 11 | 26.5 |
| Ongoing | Rigidity of hours index (0-100) | 0 | 30.1 |
| Ongoing | Difficulty of redundancy index (0-100) | 10 | 22.6 |
| Ongoing | Rigidity of employment index (0-100) | 7 | 26.4 |
| | Redundancy costs (weeks of salary) | 0 | 26.6 |
| | **Registering Property** | | |
| Short | Procedures (number) | 2 | 4.7 |
| Short | Time (days) | 2 | 25.0 |
| Short | Cost (% of property value) | 0.1 | 4.6 |
| | **Getting Credit** | | |
| Indirect | Strength of legal rights index (0-10) | 9 | 6.8 |
| Indirect | Depth of credit information index (0-6) | 5 | 4.9 |
| Indirect | Public registry coverage (% of adults) | 0.0 | 8.8 |
| Indirect | Private bureau coverage (% of adults) | 100.0 | 59.6 |
| | **Protecting Investors** | | |
| Indirect | Extent of disclosure index (0-10) | 10 | 5.9 |
| Indirect | Extent of director liability index (0-10) | 9 | 5.0 |
| Indirect | Ease of shareholder suits index (0-10) | 10 | 6.6 |
| Indirect | Strength of investor protection index (0-10) | 9.7 | 5.8 |
| | **Paying Taxes** | | |
| Direct | Payments (number per year) | 8 | 12.8 |
| Direct | Time (hours per year) | 70 | 194.1 |
| Direct | Profit tax (%) | 29.4 | 16.8 |
| Direct | Labour tax and contributions (%) | 2.6 | 24.4 |
| **Direct** | Other taxes (%) | 0.8 | 3.3 |
| Direct | Total tax rate (% profit) | 32.8 | 44.5 |
| | **Trading Across Borders** | | |
| Direct | Documents to export (number) | 7 | 4.3 |
| Direct | Time to export (days) | 10 | 10.5 |
| Direct | Cost to export (US$ per container) | 868 | 1,089.7 |
| Direct | Documents to import (number) | 5 | 4.9 |
| Direct | Time to import (days) | 9 | 11.0 |
| Direct | Cost to import (US$ per container) | 850 | 1,145.9 |
| | **Enforcing Contracts** | | |
| Direct | Procedures (number) | 30 | 30.6 |
| Direct | Time (days) | 216 | 462.4 |
| Direct | Cost (% of claim) | 22.4 | 19.2 |
| | **Closing a Business** | | |
| Indirect | Time (years) | 1.3 | 1.7 |
| Indirect | Cost (% of estate) | 4 | 8.4 |
| Indirect | Recovery rate (cents on the dollar) | 76.2 | 68.6 |

**TOTAL SCORE PER TOPIC**

| Topic | New Zealand Score |
|---|---|
| Ease of Doing Business | 2 |
| Starting a Business | 1 |
| Dealing with Construction Permits | 5 |
| Employing Workers | 15 |
| Registering Property | 3 |
| Getting Credit | 4 |
| Protecting Investors | 1 |
| Paying Taxes | 9 |
| Trading Across Borders | 26 |
| Enforcing Contracts | 10 |
| Closing a Business | 17 |
| Rank | 2 |

*Source: World Bank & International Finance Corporation*

### 6.2.3 COST OF DOING BUSINESS

The cost of doing business - the cost of completing transactions – is influenced by the local legislative framework. The World Bank (WB) and the International Bank for Reconstruction and Development (IBRD) complete an annual survey of 183 countries on the ease of doing business across the globe. The WB and IBRD publish the results in their Doing Business reports.[83] For each economy an index is calculated as the ranking on the simple average of its percentile rankings on each of the 10 topics covered. The top 50 countries and their scores per topic are listed in Appendix 8. New Zealand ranks high for all the topics covered by the survey and the scores are summarized in **Error! Reference source not found.** (on the previous page).

One of the topics covers the level of regulation in the economy. Assuming that the level of regulation (and the ease of doing business) is related to the cost of doing business, then this topic can be used as a proxy for the relative cost of doing business in a particular country. As a country, New Zealand ranks very high in all the topics. Trading across borders is the weakest topic and a closer inspection of this topic revealed that New Zealand is relatively cheap to export from and import if based on the Cost per Container (in US$ terms). This information is however based on the country level analysis completed by the WB and IBRD and it is necessary to test these findings against the experiences of Auckland's key exporters.

### 6.2.4 SYNTHESIS: INDUSTRY INPUTS

Inputs used in the business could be a source of advantage by for example assisting in keeping costs down, enhancing quality or by contributing towards a favourable value proposition. These inputs are more than just the tangible inputs and also cover labour, land and the overall business environment. Apart from the cost of inputs, firms prefer a low inflation environment. New Zealand offers a favourable macro environment and consistently scores high in indicators that measure the ease of doing business. This is a strong point that transfers to and is experienced by Auckland firms. Input (producers) price inflation in New Zealand is on the high side when compared against other OECD countries, but some of this price inflation may be imported and result from exposure to exchange rate fluctuations. An information gap was recognized due to the limited data on industry input costs for the key sectors in Auckland. This gap needs to be addressed through a sector engagement process. A possible focus area of the sector engagement may be on developing an understanding of drivers and determinants of industry inputs and how these are transformed. This however implies that the backward linkages from the key sectors to other industries need to be identified and described.

## 6.3 STRATEGY AND CAPABILITY

Business managers and leaders are responsible for the economic and social success of the businesses they lead. While their primary objective is to create value for shareholders, they also have wider responsibilities towards employees, the community and the environment. How successful business leaders are in meeting their responsibilities depends on how well they manage the variables that influence the existing economic condition. Management knowledge and skills are considered to be key factors in national economic growth and there has been specific interest in the notion of 'management capability' and how to improve New

[83] See http://www.doingbusiness.org/

Zealand firm's management capability (Massey, 2010). Having a clear and articulated strategy around key topics of innovation and R&D, business growth and exports are crucial and is the topic of this section.

### 6.3.1 FIRM AND INDUSTRY VISION

Making organisations and industries more innovative and responsive to changes in the market place requires business leaders to have a clear vision and to execute strategies aimed at achieving the vision. Specific information and the details about the industry visions associated with each key sector will need to be uncovered as part of a sector engagement process and this process may require independent facilitators to discover the salient features of each key sector's industry vision. The link between the industry vision and the industry reputation is similar in nature as the association between a firm's vision, mission and objectives as well as the strategic actions undertaken to grow the firms (Thompson and Strickland, 2003).

#### *6.3.1.1 PROPORTION OF FIRMS WHO DEVELOPED GOAL*

The rationale for using the twin standards of good strategy making and good strategy execution to determine whether a company is well managed is compelling. The better conceived a company's strategy and the more competently it is executed, the more likely it is that the company will be a standout performer and exhibit best practices (Thompson and Strickland: 2003).

Based on the New Zealand Business Operations Survey (BOS), 89 per cent of businesses in New Zealand have goals. Considering that New Zealand has many small businesses, and the fact that the BOS is survey-based (and self-reported) this proportion appears exceptionally high and it is not known how well conceived or realistic these goals are. Further it is not known if these goals are related to the financial or strategic performance of the firm. Similarly it is not known to what degree firm resources have been earmarked for implementing and achieving these goals. The BOS results indicate that as firms get larger (as measured in terms of employees) the probability that goals have been put in place increases. For example, of businesses employing between 6-19 staff, around 86 per cent have goals and this is lower than the 98 per cent of business with 100+ staff that have goals.

Similarly, the larger businesses are also more likely to have formally developed goals compared to businesses with fewer employees. In the case of business employing 100+ staff, sixty eight per cent indicated that they have formally developed goals, 31 per cent have informally developed goals and only 2 per cent have no goals. The comparable figures for business in the 6-19 employee size-band were 20 per cent having formal goals, 67 per cent having informal goals and 14 per cent having no goals. The clear difference is that the large companies tend to have more formalised processes in place to capture, record and possibly communicate the goals through the organisations.

The high level of aggregation of the BOS results limited the inferences that can be drawn between the sectors reported in the BOS and the key sectors identified in this report. Almost all (98 per cent) financial and insurance service businesses have goals in place. Information media and telecommunications firms also have high levels with 97 per cent indicating that they have business goals in place. This is followed by arts and recreation services and wholesaling with 96 per cent each. The other services sector had the lower proportion of goal oriented businesses with 81 per cent having them in place.

With reference to Auckland's key sectors, the level to which each sector has clearly defined and articulated goals have to be identified and reviewed. This will need to be informed by interactions with important firms within each key sector as well as industry representative bodies and associations where they exist.

#### *6.3.1.2 INNOVATION (PRODUCT, SYSTEM AND PROCESS)*

The increasing internationalisation of markets and interaction between countries has intensified global competition between firms. Competition from low-cost producers is forcing firms in high-labour cost countries to find new ways of doing business and reshaping strategic options. Essentially, firms have to find new ways to compete requiring innovation in products, processes and the ways in which firms organise their production and market their products. It is expected that the focus of innovation that has been on de-emphasising cost based competition, and emphasising product design, performance and customer service will remain a central focus for the foreseeable future (Roper *et al,* 2010).

In New Zealand, the importance of staying at the cutting edge of developments is acknowledged and 'first-mover' advantages and benefit associated with innovation is stressed and highlighted through different policy positions. Innovation is internationally recognised as a link to economic growth and productivity gains (OECD Innovation Strategy). However, measuring and tracking a complex theme such as innovation is mostly done through quantitative processes. Innovation is included in the Business Operations Survey which defines[84] it as including 'the development or introduction of any new or significantly improved activity for this business. This includes products, processes and methods that this business was the first to develop and those that have been adopted by other organisations.' The indicators covered include:

- Percentage of business engaged in innovation activity
- Percentage of business engaged in goods and service activity
- Percentage of business engaged in process innovation activity

Survey results indicate that 46 percent of businesses were engaged in innovation activity over the past two years and 8 per cent were involved in R&D, which was the same rate as in 2007 – implying that very little has changed since the previous survey. The industry with the highest overall innovation rate was information, media, and telecommunications, at 60 percent.

The larger the business (number of employees), the more likely they are to actively undertake innovation. Businesses with 100+ employees are more likely to have innovation and research and development (R&D) activity with 64 per cent and 20 per cent involved in innovation and R&D respectively, compared to smaller businesses (6-19 employees) where 43 per cent have innovation activity and 20 per cent are involved in research and development.

The most innovative industry is information media and telecommunications with 60 per cent of businesses involved in innovation. This relatively high proportion may be a factor of the type of activities associated with ICT. Manufacturing has the second highest level of innovation (57%) and is followed by wholesaling (56%), and electricity, gas water and waste services (53%).

The manufacturing sector has the greatest share of businesses with R&D activity with 20 per cent of respondents indicating some involvement. This is followed by information media and telecommunications (15 per cent involvement), Professional, scientific and technical services (13%) and wholesaling (12%).

In terms of the type of innovation being undertaken, 26 per cent of New Zealand businesses are involved in goods and services innovation activity and 23 per cent are involved in operational process innovation. These categories are not mutually exclusive and businesses can be involved in both. The industry with the highest proportion of businesses involved in goods or services innovation is the manufacturing industry

[84] The broad definition used is in accordance with the definitions contained in the OECD Oslo Manual (2005).

with 39 per cent, followed by the information media & telecommunications sector (36%), the wholesale trade sector (35%) and the education and training sector (31%).

The sector with the highest proportion of businesses involved in operational process innovation was the information media & telecommunications sector with 34 per cent involved. This is followed by the manufacturing sector (33%), the financial services sector (32%) and the administrative & support services sector (28%). Currently information on innovation is presented at the national level and only at a highly aggregated sector level. Quantifying the level and type of innovation undertaken within the key industries will need to be undertaken as part of the sector engagement work.

#### *6.3.1.3 R&D AS A PERCENTAGE OF GDP*

Research and development is discovering new knowledge and then using it to create new and improved products, processes and services that customers want. The term 'innovation' is widely used to describe a similar process – that of successfully exploiting new ideas. Both involve bringing discoveries and new ideas to the market through applications that improve something or add value. A nation's R&D expenditure represents present income foregone to achieve future technological progress which is a key determinant of international competitiveness, on which nations rely to maintain and enhance socio-economic well-being. The Ministry of Science and Innovation (formerly the Ministry of Research Science and Technology) identified the importance of business expenditure on research and development (BERD), and published estimates of the extent of New Zealand's situation.

BERD supports firms' technological progress that is the only sustainable way to a nation's long-term productivity growth, which is essential for its long-term international competitiveness. BERD metrics can be calculated in different ways with each approach yielding different results, hence the use of 'high' and 'low' estimates, presented in Table 6-6. A detailed description of the approach can be found on the MORST website[85]. These results need to be viewed in parallel with the section dealing with patent activity (Section 4.4.4).

Table 6-6: BERD Comparison (% of GDP)

| | **Method 1: Industry-Level model** | **Method 2: All-Economy Model** |
|---|---|---|
| New Zealand | 0.45 | 0.51 |
| Australia | 0.85 | 0.92 |
| USA | 1.79 | 1.79 |
| Japan | 1.61 | 2.4 |
| Korea | 1.89 | 2.76 |
| Germany | 1.5 | 1.97 |
| UK | 1.16 | 1.36 |
| OECD | 1.48 | 1.71 |

*Source: MORST, 2008*

MORST identifies the BERD Intensity Gap as the difference in respective BERD-to-GDP percentages between the country and the aggregate OECD BERD-to-GDP ratio. The New Zealand BERD gap is estimated between 0.49 per cent and 1.2 per cent of GDP. This is a substantial gap and suggests that New Zealand experiences competitive disadvantages. MORST research also underscores the vulnerability of nations which focus their R&D in a few areas. In this respect a nation's international competitiveness due to BERD is itself influenced by the competitiveness of the business of performing R&D. One of the features of this research is that the

[85] The website can be accessed at: http://www.morst.govt.nz/publications/a-z/b/business-rd-expenditure/

sectoral estimates were done at a 28 sector level which limits the ability to integrate it with Auckland's key sectors. The level of R&D undertaken by Auckland's key sectors needs to be investigated as part of a sector engagement process. It may also be useful to collaborate with Ministry of Science and Innovation on identifying the level of R&D in Auckland compared with the rest of New Zealand.

### 6.3.2 ABILITY TO ADAPT TO CHANGING MARKET CONDITIONS

The process of adapting to change and changes in the market place can be viewed from an entrepreneurial perspective. The ability to affect change through developing new products, services, process and new product lines is often regarded as the ambit of the entrepreneur. However, an employee can also be an entrepreneur. The term *intrapreneurship* was coined in 1976 and describes the process of developing new products, services, and lines of business within an existing company. Intrapreneurship is a form of internal entrepreneurship that takes place with the encouragement and support of management. Without intrapreneurs who can identify and exploit new opportunities (i.e. adapt to changing market conditions), organisations will be short lived. One of the most commonly cited intrapreneurship success stories is 3M Corporation, which has a policy that allows employees to spend 15 per cent of their working hours developing their own business or product ideas. This policy led to the creation of Post-It-Notes and other successful products by 3M employees.

#### *6.3.2.1 BUSINESS SURVIVAL RATES*

The business survival rates as expressed by business births and deaths are discussed under entrepreneurship in Section 5.4.

#### *6.3.2.2 ON-GOING WORKPLACE TRAINING*

The importance of human capital in maintaining a competitive position is critical and human capital depreciates quickly if it is not actively engaged. Workplace training means employees can develop skills and knowledge that benefit their current employer. Training and professional development opportunities lift the overall skills of participants translating into more efficient and productive workplaces. Some international studies reveal that the increased labour productivity resulting from training can yield a return on investment of over 30 per cent (ATTTO, 2010). Training has a proven impact on productivity and profitability, with research confirming a measurable improvement to the bottom line of businesses.

Staying competitive is the key to business sustainability and training can keep staff responsive to industry changes and up to date with market trends. Workplace training in New Zealand is delivered by a variety of providers with the industry training organisations (ITO) being the principle providers. According to the Tertiary Education Commission, there are 39 ITO's in New Zealand. The sectoral focus of the ITO varies substantially. The alignment of ITO's delivery with industry needs is a central theme that guides their activities.

Identifying and describing the contribution of the ITOs to the performance of Auckland's key sector as well as the wider Auckland economy is a target for additional research. This additional research will need to consider the structure of the programmes being delivered by the ITOs and the degree to which industry needs are currently met.

### 6.3.3 APPROPRIATE MANAGEMENT AND INFORMATION SYSTEMS

Overall economic performance and business profitability are dependent on the competency of management, just as leadership is important for the city-region. By applying appropriate management techniques and key management practices, there is a higher chance of achieving protracted performance and business growth. While there are a range of external forces that influence business success, the effective application of appropriate management techniques is a key dimension. According to the New Zealand Institute of Management (NZIM) this dimension is important as it directly affects organisational performance. The NZIM developed the Management Capability Index (MCI) in 2003, to measure the capability of New Zealand management, to identify where improvements need to be made and to track performance over time.

The MCI is based on a list of major drivers of management capability that deliver profitable business growth. The drivers and the weighting used are presented in Table 6.7. The table also shows the score of NZ firms for 2003, 2007 and 2009.

The MCI is based on the chief executive's or the board's self-assessment of nine key drivers of management capability, and therefore a subjective bias may exist in the results. Current performance, including actual results and comparative performance of the organisation, is scored as a percentage against criteria to create an index of management capability for the organisation.

Table 6-7: Management Capability Index - Weighting Scores

| Driver | Weights | 2003 | 2007 | 2009 | 2007-2009 |
|---|---|---|---|---|---|
| Visionary & Strategic Leadership | 15% | 65.27 | 66.85 | 70.73 | 3.88 |
| Performance Leadership | 10% | 69.11 | 67.78 | 71.91 | 4.13 |
| People Leadership | 10% | 64.94 | 68.01 | 70.4 | 2.39 |
| Financial Management | 10% | 74.42 | 74.11 | 77.53 | 3.42 |
| Organisation Capability | 5% | 62.63 | 65.17 | 68.17 | 3.00 |
| Application of Technology & Knowledge | 5% | 67.15 | 68.1 | 67.5 | -0.60 |
| External Relationships | 5% | 72.79 | 73.61 | 74.3 | 0.69 |
| Innovation - Products & Services | 10% | 63.69 | 63.3 | 65.9 | 2.60 |
| Results & Comparative Performance | 30% | 63.75 | 65.59 | 67.34 | 1.75 |
| NZIM Capability Index 2003 | 100% | 66.23 | 67.37 | 69.87 | 2.50 |

*Source: NZIM, 2003, 2009*

As stated, the MCI is based on the Chief Executive's or the board's self-assessment of nine key drivers of management capability. Current performance, including actual results and comparative performance of the organisation, is scored against criteria to create an index of management capability for the organisation.

Most of the 2009 results are consistently higher than the 2007 results, with only one driver declining. This was the area of application of technology and knowledge (discussed in section 5.3.2). Overall the 2009 MCI has improved 2.5 points from the previous survey. It is interesting to see the significant improvement and higher scoring of 'visionary and strategic leadership', 'performance leadership', and 'people leadership' – all critical post-recession. It appears that the New Zealand's strongest capabilities are 'financial management' and 'external relationships'.

The most significant factor that continues to impact New Zealand's overall management capability is the low rating managers give their results and comparative performance. The self-rating suggests that managers recognise that there scope for improvement.

#### *6.3.3.1 USE OF INFORMATION AND COMMUNICATION TECHNOLOGY*

Over the last 20 years information technology has increasingly been identified as a major contributor to the process of business development and improvement and according to the European Commission: 'ICT….is responsible for around half of productivity growth in modern economies. It drives improved efficiency and better services and products across the entirety of the private and the public sectors.' The use of ICT and technology has affected every aspect of business, transforming not only the way that business is conducted but also creating new business sectors and jobs. In New Zealand a few data sources and surveys have attempted to capture the use of ICT by business. The Business Operations Survey probes businesses on their use of ICT with a focus on whether businesses have a formal system for storing and retrieving information. Intuitively, defining ICT use in such a manner is fairly narrow and may not reflect the overall intensity of ICT usage by businesses. In light of limited information availability, about the ICT application, this indicator is used as a first approximation of ICT use. This gap requires industry insight, possibly through a survey process that is targeted at Auckland's key sectors.

At a national level, almost 80 per cent of businesses have a formal system in place for storing and retrieving information. It appears that a correlation exists between the size of businesses and the use of formal ICT systems to store and retrieve information - with larger businesses tending to have more formal systems, 92 per cent of businesses with over 100 employees having formal systems in place compared to 76 per cent of businesses with between 6 and 19 employees.

As expected, Professional, scientific and technical services rely heavily on such formal information systems with 96 per cent of businesses using them. Financial and insurance services and health care and social assistance services also have extensive usage with 92 per cent of respondents indicating that they have formal systems in place. Agriculture, forestry and fishing showed lower levels of reliance on formal systems with around two thirds of firms using ICT systems. This information is reported at the national level but it may be possible to access the raw data and design queries that shed light on sector level usages while isolating businesses located within the Auckland region.

### 6.3.4 **EXPORT ORIENTATION**

Many studies and statistics show that exports contribute to and often lead to economic growth. As for any economy, not all of Auckland sectors are actively engaged in exporting. The benefits of exporting and the role of exports in driving economic growth and economic well-being is well documented and export development tends to be a central part of a regional economic plan. A key benefit of trading internationally is the potential increase of sales and profits that it brings, although this is significantly influenced by the product and service quality.

With an expanded market, sales of products will definitely increase if consumers discover how much they need or desire these products and if the company continuously supplies and retains good quality products, innovates and invests in product development when needed. Export development is a crucial component for growth in Auckland's key sectors and the selected sectors are all important regional exporters.

#### *6.3.4.1* RATIO OF EXPORT GOODS TO GROSS OUTPUT

The ratio of exports to gross output shows the export focus of the industries, or the share of outputs that are exported.[86] The information used in this indicator was derived Market Economics' Auckland Region Input-Output model. This information is presented at a 123 Sector level and at this stage insufficient information is available to refine the estimates to Auckland's key sectors. Such a refinement may be possible if enough data is collected via a survey process. The collected information could then be included into a model such a multi-regional IO model to provide greater clarity about the ratio of exports to gross output. A selection of export/gross output ratios as derived from the 123 IO model are shown in Table 6-8. It distinguishes between international and interregional exports. Interregional exports relate to the shipment of goods (and delivery of services) to other parts of New Zealand.

Table 6-8: Ratio of Exports to Gross Output

| Selected Sector (123 IO) | Exports : Gross Output | | |
|---|---|---|---|
| | International Export | Interregional Export | Total exports |
| Ship and Boat Building | 4.5% | 3.6% | 8.0% |
| Fertiliser manufacturing | 0.2% | 7.8% | 8.0% |
| Other food manufacturing | 3.1% | 4.4% | 7.6% |
| Medicinal, detergent and cosmetic manufacturing | 3.4% | 4.1% | 7.5% |
| Photographic and scientific equipment manufacturing | 3.0% | 4.4% | 7.4% |
| Textile manufacturing | 7.3% | 0.0% | 7.3% |
| Electronic equipment and appliance manufacturing | 5.5% | 1.7% | 7.2% |
| Basic metal manufacturing | 4.1% | 2.5% | 6.6% |
| Seafood processing | 6.2% | 0.4% | 6.6% |
| Air transport, services to transport and storage | 2.9% | 3.6% | 6.5% |
| Other manufacturing | 3.4% | 2.8% | 6.1% |
| Soft drink, cordial and syrup manufacturing | 0.5% | 5.6% | 6.1% |
| Accommodation | 5.9% | 0.0% | 5.9% |
| Health insurance | 0.0% | 5.2% | 5.2% |

Source: Market Economics GRIT Model

The table omits the primary sector (agriculture, mining and resource related) as the exports of these sectors may be recorded in Auckland (due to the location of head-offices) but the actual production activities take place elsewhere. The highest ratio of exports to gross output was in the ship and boat building sector. The rest of the sectors, as expected, align with the key sectors defined earlier, and confirm the relative importance of these identified sectors.

Qualitative data from the Business Operations Survey inform the export orientation of New Zealand businesses. In 2009 it was found that 69 per cent of businesses said they focused 'a great deal' on serving their existing domestic markets, while 13 per cent said they focused a moderate amount, 5 per cent 'a little amount' and 9 per cent 'not at all'.

[86] It is important to realise that this indicator uses 'gross output' (as defined in IO modelling) as denominator and this should not be confused with 'final demand'. If final demand is used, these ratios would be higher.

Larger businesses are more focused on their existing domestic markets with 80 per cent of businesses with 100+ employees saying they are focused 'a great deal' on existing domestic markets compared to 66 per cent of businesses with 6-19 employees.

The wholesale trade sector is the industry concentrating most on existing domestic markets with 80 per cent of businesses saying they are focused 'a great deal' on this. This is followed by the construction and information media & telecommunication sectors each with 78 per cent of businesses saying they are focused a great deal on existing domestic markets.

#### *6.3.4.2* EXTENT OF FOCUS ON NEW EXPORT MARKETS

The New Zealand economy has retained an export focus over time. The positive growth of Australia and China during the recession, and the growing importance of China, Brazil, Russia and India in the global economy means that the New Zealand firms and industry need to actively seek to grow and secure international markets. Some New Zealand industries have an existing export focus while others are in the process of developing their international exports. The Business Operations Survey captures some elements of this commitment to exports. The main findings of the BOS relating to the focus on exports are summarized below.

The overall focus on export markets is relatively small with less than 10 per cent of New Zealand businesses considering themselves as focusing 'a great deal' serving existing export markets. Almost two thirds of firms (62%) indicated that they are 'not at all' focused on exporting. Larger businesses are more focused on existing export markets with 18 per cent considering themselves focused 'a great deal' on this compared to 7 per cent of businesses with 6-19 employees.

The industries with the highest focus on exporting are manufacturing, agriculture, forestry and fishing. One in five firms (in these industries) have a 'great deal' of focus on exports. With reference to wholesaling and the education sector, one in ten firms have an export focus. Based on the BOS it is clear that exports are not a key priority for the majority of firms. This may however be attributed to the relative small size of many NZ companies. Extending this analysis (based on BOS information), the level to which new export markets are targeted (i.e. actively seeking to grow the export base) is also measured. Less than 84 per cent of firms are even considering growing their exports, with only 5 per cent of firms indicating that they have a 'great deal of focus' on new export markets. A relationship exists between firm size and export focus, with the larger firms more likely to have exports and actively attempting to grow exports.

#### *6.3.4.3* SHARE OF GLOBAL MARKET

An indicator of market penetration and global success in addressing potentially complex demand conditions is a measurement of the share of total market captured. However, based on the results of the Business Operations Survey, the majority of New Zealand businesses are focused on serving their existing domestic markets with 69 per cent saying they are focused 'a great deal' on this, while 13 per cent say they are focused a moderate amount, 5 per cent 'a little amount' and 9 per cent 'not at all'. Larger businesses are more focused on their existing domestic markets with 80 per cent of businesses with 100+ employees saying they are focused 'a great deal' on existing domestic markets compared to 66 per cent of businesses with 6-19 employees.

The wholesale trade sector is the industry concentrating most on existing domestic markets with 80 per cent of businesses saying they are focused 'a great deal' on this. This is followed by the construction and

information media & telecommunication sectors each with 78 per cent of businesses saying they are focused a great deal on existing domestic markets.

Only a small percentage of New Zealand firms actively target export markets and to calculate the share of the global market that is captured by Auckland (or New Zealand) for a specific commodity (or industry output) two information pieces are required: the size of Auckland's exports and the size of the global market. Auckland's export values have been estimated as part of the International Engagement study[87] and these estimates are used throughout this report. Auckland's share of New Zealand's exports in the key sectors are shown. This indicator shows the share of each sectors total export that is exported from Auckland. Table 6-9 shows the share of New Zealand's exports that each key sector captures.

Table 6-9: Auckland Region's Share of New Zealand's Exports (per cent)

| Key Sector | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Business Services | 49% | 48% | 49% | 49% | 50% | 49% | 51% | 51% |
| Metals and Metal Products | 49% | 49% | 52% | 52% | 54% | 51% | 53% | 53% |
| Electronics and Electrical Equipment | 50% | 49% | 51% | 52% | 54% | 57% | 58% | 58% |
| Machinery | 49% | 48% | 46% | 46% | 44% | 43% | 43% | 45% |
| Food | 34% | 33% | 36% | 32% | 36% | 35% | 33% | 32% |
| Marine | 64% | 62% | 59% | 53% | 55% | 53% | 53% | 54% |
| Health | 70% | 70% | 71% | 72% | 72% | 76% | 77% | 77% |
| Tourism | 68% | 67% | 67% | 64% | 63% | 63% | 66% | 66% |
| Technical Services | 46% | 49% | 51% | 49% | 42% | 45% | 48% | 48% |
| Transport Services | 66% | 65% | 66% | 63% | 66% | 67% | 66% | 66% |
| Paper Products | 61% | 61% | 62% | 63% | 62% | 60% | 60% | 61% |

*Source: Auckland's International Engagement Report*

Auckland's key sectors capture a substantial share of New Zealand's sectoral exports and on average, 55 per cent of the key sector's exports are from businesses in Auckland. More than three quarters of New Zealand's health exports are generated by Auckland and this has increased (up from 70 per cent in 2001) Tourism has the next largest share of exports, at 66 per cent. The food sector has a comparatively small share of national exports but at 32 per cent is still an important contributor.

The second requirement (international market size) data is unavailable for Auckland, but can be analysed for New Zealand using the COMTRADE database (managed by the United Nations). MED research comparing the growth in world exports to the growth in New Zealand exports focused at a detailed product level, to understand where New Zealand had comparative advantage. Products that had a comparative advantage constituted 83.4 per cent of New Zealand's exports[88].

[87] It is stressed that the export estimates at the 6D ANZSIC level were obtained from the International Engagement Study undertaken for the ARC and the limitation and assumptions associated with these estimated are detailed in the international Engagement Report as outlined earlier. Importantly, the estimates are not strictly additive as has been done here. Since these percentages are ratios of different sector groupings this different datasets used (Harmonised System for physical goods and Non-rated GST sales for service exports) these approximations can be but only offer an approximation.

[88] This analysis is based on preliminary calculations undertaken by the Ministry of Economic Development based on 2007 United Nations COMTRADE data.

Overall, the fastest export growth occurred in New Zealand's beverage and tobacco product category, which was well above the growth in world exports. Exports of mineral fuels also grew faster than world exports. New Zealand exports grew slightly faster than world exports of food and live animals, machinery and transport equipment and miscellaneous manufactures.

New Zealand's revealed comparative advantage is still strongest in products based on the agriculture, horticulture, fishing or forestry industries, including dairy products, meat, wool, horticultural based products, seafood, various processed food products and wood products. New Zealand has also leveraged off its expertise in these areas to develop a high comparative advantage (RCA index greater than 500 under the UN data) in higher value manufacturing such as machinery (for dairy and cleaning, sorting, grading). While New Zealand does not have an overall comparative advantage in manufactured products, it does have a high comparative advantage in a variety of specific types of manufactured products, including certain mechanical and electrical machinery and equipment, navigational instruments and appliances, therapeutic respiration apparatus, parts for optical/electric instruments and bulk penicillin or streptomycin.

Reflecting the above, between 1999 and 2007, New Zealand developed a strong comparative advantage in quite specific products such as hydraulic power engines/motors, breathing appliances and gas masks, a lesser comparative advantage in direction finding compasses and certain types of navigational instruments and appliances, as well as maintaining advantage in the more traditional areas such as food industries (crustaceans, certain animal feed products, and vegetable or animal colouring), paper coated/impregnated with wax/stearin/glycerol, unwrought copper-zinc based alloys and certain tin products. Export sales of these products are growing, but overall they are not yet significant contributors to New Zealand's export earnings. Many of these products correspond with the key sectors in which Auckland has a comparative advantage, reflecting the strong presence of companies manufacturing these products in Auckland.

Of the 128 products where New Zealand's exports have grown faster than world exports (and New Zealand has gained market share), world exports have grown faster than average world products, and New Zealand has a revealed comparative advantage (RCA>100). Just 44 are (unprocessed or processed) primary products, which account for US$2.4 billion exports. These include 21 food and beverage products.

The remaining 84 manufactured goods accounted for US$1.6 billion exports in 2007, so are smaller on average than the primary products. They include many of the higher value products evident in Auckland's key sectors, which showed strong export growth (such as certain types of machinery and equipment, and therapeutic respiration apparatuses).

### 6.3.5 SYNTHESIS: STRATEGY AND CAPABILITY

Business leaders create value through their visioning and steering firms through the economic landscape. Improving the overall management capability of firms is an ongoing requirement. A number of country-wide studies focus on the management capability of the New Zealand's firms. The New Zealand Institute for Management's Management Capability Index shows that there has been some improvement in most of the areas measured after a slow decline in recent years. A key issue is the reduction in the score on the 'application of technology and knowledge'. Based on results from the Business Operations Survey it appears that most of innovation and R&D is concentrated in larger firms. Nationally, R&D budgets and innovation intensity are below par compared against other OECD countries.

The slowdown in the application of technology and knowledge combined with the realisation that innovation, R&D is predominantly undertaken by the larger firms is a concern in the context of New Zealand's high numbers of small businesses. Further research is required about Auckland's relative performance in terms of management capability and a possible starting point could be the NZIM Capability Index to determine if it is possible to extract Auckland and sector specific data from the surveys.

The availability of management skills within the key sectors needs to be quantified and is also a topic for further research. The indicators associated with strategy and capability presented in this section do not directly measure the strategy (formulation and implementation) and capability of Auckland's leaders and managers but relied on indicators associated with industry performance.

## 6.4 RELATED AND SUPPORTING INDUSTRIES

Industry performance is influenced by the strength of suppliers and service providers. These important role-players contribute, directly and indirectly to an industry's performance. Porter (1990) describes these ancillary businesses needed by firms as related and supporting industries. Generally these related and supporting industries are described as suppliers and distributers. However, they could also include consulting companies, contractors or even outsourcing ventures. According to Porter's diamond model, the stronger these industries are, the stronger the focal industry will be. A central and underlying assumption is that competitive supporting industries will assist the focal industry to be more competitive. Similarly, supporting industries that exhibit unique practices will create competitive advantages for the firms they serve, which will add value for the end consumer. It follows therefore those dynamic related and supporting industries that provide inputs to an industry will positively impact the overall competitiveness of the focal industry (this framework is often used at the heart of cluster development analysis and activities).

### 6.4.1 INTER-INDUSTRY CONNECTEDNESS

Economic input-output (IO) tables or matrices provide information on the extent to which industries are connected through production supply chains. Although an industry may directly sell to or buy from only a few industries, its customers and suppliers may be connected with a good many other industries. Thus despite relatively few customers/suppliers, the industry may thus have a strong influence on the economy through indirect relations, and it is important to capture and understand such relationships (Bekhet, 2009). By comparing input-output relationships established over different time periods, we can find out whether inter-industrial dependency and connectedness within the economy changes. As a guide for interpreting input output matrices, if transactions are spread between industries, interdependence is high and the interaction effect large. If transactions are bunched amongst certain industries, then interdependence is low and localised.

The typical indicators used for measuring the economic connectedness and interdependencies between sectors are ratios termed 'multipliers'. These multipliers measure the impact (e.g. employment, value added) on other sectors within an economy, resulting from an exogenous change in a given sector. When multipliers are generally low within an economy (or for specific sectors), this indicates that there is limited inter-industry connectedness through economic supply chains. This can arise for a variety of reasons, such as limited clustering of activities, and a lack of competitiveness with import supplies. If a city-region exhibits high inter-industry connectedness, growth in sectors will have strong positive feedbacks through

the economy. It must be stressed, however, that a high degree of connectedness is not always a favourable situation – as if key industries experience difficulties this can also have serious negative implications for the entire economy.

In earlier sections, the relative size of Auckland's key sectors was discussed by using different variables, most notably exports and employment. The firms that make up these sectors interact with one another on different levels, as suppliers, competitors or clients. These external interactions form the basis for agglomeration benefits and the degree to which firms are connected may influence the level of benefit received. To estimate the level of connectedness of the key sectors, Type I Value Added multipliers were calculated for each key sector.[89] These multipliers were calculated based on a weighted average of two different IO models – the 2000-01 and 2006-07 model years. By using two different sets any changes were tracked. The multipliers for the key sectors are shown in Table 6.10. The New Zealand multipliers are also included as a benchmark.

The general trend is downwards for most of the key sectors. Essentially these results point towards the sectors becoming less connected within the Auckland and New Zealand economies and conversely more connected globally via the supply of imports in production. The sectors that increased the level of connectedness with the local (Auckland and New Zealand) economies were: transport and tourism in the Auckland context and technical services in the New Zealand context.

Table 6.10: Interdependencies (VA-Type I multiplier)

| | **New Zealand Type I VA Multipliers** | | **Auckland Region Type I VA Multipliers** | |
|---|---|---|---|---|
| | **2000-01** | **2006-07** | **2000-01** | **2006-07** |
| Business Services | 1.77 | 1.57 | 1.99 | 1.49 |
| Metals and Metal Products | 2.00 | 1.95 | 2.27 | 1.91 |
| Electronics and Electrical Equipment | 1.94 | 1.62 | 2.15 | 1.55 |
| Machinery | 1.70 | 1.68 | 1.80 | 1.57 |
| Food | 2.97 | 2.70 | 2.44 | 1.98 |
| Marine | 2.15 | 1.75 | 2.37 | 1.67 |
| Health | 1.78 | 1.74 | 1.88 | 1.65 |
| Tourism | 1.32 | 1.70 | 1.38 | 1.65 |
| Technical Services | 1.47 | 1.50 | 1.67 | 1.45 |
| Transport Services | 1.39 | 2.13 | 1.41 | 1.93 |
| Paper Products | 1.50 | 1.76 | 1.55 | 1.63 |

*Source: Market Economics Ltd, 2001 and 2007*

The drivers and consequences of these changes in connectedness needs to be identified and the sectors with which the new (growing) connections are established should also be highlighted to ensure that local connections are developed with local, high value adding sectors. Using a structural decomposition approach to assess the changes in the economic structure is a possible way of developing an understanding of the evolving industry connections.

[89] Type I multipliers capture the direct and indirect relationships between economic sectors. Type II multipliers also capture the relationships between economic sectors and households, via income received from production and consumer spending (refer to Miller and Blair, 2009).

### 6.4.2 BUSINESSES WITH COOPERATIVE AGREEMENTS

Establishing cooperative ties between businesses is a strategy that has a number of strategic purposes, such as gaining access to markets, securing supply (or delivery) channels, and gaining access to copyrights. The sophistication of collaborative arrangements between firms and within industry groups can vary from being relatively simple to very complex. The Statistics New Zealand Business Operations Survey (BOS) investigates the cooperative agreements and defines 'cooperative arrangement' as the:

> *'Active participation with another organisation or individual in activities for the purpose of innovation. This includes collaborative arrangements for the purpose of innovation. Each party should bring exclusive knowledge or expertise to the cooperation'*

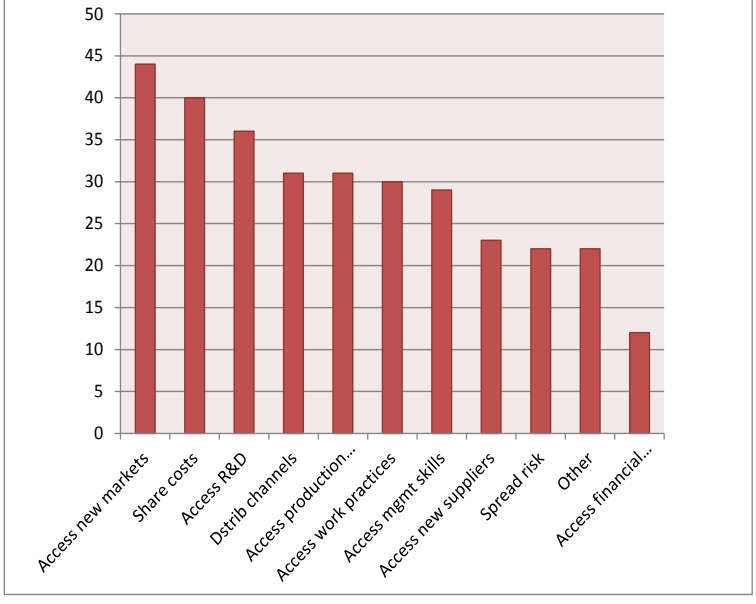
The 2009 BOS revealed (for New Zealand) that of the businesses that undertook innovation activities, many of these businesses were actively collaborating. These collaborative ventures were often formalised via cooperative arrangement. The distribution of these arrangements was as follows: 15 per cent were with suppliers, 12 per cent with customers and 8 per cent with competitors and other businesses within the same industry. Surprisingly, the collaboration with Crown Research Institutes, Universities and Polytechnics has the same share as collaboration with competitors and other businesses in the same industry.

The intensity of collaboration and the nature of collaboration between the key sectors and their supporting and related industries need to be explored in a way that the barriers and opportunities are identified, so that the cooperative arrangements are expanded.

### 6.4.3 REASONS FOR COOPERATIVE ARRANGEMENTS

Cooperative arrangement has been defined in 6.4.2. A key element of the definition is that each party should bring exclusive knowledge or expertise to the partnership. Partners do not necessarily gain immediate commercial benefit from the collaboration. Based on the Business Operation Survey, there are around 3,600 businesses in New Zealand which are involved in innovative activities and have cooperative arrangements. The specific reason for establishing the arrangements are diverse and depend on the aims of the firms that set-up the agreements. The main reasons for going into cooperative arrangements are shown in Figure 6.2 (sourced from SNZ-BOS). Cooperative arrangements can be established for several reasons and often serve more than one purpose. According to the Business Operations Survey, 44 per cent of these relationships help companies

Figure 6.2: Reason for Cooperative Arrangement




*Source: SNZ – Business Operation Survey*

access new markets, 40 per cent help share costs, 36 per cent access research and development, 31 per cent help access new distribution channels and 31 per cent help access production processes. Other functions for cooperative arrangements are access to work practices (30%), access management skills (29%), access new suppliers (23%), spread risk (22%), access financial resources (12%) and for other purposes (22%). Although a cooperative arrangement can serve a number of purposes, the cooperative arrangements of smaller firms tend to serve different functions than larger companies.

For businesses with 6 to 19 employees, 47 per cent of cooperative agreements help with accessing new markets compared to 37 per cent of cooperative agreements for firms with 100+ employees. Larger companies tend to have more relationships focused on research and development with 50 per cent of their cooperative agreements for this purpose, compared to 32 per cent of cooperative agreements for smaller firms.

Larger firms also have more cooperative agreements helping with management skills (35%) than smaller businesses (27%) as well as assisting with access to work practices (33% compared to 27%), accessing production practices (36% compared to 31%) and accessing financial resources (18% compared to 15%). However both large and smaller businesses have similar proportions of cooperative agreements helping with sharing costs (44-45%), accessing new distribution channels (31-32%), spreading risk (23-25%) and accessing new suppliers (24-26%). At industry level, the manufacturing sector has 765 innovative businesses in cooperative agreements, 50 per cent of these help with access to new markets while 48 per cent assist with access to production processes and 47 per cent with access to research and development. The professional, scientific & technical services sector has 567 innovative businesses in cooperative agreements with 52 per cent of these helping with access to research and development, 49 per cent with access to new markets and 42 per cent with sharing costs. These figures are for the New Zealand situation and the comparable data for Auckland key sectors need to be obtained via a qualitative research process.

### 6.4.4 RESEARCH CENTRES

A number of research organisations are located throughout New Zealand and these organisations and institutions focus on a wide range of themes. According to MSI, the research landscape can be classified into 3 core areas:

- Crown Research Institutes (CRIs);
- Research associations, institutions and organisations; and
- Universities.

A number of CRIs were established with specific scientific purpose. Each institute is based around a productive sector of the economy or a grouping of natural resources. The CRIs are:

i. **AgResearch -** A life sciences research organisation with an increasing emphasis on product development and commercialisation. Its expertise in modern biotechnologies is founded on a legacy in the biological sciences of agriculture.
ii. **Plant and Food Research** (Rangahau Ahumāra Kai) A science company formed in December 2008 through the merger of HortResearch and Crop & Food Research. Provides research and development that adds value to fruit, vegetable, crop and food products. Plant and Food Research operates its head office from Auckland, along with one of its thirteen regional sites based from Pukekohe, in the Auckland region.

iii. **Institute of Environmental Science and Research Ltd (ESR**) (Manaaki Tangata Taiao Hoki) Provides specialist science solutions related to public health, environmental health and forensic science. Its particular capabilities are in chemical and microbiological contaminants, and surveillance of diseases and hazards. ESR has science centres in Auckland, Wellington, Wallaceville and Christchurch.

iv. **Scion** - Provides research and technology solutions to all levels of forest and wood products industries, including biomaterials science, alternative species, and plantation resources. Forest Research has recently extended its focus beyond wood to meet the growing consumer demand for renewable materials and products from plants. Scion's main site is based in Rotorua, but has offices in Auckland, Christchurch and Wellington.

v. **Institute of Geological and Nuclear Sciences Ltd (GNS Science) -** (Te Pū Ao ) This is the CRI that focuses on geological resources, environmental and industrial isotopes, and natural hazards. GNS does not have a centre in Auckland, but has its main office in Wellington, with other offices in Dunedin and Wairakei.

vi. **Industrial Research Ltd (IRL**) – Undertakes development and technology commercialisation in areas of communication, information and electronic technologies, advanced materials and performance, intelligent devices and systems, biochemical technologies, energy technologies, complex measurement and analysis. IRL has offices in Wellington, Auckland and Christchurch.

vii. **Landcare Research** – Manaaki Whenua - Research focuses on six areas: biodiversity and ecosystem processes; greenhouse gases and carbon storage; sustainable business and government; biosecurity and pest management; rural land use; and urban environmental management. The main centre for Landcare Research is Lincoln, but it has ten offices throughout the country, one being in Auckland.

viii. **National Institute of Water and Atmospheric Research (NIWA)** - Taihoro Nukurangi - Provides a scientific basis for the sustainable management and development of New Zealand's atmospheric, marine and freshwater systems and associated resources. The Head Office of NIWA is in Auckland, and there are fourteen other offices throughout the country.

The Head Office of two CRI's are located in Auckland – Plant and Food Research and NIWA. The only CRI that does not have a presence in Auckland is GNS. The presence of these research institutions within the Auckland region provides a unique opportunity to develop and integrate research findings directly into industry. A list (obtained from MSI) of the Research Centres is presented in Table 6.111. Where the research centre has a presence in Auckland, this is shown.

In addition to the CRI's and the Research Centres, Centres of Research Excellence (CoRE) are in operation. According to the TEC, the role of these CoRE is to 'support leading edge, international standard innovative research that fosters excellence and contributes both to New Zealand's national goals and to knowledge transfer'. Each Centre is hosted by a tertiary education institution. The centres are:

- Allan Wilson Centre for Molecular Ecology and Evolution (Massey University).
- Centre for Molecular Bio-discovery (Auckland).
- New Zealand Institute of Mathematics and its Applications (Auckland).
- Nga Pae o te Maramatanga (Horizons of Insight) - the National Institute of Research Excellence for Māori Development (Auckland).
- The MacDiarmid Institute for Advanced Materials and Nanotechnology (Wellington and Canterbury).
- National Centre for Growth and Development (Head quartered at the Liggins Institute, Auckland)
- National Centre for Advanced Bio-Protection Technologies (Lincoln).
- The Riddet Institute – food science and nutrition (Massey University).

Table 6.11: Research Centres

| Area | Research associations & organisations | Location | Comment |
|---|---|---|---|
| Primary Industry | Cawthron Institute | Nelson | Research based solutions to enable the sustainable management and development of New Zealand's coastal and freshwater systems and resources for the benefit of the region and the nation (marine, freshwater and aquaculture research). |
| | CRL Energy Research | Lower Hutt, Hamilton, Christchurch, Greymouth | Research in New Zealand's energy sector through Foundation for Research, Science and Technology (FRST) and Ministry for the Environment (MfE) funded research programmes |
| | Dairy NZ | Hamilton | An industry good organisation, representing New Zealand's dairy farmers. Funded by a levy on milk solids and through government investment, our purpose is to secure and enhance the profitability, sustainability and competitiveness of New Zealand dairy farming. We aim to do this by leading innovation in world-class dairy farming and by working always in the best interests of New Zealand's dairy farmers |
| | FertResearch | Auckland | FertResearch is an industry association, funded by member companies to address issues of common public good. |
| | New Zealand Leather and Shoe Research Association | Palmerston North | LASRA research covers leather production, processes and product development, and waste treatment |
| | New Zealand Plant Breeding and Research Association | Christchurch | Involved in the development and marketing of plant intellectual property on the strength of research proven standards of performance |
| | Beef and Lamb New Zealand | Wellington | Funding for R&D and technology transfer activities |
| Medical | Malaghan Institute of Medical Research | Wellington | Biomedical research facility |
| | The Liggins Institute | Auckland | Centre for translational research on foetal and child health; the impact of nutrition on health throughout life; epigenetic regulation of growth and development; breast cancer; and evolutionary medicine. |
| Construction and Engineering | Building Research Association New Zealand | Porirua | Industry body which funds research into building and construction industry. It supplies research, testing, consulting and information. |
| | Cement and Concrete Association of New Zealand | Wellington | Concrete systems, construction, architecture and design, materials and properties. |
| | Heavy Engineering Research Association | Auckland | Accelerates innovation and by strengthening its combined opportunities through the provision of research, education, marketing and advocacy functions in the NZ metals engineering industry. |
| | Transport Engineering Research New Zealand | Auckland | Independent research organisation that specialises in transport-related issues. |
| ICT | NZi3 | Christchurch | New Zealand's Information and Communications Technology Research Institute |
| Pan industry | Independent Research Association of New Zealand | Wellington | IRANZ was formed to promote communication among member organisations and further the pursuit of common interests, especially with respect to issues that affect government research funding and member access to funding. |

*Source: MSI; Association websites*

In addition to these Centres of Research Excellence, the Department of Mechanical Engineering at Auckland University has a Centre for Advanced Composites Materials, alongside a Yacht Research Unit and an Energy and Fuels Research Unit. These centres and units are aligned closely with the marine industry, and provide examples of how research can be integrated between institutions in a particular city region.

The levels of association between research and industry, and the R&D 'spill overs' generated by these entities, needs to be quantified in a coherent manner, with a specific focus on Auckland's key sectors. Further industry engagement would reveal the extent to which this occurs and any gaps in the above list.

### 6.4.5 NUMBER OF OVERSEAS HOLDINGS

The level of overseas holdings was discussed in Section 6.1.2.1 and the highlights of that section are:

- Overall 4 per cent of New Zealand businesses have overseas holdings (this is about 1,090 companies) – this slightly higher than the BDS estimates
- Larger companies are more likely to have overseas holdings with 12 per cent of businesses with 100+ employees having them, compared to 3 per cent of businesses with 6-19 employees.
- Information media & telecommunications sector has the greatest international equity

### 6.4.6 SYNTHESIS: RELATED AND SUPPORTING INDUSTRIES

Business interactions influence and shape the wider economic environment and these interactions also influence the level of success that an industry enjoys. Various empirical techniques can be used to estimate the connectedness of industries in local value chains, reflecting not only the importance of sectors but also the level of connectedness of sectors to the domestic and international markets. Auckland is relatively well connected in the New Zealand context with transport playing an important role. Deepening the knowledge base about the industry interconnections and the evolution of these connections would shed light on possible future evidence based interventions. By using a structural decomposition approach the implications of different development paths on the economic structure and functioning of Auckland's economy and key sectors can be assessed to inform policy directions. An initial analysis of the interconnections of Auckland's key sectors revealed that most key sectors are becoming less connected to the local economy, and by implication are increasingly integrated into the global economy. The drivers and implications of these changes will need to be investigated to ensure that high value adding activities are kept in the Auckland economy. In addition the return on public investment by the supporting institutions (such as the research entities) needs to be positioned in such a way that maximises the public benefits.

## 6.5 SKILLS AND EXPERTISE

Human capital strategies and practices are designed to support the achievement of company specific goals. Although human resource management alone cannot ensure high performance, proper attention to human resources and the associated skills and expertise requirements is a fundamental building block to achieving a business' goals. Research highlights the need to integrate human resource management with strategic and day-to-day business management efforts. People leadership was identified as one of New Zealand

business's strong points (see Section 6.3.3 and Table 6-7). Human resource management and people leadership have a substantial impact on the overall performance of a business. Firms use labour to achieve their goals and need to allocated substantial resources towards recruitment, training, development and the retaining of employees to ensure that they contribute towards the firm achieving its goals.

### 6.5.1 FINDING SKILLED LABOUR

As discussed in section 5.2.6, there were severe difficulties for businesses to find skilled labour, peaking in 2006. This situation eased for employers during the recession, but it highlighted problems of skills mismatch within the Auckland economy, as the difficulties in finding employees occurred when there was unemployment within the Auckland economy. 'Skill' is defined as the capability of a person to undertake a given set of tasks, which requires use of knowledge or dexterity/coordination to undertake physical tasks. A skillset is an attribute of an individual person, but interest in skill sets has increased in public policy circles given the mismatch between skills demand and supply. If the skills required are not aligned with those that are available, it may inhibit the economic functioning of a particular region/area. The definition of skill above is broad, and there is equally a broad range of skills required within the labour market to undertake economic transactions. The concept of 'employability' emerged as a concept in the 1990s, particularly because job security was decreasing and inevitably individuals were less likely to be offered life-long jobs. In the western countries, there was concern over the long-term unemployed who were not joining the labour market, despite skill shortages. To be employable to a range of employers, individuals require a range of personal qualities, such as reliability, flexibility and adaptability, in addition to transferable skills such as commercial awareness, communication and problem solving. Therefore the focus on skilled labour is moving away from qualifications as a proxy, but focusing on a range of personal skills required for a job. Overall, a distinction is made between general employability skills and industry specific skills. Both sets are important, and can be used to inform the structure of a skill's taxonomy. A narrow supply-side view of skills and attributes inform certain sets of skills, useful at a particular point in time, whereas broader demand considerations explain attributes that enable mobility across occupations and sectors.

Approaches to skill management, training provision and future supply to the labour force differs across many countries. In a 2006 comparative assessment of international policy approaches to skills and the approaches of countries were broken down into three types (Sung, Raddon and Ashton 2006):

1) National sectoral systems (evident in Australia, Canada, the Netherlands, New Zealand and South Africa).
2) National vocational education training frameworks, with sectoral sub-systems (France, Singapore, USA); and
3) Non-sectoral VET frameworks such as Germany, that provide useful lessons for sectoral systems.

The first grouping clearly tailors the skills for industry/sector, whereas the second and third group encompasses broad skill sets that are more general and transferable across industry/sectors. This also affects the classification and measurement of skills in each country.

It has been noted that Auckland is the only New Zealand city with the scale to generate sizeable agglomeration and be able to compete in the global talent pool. Agglomeration of skills implies having sufficient concentration of businesses, developing economies of scale and specialisation while also enabling a transfer of knowledge, know-how and skills across the businesses and industries. Infometrics (2009) noted that it is easier for skilled people to find work doing what they do best, and it is easier for the businesses to recruit in a city. With regard to Auckland, they note that it is New Zealand's best competitor with the Australian cities of Melbourne and Sydney. This makes Auckland New Zealand's key value

proposition in attracting and retaining highly skilled labour. However a Skills Index indicates that Auckland has a lower proportion of highly skilled jobs than Wellington, in both the public and private sector. Auckland has closed the gap with Wellington, in the early part of this decade, due largely to Auckland's ability to attract skilled immigrants. However this progress in Skills Index improvements has tapered off in recent years (Infometrics, 2009).

### 6.5.2 LONG TERM SKILLS SHORTAGE

Despite the economic slowdown, the job market has not collapsed and many organisations are now using this environment to expand teams that have suffered long term skill shortages. Among developed nations, New Zealand has one of the worst records for skill shortages (Canterbury Employers Chamber of Commerce). There are broadly two categories of shortages:

1. Shortages associated with wages and working conditions which are unattractive to potential employees.
2. Shortages associated with inadequate numbers of qualified workers in the workforce and this type of shortage is one where employers either cannot recruit to fill vacancies or where there are concerns about the skills of an existing workforce.

The second category is the focus of this indicator. The Department of Labour's (DoL) Essential Skills in Demand Lists provide an insight into the occupations that are in shortage. The lists have been developed with the immigration process in mind and the DoL maintains two lists: the Long Term Skill Shortage List and the Immediate Skill Shortage List. The former includes occupations that have ongoing shortages both globally and throughout New Zealand while the latter list includes occupations with short term shortages that may be restricted to certain regions. The current lists were published in March 2008 and it is likely that the shortage situation will have changed since then. Auckland's occupational shortages, (as calculated by Infometrics, for Knowledge Auckland, Manukau Institute for Technology and Unitec) in March 2008 are listed in Appendix 9

The relationship between the listed occupations and Auckland's key sectors needs to be investigated in detail and the level to which the key sectors are represented in the lists clarified. As a first step, the sector engagement process will need to explore the accuracy of the long term skills shortages with a particular emphasis on the key sectors.

### 6.5.3 HIGHEST QUALIFICATION OF WORKERS

The relationship between skills, labour productivity and output is described elsewhere (see Section 4.4). In order to accurately estimate the skills content of Auckland's key sectors requires the development of a dataset that outlines the qualifications of employees by 6D ANZSIC level. Statistics New Zealand may be in a position to link different datasets (which are not available to the public) to develop a profile of the highest level of qualification of workers in different sectors which can then be aligned with Auckland's key sectors. However, of more use would be to establish a taxonomy of employability skills for each key sector, to inform training provision.

### 6.5.4 SYNTHESIS: SKILLS AND EXPERTISE

Human resources management is a New Zealand strength and this is a key requirement in the tight labour market that characterizes the local market place. New Zealand and Auckland firms constantly face skills shortages and the country's immigration policy targets certain occupations to alleviate some of the

pressures. Having access to a high quality labour force is a key requirement for any productivity growth drive and the match between available skills and demands from each sector will need to be investigated to quantify the labour constraints faced by Auckland's key sectors. With the economic recovery taking hold, it can be expected that difficulty in finding suitable labour will return, as was experienced prior to 2009. The exact nature of the skills and expertise requirements of the key sectors needs to be investigated as part of a qualitative process as limited data is available to accurately estimate the human resources features of these sectors.

# 7 FIRM AND INDUSTRY COMPETITIVENESS

## 7.1 FIRM AND INDUSTRY PROFITABILITY

Data on firm-level profitability is severely limited due to privacy and confidentiality issues. Government collects information from business on a range of issues with the financial performance (and associated taxation) information held by the Inland Revenue Department (IRD). Other data is collected by Statistics New Zealand. Access to the Statistics New Zealand data is governed by strict security and confidentiality provisions outlined in the Statistics Act 1975. Similarly company and personal information supplied to the IRD is also protected by law (such as the Tax Administration Act). Before any data is used (by parties other than the IRD) for statistical purposes it is 'sanitised' to protect confidentiality. The strict rules governing access to firm level information limits the type of analysis that can be undertaken due to data availability issues.

Table 7.1: Industry Profitability – Selected Industries

| Industry | Gross operating margin |
|---|---|
| Other business services | 13.3% |
| Advertising and marketing services | 12.0% |
| Business administrative and management services | 19.4% |
| Accounting services | 29.4% |
| Legal services | 34.2% |
| Computer services | 17.3% |
| Technical services | 18.6% |
| Scientific research | 6.5% |
| Services to finance and insurance | 17.2% |
| General insurance | 30.6% |
| Life insurance | 5.6% |
| Finance | 24.0% |
| Communication services | 27.9% |
| Air transport, services to transport and storage | 8.8% |
| Water and rail transport | 13.1% |
| Other manufacturing | 14.1% |
| Photographic and scientific equipment manufacturing | 14.6% |
| Ship and boat building | 5.7% |
| Structural, sheet and fabricated metal product manufacturing | 12.1% |

Note: These sectors have been selected to broadly align with the key sectors identified earlier

*Source: Calculations based on Market Economics GRIT Model (123 Sector)*

To overcome this information gap, we derived estimates of industry level profitability at a 123-Sector level using Market Economics GRIT Model. Gross operating surplus is expressed as a percentage of gross output. Gross operation surplus is the portion of income derived from production. Only a subset of total costs is subtracted from gross output to calculate the GOS. Essentially GOS is gross output *less* the cost of intermediate goods and services, and *less* compensation of employees. It is *gross* because it makes no allowance for depreciation of capital. It is clearly not the equivalent of net profits as net profit (profit after

tax) but it is also not equal to gross profit as GOS is as per definition net of compensation (gross profit = sales *less* cost of goods sold). Expressing GOS as a percentage of gross output, a 'gross operating margin' is presented. The gross operating margins for a selection of industries are shown in Table 7.1 The above table is based on the 123 Sector level and the Gross operating margin for the national equivalents of Auckland's key sectors were estimated as shown in Table 7.2. However due to confidentiality in key components of the 6D ANSZIC data (like telecommunications, international travel etc.) it was not possible to provide estimates for some sectors.

Table 7.2: Ratio of Gross Operating Surplus to Gross Output in the New Zealand economy

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Business Services | 0.22 | 0.28 | 0.23 | 0.32 | 0.32 | 0.35 | 0.35 | 0.31 |
| Metals and Metal Products | Confidentiality issues | | | | | | | |
| Electronics and Electrical Equipment | 0.05 | 0.14 | 0.11 | 0.15 | 0.12 | 0.15 | 0.09 | 0.14 |
| Machinery | 0.21 | 0.21 | 0.23 | 0.27 | 0.24 | 0.20 | 0.06 | 0.20 |
| Food | Confidentiality issues | | | | | | | |
| Marine | 0.07 | Confidentiality issues | | | 0.11 | 0.07 | 0.15 | 0.12 |
| Health | 0.22 | 0.14 | 0.20 | 0.22 | 0.18 | 0.16 | 0.15 | 0.15 |
| Tourism | Confidentiality issues | | | | | | | |
| Technical Services | | | | | | | | |
| Transport Services | | | | | | | | |
| Paper Products | 0.10 | 0.13 | 0.22 | 0.21 | 0.17 | 0.22 | 0.20 | 0.15 |

*Source: Market Economics GRIT Model and SNZ*

The underlying profitability of Auckland's key sectors needs to be estimated based on the detailed datasets held by SNZ and the IRD. Alternatively, first approximations of industry profitability can be obtained via a dedicated section dealing with the financial characteristics of each key sector during a sector engagement process.

### 7.1.1 SYNTHESIS: FIRM AND INDUSTRY PROFITABILITY

Firm-level financial data is subject to confidentiality issues, meaning that alternative ways to estimate industry profitability were used based on modelling techniques which are limited by data availability and assumptions. Industry level estimates of operating surplus were used as a proxy for profitability for some of the key sectors. These high level approximations revealed that business services and professional type activities tend to have relatively high gross operating surpluses. This does not reflect the capital structure (and capital intensity) of sectors. The underlying profitability of Auckland's key sectors needs to be estimated by reviewing confidential (IRD and SNZ) data or alternatively by obtaining an overview of each key sector's financial characteristics via the sector engagement process. It is important to remember that profitability is not the only bottom line for firms and businesses in operation in Auckland. Firms make and take decisions on other factors than profitability alone. Exploring these trade-offs should be addressed in a sector engagement process with the key industries.

# 8 CONCLUSION

Building an evidence base for a city-region requires a myriad of data sources, given the complexities within a city-region system. This report is a compilation of indicators relating to Auckland's distinctiveness and its competitiveness in key industrial sectors. Establishing place-specific elements of a city-region's economy is essential for understanding economic outcomes. A discussion of place immediately moves the economic debate away from purely theoretical concepts and indicators to a debate on distinctiveness – in terms of analysing the attributes of a city-region system that sets it apart from others.

Thus the concept of distinctiveness of a city-region was thought to be a powerful explanatory factor for economic outcomes. This required a re-expression of how city-region competitiveness is conceived – or the development of a more holistic conceptual framework. This indicator report is nested within a logical framework developed while unpicking the components of economic competitive advantage.

Distinctiveness by definition leads to comparable analyses – raising the question of 'distinct from what'? Where possible, comparisons were made with other cities, which were identified as being similar to Auckland, in terms of a number of factors such as size, history and colonial past, relative importance to national country, and location in the global economy. Distinctiveness affects economic outcomes, in terms of the choice or evolution of economic activities that are undertaken in a particular city-region. Industries and businesses have access to resources that could be unique to the city-region, some in abundant amounts leading to favourable input costs, others that are unique features of that city-region, effectively ensuring a monopoly in terms of inputs. This study, based on a theoretical framework built to explore this interplay between economic outcomes and distinctiveness, has attempted to inform the understanding with regards to the Auckland region. As with the development of any new theoretical or conceptual framework, traditional statistics are usually insufficient to analyse the concepts in full.

Nevertheless, some salient features emerged about the Auckland city-region. Auckland is sliding down the economic performance rankings. It is now ranked eighty-fourth in terms of GDP per capita for metropolitan regions. Yet Auckland had consistently higher GDP per capita values than the New Zealand average – in recent years this gap has been decreasing. New Zealand's productivity growth rates were lower than the United States, Canada and Australia for the 1995-2000 period, but above Denmark, Canada and Australia for the 2000-2007 period. The United States had consistently higher productivity rates over these two periods. Of concern for New Zealand was the growth in unit labour costs, without a corresponding growth in labour productivity for the period 2001-2006. Yet wage rates and household incomes in Auckland are relatively low by international standards. Furthermore, the growing levels of inequality evident in the New Zealand and Auckland economies is concerning, as it may lead to polarisation of communities, and could undermine the relatively positive social factors, such as low crime rates.

In terms of skills demand and labour mobility, the workers that Auckland requires for productivity gains have options to locate in many cities requiring their skills. They are a transient population, with global mobility, and can choose between city-regions. Other cities are just as distinctive and interesting for potential migrants. For potential migrants to locate in Auckland, there are considerations such as accepting lower wage rates than other countries. Yet, Auckland attracts migrants; it is seen as a desirable place to live and work; has a young population (indicating it is a desirable city to raise children in) so is overall a good destination to relocate to. The natural amenities are unique and enhance the attractiveness of the city-region.

In terms of competitive advantage, the dominance of small to medium sized enterprises and business units is a concern. Auckland's key economic sectors are also dominated by small firms, which reinforces the notion that businesses fill the demands of Auckland's population requirements, rather than aspiring for overseas markets. Auckland rates high in terms of entrepreneurship. However, the ability to 'go it alone' or start up a business does not lead to export oriented growth. It seems that entrepreneurship in Auckland is a means of surviving in the domestic market, but not suitable to operate in a global market. For this, additional skill sets are required, and further work needs to be undertaken on whether such aspirations exist within key sector's firms and businesses. Of concern also for establishing globally competitive firms is the level of R&D investment. Foreign direct investment was focused on establishing sales and market channels in New Zealand, to establish foreign products in this market. Although this is declining in recent years, further work is required in the key sectors to establish whether this is a barrier to competitive advantage, or how Auckland firms can retain their competitive edge.

A process of indicator selection was used in this study, and data gathered to inform the indicators, and populate the conceptual framework. Not all data was readily available, and part of the process of this project was to identify where gaps exist. Table 8.1 evaluates the indicators used in this study – whether they were quantitative or qualitative, how easily replicable they were and whether future work is required to populate the framework completely.

Overall, there are gaps in the provision of regional economic data in New Zealand, in terms of gross domestic product, labour and capital utilisation, and all types of productivity. Table 8.1 summarises the indicators used in this report, and identifies where further work is required. Regional data is generated from economic models, which are only as good as the assumptions embodied within them. There is good regional data available on employment, business numbers and size. The annual Business Operations Survey has a wealth of information, but is not available at a regional level. Key sectors were identified in this study in terms of their recent economic performance, particularly with regard to the value and growth of exports. Data was presented which tracks their relative performance, and explains their selection as key sectors of interest for the region. However, there is a lack of information, from an agent-based perspective, on the connection between distinctiveness and business outcomes. The question still remains as to what factors of a city-region's character influences or motivates the economic performance of that city-region. Engaging industry to explore such themes will cast a light on this connection.

Table 8.1: Indicator Summary and Gaps Analysis

| | Indicator name | Qualitative/ Quantitative | Completeness of existing data (for Auckland) | Availability of data | Future work required |
|---|---|---|---|---|---|
| | ***GDP per capita*** | | | | |
| 2.1 | GDP per Capita | Quantitative | Estimated from models | Infometrics, quarterly | |
| | ***Productivity*** | | | | |
| 3.1.1 | Multi-factor productivity | Quantitative | No regional data | | Yes |
| 3.1.2 | Labour productivity | Quantitative | | | Yes |
| | Capital productivity | Quantitative | | | Yes |
| | ***Income*** | | | | |
| 3.2.1 | Household income | Quantitative | Complete | StatsNZ | |
| 3.2.2 | Gini coefficient | Quantitative | Complete | One-off study | |
| | ***Employment*** | | | | |
| 3.3.1 | Labour force participation rate | Quantitative | Complete | StatsNZ | |
| 3.3.2 | Unemployment rate | Quantitative | Complete | Quarterly | |
| 3.3.3 | Unemployment by ethnic group | Quantitative | Complete | Quarterly | |
| | ***Agglomeration*** | | | | |
| 3.4.1 | Agglomeration | Quantitative | | One-off study | |
| | ***Image and identity*** | | | | |
| 4.1.1 | City brand ranking | Qualitative | Complete | One off study | |
| 4.1.2 | Number of signature events | Qualitative | More data required | | Yes |
| 4.1.3 | Proportion of people in creative industries | Quantitative | Complete | StatsNZ | |
| 4.1.4 | Quality of living index | Quantitative | Complete | Annually, requires purchase | |
| 4.1.5 | Leadership | Qualitative | Incomplete | | Yes |
| 4.1.6 | Number of residents who were born overseas | Quantitative | Complete | StatsNZ | |
| 4.1.7 | Age structure of population | Quantitative | Complete | StatsNZ | |
| 4.1.8 | Historic and projected growth rates of population | Quantitative | Complete | StatsNZ | |
| | ***Built environment*** | | | | |
| 4.2.1 | Urban areas by population density | Quantitative | Complete | International Study | |
| 4.2.2 | Housing affordability | Quantitative | Complete | | |
| 4.2.3 | Heritage buildings | Qualitative/ Quantitative | Complete | | |
| 4.2.4 | Attractive buildings | Qualitative | More data required | | Yes |
| | ***Connectivity*** | | | | |
| 4.3.1 | Congestion | Quantitative | Complete | MED/Monitor Auckland | |
| 4.3.2 | Means of travel to work | Qualitative/ Quantitative | Complete | MED | |
| 4.3.3 | Number of airlines using Airport | Quantitative | Complete | MED and airport website | |
| 4.3.4 | Proportion of people with internet and broadband connections | Quantitative | Incomplete | OECD | |

| | Indicator name | Qualitative/ Quantitative | Completeness of existing data (for Auckland) | Availability of data | Future work required |
|---|---|---|---|---|---|
| | ***Knowledge Resources*** | | | | |
| 4.4.1 | Adult literacy and numeracy | Quantitative | Incomplete | Once off NZ study, Ministry of Education | |
| 4.4.2 | Highest qualification of the adult population in Auckland | Quantitative | Complete | StatsNZ Census | Sector engagement, for specific details |
| 4.4.3 | Proportion of workforce in Knowledge-Intensive and high-tech manufacturing occupations | Quantitative | Complete | MED | |
| 4.4.4 | Number of patent applicants per capita | Quantitative | Incomplete | OECD | Sector engagement |
| 4.4.5 | Tertiary Education System | Qualitative | Complete | | |
| | ***Natural Amenity*** | | | | |
| 4.5.1 | Climate | Qualitative | Complete | | |
| 4.5.2 | Public Spaces/Parks | Quantitative | Complete | | |
| 4.5.3 | Environmental Quality Index | Quantitative | Partial | Mercer | |
| 4.5.3.1 | Air Quality | Quantitative/ Qualitative | Complete | Auckland Council | |
| 4.5.4 | Topographic Indicator | Qualitative | Incomplete | | |
| | ***Social and Cultural Amenity*** | | | | |
| 4.6.1 | Recreation Index | Quantitative | Complete | Mercer | |
| 4.6.2 | Reported Crime Rates | Quantitative | Complete | Police Statistics | |
| 4.6.3 | Number of general practitioners per capita | Quantitative | Complete | | |
| 4.6.4 | Simple location quotient for retailing | Quantitative | Complete | | |
| 4.6.5 | Sporting facilities | Qualitative | Incomplete | | |
| | ***Factor Endowments: Land, water and Energy*** | | | | |
| 5.1.1 | Price of land | Quantitative | Complete | | |
| 5.1.2 | Security of land supply | Quantitative | Complete | One-off study | |
| 5.1.3 | Water quality and use | Quantitative/ Qualitative | Complete | Auckland Council | |
| 5.1.4 | Security of Energy Supply | Quantitative | | One-off study | |
| | ***Labour*** | | | | |
| 5.2.1 | Overwork | Quantitative | Complete | One-off study | |
| 5.2.2 | Under-employment | Quantitative | Complete | One-off study | |
| 5.2.3 | Labour migration | Quantitative/ Qualitative | Partial | StatsNZ/ DoL | Link with existing research projects |
| 5.2.4 | Ease of finding skilled labour index | Quantitative | Partial (upper North Island) | NZIER | |
| 5.2.5 | Average wage rates | Quantitative | Partial | StatsNZ | Sector engagement |
| | ***Capital*** | | | | |
| 5.3.1 | Productive capital stock | Quantitative | Incomplete | | |
| 5.3.2 | Use of technology | Quantitative | Incomplete | StatsNZ (BOS) | Sector engagement |
| 5.3.3 | Foreign Direct Investment and Venture Capital | Quantitative | Incomplete | | |
| | ***Entrepreneurship*** | | | | |
| 5.4.1 | Birth And Death rates of firms | Quantitative | Complete | StatsNZ | |
| 5.4.2 | Working proprietors as proportion of working population | Quantitative | Complete | StatsNZ | |
| 5.4.3 | Global entrepreneurship monitor | Qualitative | Complete | | |
| | ***Industry Structure*** | | | | |
| 5.5.1 | Key sector analysis | Quantitative/ Qualitative | Complete | Requires model | |
| 5.5.2 | Location quotients | Quantitative | Complete | Requires model | |
| 5.5.3 | Number of businesses and average size | Quantitative | Complete | StatsNZ | |
| 5.5.4 | Specialisation and revealed comparative advantage | Quantitative/ Qualitative | Incomplete | UN Harmonised data | Sector engagement |
| 5.5.5 | Growth outlook | Quantitative | Complete | Requires model | |

| | Indicator name | Qualitative/ Quantitative | Completeness of existing data (for Auckland) | Availability of data | Future work required |
|---|---|---|---|---|---|
| | ***Industry sources of advantage*** | | | | |
| 6.1 | Demand conditions – product preference | Quantitative/ Qualitative | Incomplete | | Sector level engagement |
| 6.1.1.1 | Branding and reputation | Qualitative | Incomplete | | |
| 6.1.1.2 | Export growth | Quantitative | Partial | Model | |
| 6.1.1.3 | Share of global market | Quantitative | Incomplete | National level only | |
| 6.1.2 | Market accessibility | Qualitative | Incomplete | | |
| | ***Industry inputs*** | | | | |
| 6.2.1 | Sector wage rates | Quantitative | NZ level | | Analysis of price differentials between Auckland and NZ |
| 6.2.2 | Commodity price index | Quantitative | NZ level | | |
| 6.2.3 | Producer' price index | Quantitative | NZ level | | |
| 6.2.4 | Cost of doing business | Quantitative | NZ level | | |
| | ***Strategy and capability*** | | | | |
| 6.3.1 | Firm and industry vision | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| | Proportion of firms who developed goal | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| | Innovation (product, system and process) | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| | R&D as a percentage of GDP | Qualitative | Incomplete | | Sector level engagement |
| 6.3.2 | Ability to adapt to changing market conditions | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| | Business survival rates | Quantitative | Complete | StatsNZ | |
| | On-going workplace training | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| 6.3.3 | Appropriate management and information systems | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| | Use of Information and communication technology | Qualitative | Incomplete | | Sector level engagement |
| 6.3.4 | Export orientation | Quantitative | Partially complete | | Sector level engagement |
| | Ratio of export goods to gross output | Quantitative | Complete | Model required | Firm level data (Microlab) |
| | Extent of focus on new export markets | Quantitative/ Qualitative | Incomplete | | Sector level engagement |
| | Share of global market | Quantitative | Incomplete | Model required | Harmonised data, modelled with sector engagement |
| | ***Related and Supporting Industry*** | | | | |
| 6.4.1 | Inter-industry connectedness | Quantitative | Incomplete | I-O Model required | Supply chain analysis |
| 6.4.2 | Businesses with cooperative agreements | Qualitative/ Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| 6.4.3 | Reasons for cooperative arrangements | Qualitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| 6.4.4 | Research centres | Qualitative | Partially complete | | Sector level engagement |
| 6.4.5 | Number of overseas holdings | Quantitative | Incomplete | StatsNZ (BOS) | Sector level engagement |
| 6.5 | Skills and expertise | Quantitative | Incomplete | | Published reports/ sector engagement |
| 6.5.1 | Long term skill shortage | Quantitative/ Qualitative | Incomplete | | Other research projects |
| 6.5.2 | Highest qualification of workers | Quantitative | Partial | StatsNZ (Census) | Published reports/ sector level engagement |
| 7 | Firm and industry profitability | Quantitative | Complete | Model required | Datalab |

# 9 APPENDICES

**Appendix 1: Sector selection process**

As part of the Competitive Advantage and Distinctiveness project the project team wanted to identify sectors that currently play a central role in the Auckland economy. To elucidate what is happening in Auckland industry, and to determine the industries that are important from a policy perspective, a selection or filtering process was adopted. The Australian and New Zealand Standard Industrial Classification (ANZSIC), developed jointly by Statistics New Zealand and the Australian Bureau of Statistics, classifies every business in operation according to its predominant activity. There are 477 classes of industry identified in ANZSIC (SNZ, 2004). Market Economics Ltd and the Ministry of Economic Development undertook a multi-criteria selection process of these classes, based on principles of prioritisation, for identifying the key industry sectors in Auckland. The first stage (Filter 1) looked at relative size and importance of the 477 classes, identifying growth industries at this, so called, six-digit level of ANZSIC. As the model for the Auckland economy used in this study is an input-output model, these 477 industry classes were aggregated up to the 123 input-output industries (SNZ, 2001). The second stage (Filter 2) was similar to the first, but was conducted at a different level of industry analysis (123 input-output industry classification). From this filtering process, key sectors were emerging according to the criteria identified as being important – such as business activity and employment, the relative importance of the industry, basic economic characteristics and impact ratios. Thus, from beginning with a broad picture of all the industries in Auckland and their relative performance, certain sectors were focussed on. In line with the economic literature on sector development, while also considering the national economic development objectives (under the government's Economic Growth Agenda), three factors were considered crucial for the selection of key-performing industries: 1. the extent to which the industries were growing; 2. their relative size; and 3. the extent of exports. The filter was run again, with these three factors weighted. Thus the 'key sectors' as identified in section 5.5 emerged. The mechanisms used for the filters as well as the weightings are given below.

**Filter 1**

The first filter was designed to capture the importance of different sectoral characteristics in one 'Control Panel' and to calculate sectoral rankings based on a set of weightings. Conceptually, the first filter consists of two stages. Stage 1 assessed 'Employment and Business Activity' and 'Relative Importance' for each six-digit industry and Stage 2 captures economic (sectoral) relationships derived from the Auckland region Input-Output Tables. The table below shows the criteria used.

**Filter 2**

After the initial filter run(s) during which all dimensions were concurrently assessed, the need to look at the results in a more disaggregated fashion was identified. The filter was restructured to give weight to a number of policy scenarios. Three scenarios used were identified during discussions with MED and include, government objectives (export and other) focus, scale focus and a growth focus.

Industry characteristics obtained from the Auckland Region Input-Output Tables are embedded in the filter process, allowing sectors to be differentiated based on a range of economic characteristics, such as, each sector's demand drivers (i.e. the share of each industry's total demand that comes from exports, domestic or intermediate demand) and the relatedness of each sector to other sectors (i.e. the relative concentration

of the sectors economic linkages and the sphere of influence of a sector on other sectors – using the Auckland regional Input-Output Tables). An emphasis was placed on the type of demand being serviced.

| BASIC STRUCTURE AND CRITERIA USED | | |
|---|---|---|
| Stage | Dimension covered | Criteria |
| Stage 1 | Business Activity & Employment | Business Activity Units (Geo Units, 2009) |
| | | Growth in number of GEOs (2000-9) |
| | | Percentage Growth in GEOs (2000-9) |
| | | Total Employment Size (Employee Counts) 2009 |
| | | Employment Growth (Number) |
| | | Employment Growth (Percentage change - 2000-2009) |
| | | % of Auckland Employment Growth provided by sector (2000-2009) |
| | | % of National Growth (sector) provided by sector (2000-2009) |
| | Relative Importance | Location Quotient (Excluding Working Proprietors; 2009) |
| | | % change in LQ (2000-9) |
| | | Average size of business (AES 2008) |
| | | % Change of average size (2000-8) |
| Stage 2 | Basic economic characteristics | Compensation of Employees ( % of Output) |
| | | Operating surplus (% of Output) |
| | | International exports (% of output) |
| | | Interregional exports (% of output) |
| | Economic productivity | Labour Productivity (Value Added ($000)/FTE) |
| | | Capital Productivity (Value Added/Consumption of Fixed Capital) |
| | | Income: Gross Output (indexed against average) |
| | Impact ratios | Value Added: Gross Output (indexed against average) |
| | | Employment: Gross Output (FTEs/$m) (indexed against average) |
| | % Share of NZ | % of NZ output |
| | | % of NZ VA |
| | | % of NZ Compensation |

By selecting different combinations of scenarios and demand drivers a total of nine combinations were identified. The weightings associated with each combination are shown in the following table. Note the percentages shown in the table reflect the auto-calibrated weightings.

A key benefit of using the disaggregated approach was that, as mentioned earlier, all (477) sectors were included in the filter and a range of different dimensions were evaluated. Interpreting the results from the nine filter runs raised issues around the best approach to synthesise the results into a single list of key sectors.

The second filter used the results of the first filter (the top 50 sectors in each scenario) as a point of departure. This filter assigns points (out of 50) to each sector. Next, a list was prepared by removing duplicates (industries). By using this unique list we were able to evaluate each sector not only in terms of the number of times it appears in the results of the nine scenarios but also in terms of the relative position it occupies in the results.

**WEIGHTINGS USED**

| Stage | Dimension covered | Criteria | Govt. Objective | Scale | Growth |
|---|---|---|---|---|---|
| Stage 1 | Business Activity & Employment | Business Activity Units (Geo Units, 2009) | - | 21.1 | - |
| | | Growth in number of GEOs (2000-9) | - | - | 15.0 |
| | | Growth in GEOs % (2000-9) | - | - | 15.0 |
| | | Total Employment (ECs) Size 2009 | 3.9 | 45.2 | - |
| | | Employment Growth (Number) | - | - | 3.0 |
| | | Employment Growth (Percentage change - 2000-2009) | 3.9 | - | 15.0 |
| | Relative Importance | % of Auckland Employment Growth provided by sector (2000-2009) | - | - | 7.5 |
| | | % of National Growth (sector) provided by sector (2000-2009) | - | - | 7.5 |
| | | Location Quotient (Excluding Working Proprietors; 2009) | 7.8 | 7.4 | - |
| | | % change in LQ (2000-9) | - | - | 6.7 |
| | | Average size of business (AES 2008) | - | 14.7 | - |
| | | % Change of average size (2000-8) | - | - | 3.3 |
| Stage 2 | Basic economic characteristics | Compensation of Employees ( % of Output) | 0.3 | 5.8 | - |
| | | Operating surplus (% of Output) | - | - | - |
| | | International exports (% of output) | 7.6 | - | - |
| | | Interregional exports (% of output) | 0.3 | - | - |
| | Economic productivity Impact ratios | Labour Productivity (VA / FTE) | 9.0 | - | - |
| | | Capital Productivity (VA / Consumption of Fixed Capital) | 9.0 | - | - |
| | | Income: Gross Output (indexed against average) | - | - | - |
| | | Value Added: Gross Output (indexed against average) | - | - | - |
| | | Employment: Gross Output (FTEs/$m) (indexed against average) | - | - | - |
| | % Share of NZ | % of NZ output | 2.7 | 2.9 | - |
| | | % of NZ VA | 2.7 | 2.9 | - |
| | | % of NZ Compensation | 2.7 | - | - |
| | | Size of Exports (Auckland region based) | 50.0- | - | - |
| TOTAL | | | 100% | 100% | 100% |

Again a weighting system was included to rank the sectors based on the importance assigned to the scenario (in contrast to criteria as used during the first filter). The weightings used during the second filter were:

- **Sectors in each 'scenario' (Weighting 66%)**
  - Government Objective 100%
  - Scale 25%
  - Growth 50%
- **Sectors in each demand category (Weighting 100%)**
  - Intermediate 50.0%
  - Export 100.0%
  - Domestic 10.0%

It is important to realise that these weightings capture the importance of the scenarios (and demand categories) in relative terms i.e. against each other. The underlying rationale for selecting the weightings is:

- Government Objective (100%): The importance of sector's roles in driving productivity and wage growth is captured under this scenario and these sectors have favourable characteristics such as value added per employee, relatively high employee compensation ratio (against output), relatively high capital productivity, international exports and a share of national output, value added and sector compensation.

- Scale (25%): the scale of a sector offers a number of potential benefits to businesses located within such sectors (such as spill-overs and agglomeration advantages). However, these benefits need to translate into sustained advantage and needs to be used to grow the business(es).
- Growth (50%): It is assumed that a business that is experiencing growth is successful in capturing and managing resources in a competitive manner in the market place. However, such growth can be in relation to the New Zealand (domestic) market only. Hence a lower importance than the government objective scenario is assigned.

Appendix 2: Congestion levels in European Cities

| City | Congestion Level | City | Congestion Level |
|---|---|---|---|
| 1.Brussels | 37.7 | 30.Krakow | 21.2 |
| 2.Warsaw | 37.5 | 31.Essen | 21.1 |
| 3.Wroclaw | 35.7 | 32.Hamburg | 20.6 |
| 4.London | 34.7 | 33.Lisbon | 20 |
| 5.Edinburgh | 34.5 | 34.Sheffield | 19.5 |
| 6.Dublin | 33.9 | 35.Stuttgart | 19.1 |
| 7.Belfast | 31.8 | 36.Cologne | 18.1 |
| 8.Marseille | 31.2 | 37.Dusseldorf | 17.9 |
| 9.Paris | 30.4 | 38.Berlin | 17.2 |
| 10.Luxembourg | 29.4 | 39.Tallinn | 16.8 |
| 11.Milan | 29.4 | 40.Helsinki | 16.8 |
| 12.Rotterdam | 28.8 | 41.Nuremberg | 16.7 |
| 13.Birmingham | 28.5 | 42.Madrid | 16.3 |
| 14.Rome | 28 | 43.Frankfurt | 15.3 |
| 15.Amsterdam | 27.7 | 44.Hannover | 14.8 |
| 16.Oslo | 26.4 | 45.Glasgow | 14.7 |
| 17.Barcelona | 26.3 | 46.Bremen | 14.6 |
| 18.Budapest | 26.2 | 47.Copenhagen | 13.9 |
| 19.Naples | 26.1 | 48.Bratislava | 13.7 |
| 20.Poznan | 25.4 | 49.Seville | 13.6 |
| 21.Lodz | 25 | 50.Bern | 10.9 |
| 22.Turin | 24.2 | 51.Vilnius | 10.8 |
| 23.Palermo | 24.1 | 52.Leipzig | 10.6 |
| 24.Prague | 23.6 | 53.Dresden | 9.7 |
| 25.Genoa | 22.7 | 54.Dortmund | 9.3 |
| 26.Cardiff | 22.6 | 55.Malaga | 7.9 |
| 27.Vienna | 22.4 | 56.Stockholm | 6.4 |
| 28.Munich | 22.4 | 57.Zagreb | 5.9 |
| 29.Leeds | 21.8 | 58.Valencia | 5.3 |
| | | 59.Zaragoza | 1.5 |

Source: Tom Tom Ltd Data

Appendix 3: WHO Air Quality Guidelines

| PARTICULATE MATTER | |
|---|---|
| $PM_{2.5}$ | $PM_{10}$ |
| 10 µg/$m^3$ annual mean<br>25 µg/$m^3$ 24-hour mean | 20 µg/$m^3$ annual mean<br>50 µg/$m^3$ 24-hour mean |

The 2005 AQG set for the first time a guideline value for particulate matter (PM). The aim is to achieve the lowest concentrations possible. As no threshold for PM has been identified below which no damage to health is observed, the recommended value should represent an acceptable and achievable objective to minimize health effects in the context of local constraints, capabilities and public health priorities.

*Definition and principle sources*

PM affects more people than any other pollutant. The major components of PM are sulphate, nitrates, ammonia, sodium chloride, carbon, mineral dust and water. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air. The particles are identified according to their aerodynamic diameter, as either $PM_{10}$ (particles with an aerodynamic diameter smaller than 10 µm) or $PM_{2.5}$ (aerodynamic diameter smaller than 2.5 µm). The latter are more dangerous since, when inhaled, they may reach the peripheral regions of the bronchioles, and interfere with gas exchange inside the lungs.

*Health effects*

The effects of PM on health occur at levels of exposure currently being experienced by most urban and rural populations in both developed and developing countries. Chronic exposure to particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as of lung cancer. In developing countries, exposure to pollutants from indoor combustion of solid fuels on open fires or traditional stoves increases the risk of acute lower respiratory infections and associated mortality among young children; indoor air pollution from solid fuel use is also a major risk factor for chronic obstructive pulmonary disease and lung cancer among adults. The mortality in cities with high levels of pollution exceeds that observed in relatively cleaner cities by 15–20 per cent. Even in the EU, average life expectancy is 8.6 months lower due to exposure to $PM_{2.5}$ produced by human activities.

| OZONE ($O_3$) |
|---|
| $O_3$ |
| 100 µg/$m^3$ 8-hour mean |

The previously recommended limit, which was fixed at 120 µg/$m^3$ 8-hour mean, has been reduced to 100 µg/$m^3$ based on recent conclusive associations between daily mortality and ozone levels occurring at ozone concentrations below 120 µg/$m^3$.

*Definition and principal sources*

Ozone at ground level – not to be confused with the ozone layer in the upper atmosphere – is one of the major constituents of photochemical smog. It is formed by the reaction with sunlight (photochemical reaction) of pollutants such as nitrogen oxides ($NO_x$) from vehicle and industry emissions and volatile organic compounds (VOCs) emitted by vehicles, solvents and industry. The highest levels of ozone pollution occur during periods of sunny weather.

*Health effects*

Excessive ozone in the air can have a marked effect on human health. It can cause breathing problems, trigger asthma, reduce lung function and cause lung diseases. In Europe it is currently one of the air pollutants of most concern. Several European studies have reported that the daily mortality rises by 0.3% and that for heart diseases by 0.4 per cent, per 10 $\mu g/m^3$ increase in ozone exposure.

**NITROGEN DIOXIDE ($NO_2$)**

| $NO_2$ | | | |
|---|---|---|---|
| 40 | $\mu g/m^3$ | annual | mean |
| 200 $\mu g/m^3$ 1-hour mean | | | |

The current WHO guideline value of 40 $\mu g/m^3$ (annual mean) set to protect the public from the health effects of gaseous $NO_2$ remains unchanged from the level recommended in the previous AQGs.

*Definition and principle sources*

As an air pollutant, $NO_2$ has several correlated activities: At short-term concentrations exceeding 200 $\mu g/m^3$, it is a toxic gas which causes significant inflammation of the airways. $NO_2$ is the main source of nitrate aerosols, which form an important fraction of $PM_{2.5}$ and, in the presence of ultraviolet light, of ozone. The major sources of anthropogenic emissions of $NO_2$ are combustion processes (heating, power generation, and engines in vehicles and ships).

*Health effects*

Epidemiological studies have shown that symptoms of bronchitis in asthmatic children increase in association with long-term exposure to $NO_2$. Reduced lung function growth is also linked to $NO_2$ at concentrations currently measured (or observed) in cities of Europe and North America.

**SULPHUR DIOXIDE ($SO_2$)**

| $SO_2$ | | | |
|---|---|---|---|
| 20 | $\mu g/m^3$ | 24-hour | mean |
| 500 $\mu g/m^3$ 10-minute mean | | | |

A $SO_2$ concentration of 500 $\mu g/m^3$ should not be exceeded over average periods of 10 minutes duration. Studies indicate that a proportion of people with asthma experience changes in pulmonary function and respiratory symptoms after periods of exposure to $SO_2$ as short as 10 minutes. The revision of the 24-hour guideline for $SO_2$ from 125 to 20 $\mu g/m^3$ is based on the following considerations: Health effects are now known to be associated with much lower levels of $SO_2$ than previously believed. A greater degree of protection is needed. Although the causality of the effects of low concentrations of $SO_2$ is still uncertain, reducing $SO_2$ concentrations is likely to decrease exposure to co-pollutants.

*Definition and principal sources*

$SO_2$ is a colourless gas with a sharp odour. It is produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores that contain sulphur. The main anthropogenic source of $SO_2$ is the burning of sulphur-containing fossil fuels for domestic heating, power generation and motor vehicles.

*Health effects*

$SO_2$ can affect the respiratory system and the functions of the lungs, and causes irritation of the eyes. Inflammation of the respiratory tract causes coughing, mucus secretion, aggravation of asthma and chronic bronchitis and makes people more prone to infections of the respiratory tract. Hospital admissions for cardiac disease and mortality increase on days with higher $SO_2$ levels. When $SO_2$ combines with water, it forms sulphuric acid; this is the main component of acid rain which is a cause of deforestation.

# Appendix 4: Office Quality Grading Matrix (NZ Property Council)

| Grade | Size | Floor plate | Finish | Technical Services |
|---|---|---|---|---|
| A | Generally >20,000 sqm | Generally >1,000 sqm, largely column free | A landmark office building located in major CBD office markets which is a pace setter in establishment rents & includes: ample natural light; good views/outlook; prestige lobby finish; on-site undercover parking; quality access to/from an attractive street setting; & premium presentation and maintenance. | State of the art technical services will typically include: **Heating, Ventilation & Air-conditioning system:** Multiple zones of approx. 70 sqm with around 25 watts per sqm for tenant equipment. The system should also have a supplementary fresh air system, auxiliary condenser water loop for tenant and capacity for tenant exhaust risers. **Lifts:** Waiting interval not to exceed 25 seconds, handling capacity in excess of 15 per cent and a high quality ride with low noise. At least one dedicated goods lift. **Power:** Minimum of 25 watts per sqm load capacity. Dedicated data risers should be available. **Lighting:** High quality ultra-low brightness fittings. **Building Intelligence:** High quality building automation system, 24 hour access (card key), after hours air-conditioning dial-up, energy & stand-by power management, manned control room, perimeter security, & closed circuit TV. **Standby Power :** Full power for all essential services and ventilation and at least 50 per cent for lighting and lifts. |
| B | Generally >10,000 sqm | Generally >600 sqm, largely column free | High quality space including: good views/outlook; quality lobby finish; on-site undercover parking; quality access to/from an attractive street setting; &, quality presentation and maintenance. | High quality technical services will typically include: **Heating Ventilation & Air-conditioning System:** Multiple zones of approximately 100 sqm with around 15 watts per sqm for tenant equipment. The HVAC should have an auxiliary condenser water loop for tenant use. **Lifts:** Waiting interval not to exceed 30 seconds, handling capacity around 14 per cent to 15 per cent and a good quality ride. **Power:** Minimum of 15 watts per sqm load capacity **Lighting:** Lower ultra-low brightness fittings. **Building Intelligence:** Direct digital controls, 24 hour access with card key & off site alarm monitoring, key switch after hours air-conditioning. **Standby Power:** Full power for all essential services & full ventilation. |
| C | Any size | Any size | Good quality space with a reasonable standard of finish & maintenance. Tenant car parking facilities should be available. | A basic standard of technical services that will generally include most of the following: **Heating, Ventilation & Air-conditioning System:** Comprises a reasonable system with one controllable zone per building face. **Lifts:** Waiting not to exceed 35 seconds, handling capacity around 13 per cent to 14 per cent. **Power:** Load capacity 10 watts per sqm **Lighting:** Recessed prismatic fittings **Building Intelligence:** Electronic controls, 24 hours access with key card, key switch for afterhours air-conditioning **Standby Power:** None. |
| Other | Any size | Any size | Office space with lower or poor quality finish. | Services fall below the minimum requirement for a C grade. |

Source: Property Council of New Zealand (can be accessed at: http://www.propertynz.co.nz/files/Research/Quality%20Grading%20Matrix.pdf)

# Appendix 5: Sector Definitions

| Key Sector | 6D Code | 6D Description |
|---|---|---|
| Business Services | L784200 | Accounting Services |
| | L785100 | Advertising Services |
| | L785400 | Business Administrative Services |
| | L785500 | Business Management Services |
| | L786900 | Business Services nec |
| | L784100 | Legal Services |
| Metals and Metal Products | C271100 | Basic Iron and Steel Manufacturing |
| | C276900 | Fabricated Metal Product Manufacturing nec |
| | C275900 | Sheet Metal Product Manufacturing nec |
| | C274900 | Structural Metal Product Manufacturing nec |
| | F452200 | Metal and Mineral Wholesaling |
| | C276200 | Spring and Wire Product Manufacturing |
| Electronics and Electrical Equipment | C285400 | Electric Light and Sign Manufacturing |
| | F461500 | Electrical and Electronic Equipment Wholesaling nec |
| | C285900 | Electrical Equipment Manufacturing nec |
| | C284900 | Electronic Equipment Manufacturing nec |
| | C285100 | Household Appliance Manufacturing |
| | C283900 | Professional and Scientific Equipment Manufacturing nec |
| | F473100 | Household Appliance Wholesaling |
| Machinery | C286400 | Machine Tool and Part Manufacturing |
| | C286600 | Pump and Compressor Manufacturing |
| | C286900 | Industrial Machinery and Equipment Manufacturing nec |
| | C286300 | Food Processing Machinery Manufacturing |
| | C286500 | Lifting and Material Handling Equipment Manufacturing |
| | F461900 | Machinery and Equipment Wholesaling nec |
| Food | C215200 | Cereal Food and Baking Mix Manufacturing |
| | C217200 | Confectionery Manufacturing |
| | C217900 | Food Manufacturing nec |
| | C212200 | Ice Cream Manufacturing |
| | C212100 | Milk and Cream Processing |
| | C218100 | Soft Drink, Cordial and Syrup Manufacturing |
| | C218400 | Spirit Manufacturing |
| | C218300 | Wine Manufacturing |
| | F471500 | Fruit and Vegetable Wholesaling |
| | F471100 | Meat Wholesaling |
| | F471700 | Liquor Wholesaling |
| | F471900 | Grocery Wholesaling nec |
| Marine | C282200 | Boatbuilding |
| Health | C283200 | Medical and Surgical Equipment Manufacturing |
| | C254300 | Medicinal and Pharmaceutical Product Manufacturing |
| | F479600 | Pharmaceutical and Toiletry Wholesaling |
| Tourism | I640300 | Non-Scheduled Air and Space Transport |
| | I640200 | Scheduled Domestic Air Transport |
| | I640100 | Scheduled International Air Transport |
| | I664100 | Travel Agency Services |
| Technical Services | L783400 | Computer Consultancy Services |
| | L782300 | Consultant Engineering Services |
| | L781000 | Scientific Research |
| | L785300 | Market Research Services |
| | L782900 | Technical Services nec |
| | F461200 | Professional Equipment Wholesaling |
| | F461300 | Computer Wholesaling |
| | J712000 | Telecommunication Services |
| Transport Services | I664200 | Road Freight Forwarding |
| | I611000 | Road Freight Transport |
| | I630100 | International Sea Transport |
| | J711200 | Courier Services |
| | I664300 | Freight Forwarding (except Road) |
| | I664900 | Services to Transport nec |
| | I662900 | Services to Water Transport nec |
| Paper Products | C233900 | Paper Product Manufacturing nec |
| | F479500 | Paper Product Wholesaling |

| Other sectors investigated | | |
|---|---|---|
| Metals and Metal Products-2 | C292200 | Sheet Metal Furniture Manufacturing |
| | C271300 | Steel Pipe and Tube Manufacturing |
| | C276200 | Spring and Wire Product Manufacturing |
| Plastics and Plastic Products | C256300 | Plastic Bag and Film Manufacturing |
| | C256200 | Plastic Extruded Product Manufacturing |
| | C256600 | Plastic Injection Moulded Product Manufacturing |
| | C256400 | Plastic Product Rigid Fiber Reinforced Manufacturing |
| | C253300 | Synthetic Resin Manufacturing |
| | C253500 | Inorganic Industrial Chemical Manufacturing nec |
| Food-2 | C218200 | Beer and Malt Manufacturing |
| | C216300 | Biscuit Manufacturing |
| | C217100 | Sugar Manufacturing |
| | F471300 | Dairy Produce Wholesaling |
| Financial Services | K732900 | Deposit Taking Financiers nec |
| | K734000 | Financial Asset Investors |
| | K751900 | Services to Finance and Investment nec |
| | K752000 | Services to Insurance |
| | L773090 | Non-Financial Asset Investors nec |
| Tourism-2 | H573000 | Cafes and Restaurants |
| | G525900 | Retailing nec |
| Textiles and Clothing | C222200 | Textile Floor Covering Manufacturing |
| | C222900 | Textile Product Manufacturing nec |
| | C221500 | Textile Finishing |
| | C224000 | Clothing Manufacturing |
| | G522100 | Clothing Retailing |
| | F472200 | Clothing Wholesaling |
| | C222100 | Made-Up Textile Product Manufacturing |
| | F472100 | Textile Product Wholesaling |
| Other Wholesaling | F479400 | Book and Magazine Wholesaling |
| | F453900 | Building Supplies Wholesaling nec |
| | F462100 | Car Wholesaling |
| | F453100 | Timber Wholesaling |
| | F479900 | Wholesaling nec |
| Other interesting segments | C282400 | Aircraft Manufacturing |
| | P931900 | Sports and Services to Sports nec |
| | C292100 | Wooden Furniture and Upholstered Seat Manufacturing |
| Visitor Economy | | Retailing |
| | | Accommodation |
| | | Entertainment & Leisure |
| | | Education |
| | | Transport |
| | | Goods |
| Chemicals and related products | C254900 | Chemical Product Manufacturing nec |
| | F452300 | Chemical Wholesaling |
| | C254200 | Paint Manufacturing |
| | C254500 | Soap and Other Detergent Manufacturing |
| | C254600 | Cosmetic and Toiletry Preparation Manufacturing |

# Appendix 6: Selected Data on Key Sectors

| | | Employees | Employment Growth 2000-2009 | Estimated Export value $m[1] | Export Growth 2002-2007 | Location Quotient (Exclud. Working Proprietors 2009) | Value added ($'m; 2008) |
|---|---|---|---|---|---|---|---|
| Business Services | Accounting Services | 6,703 | 5.8% | 36 | 5.4% | 1.1 | 649 |
| | Advertising Services | 3,247 | 6.0% | 92 | 17.2% | 2.2 | 377 |
| | Business Administrative Services | 11,832 | 18.5% | 299 | 10.5% | 1.7 | 30 |
| | Business Management Services | 9,146 | 4.9% | 271 | 8.8% | 1.4 | 1,073 |
| | Business Services nec | 6,817 | -1.3% | 72 | -9.2% | 1.3 | 385 |
| | Legal Services | 5,330 | 0.6% | 84.1 | 7.4% | 1.2 | 714 |
| Metals and Metal Products | Basic Iron and Steel Manufacturing | 1,573 | -1.4% | 585 | 13.0% | 2.8 | 320 |
| | Fabricated Metal Product Manufacturing nec | 1,570 | -2.4% | 80 | -0.7% | 1.0 | 119 |
| | Sheet Metal Product Manufacturing nec | 1,478 | 3.3% | 38 | 4.5% | 1.1 | 95 |
| | Structural Metal Product Manufacturing nec | 1,066 | -0.1% | 21 | 2.2% | 1.4 | 74 |
| | Metal and Mineral Wholesaling | 1,118 | 4.9% | 654 | 8.1% | 1.2 | 280 |
| | Spring and Wire Manufacturing | 755 | -3.6% | 16 | 7.8% | 2.3 | 60 |
| Electronics and Electrical Equipment | Electric Light and Sign Manufacturing | 304 | 1.0% | 35 | 5.8% | 2.3 | 5 |
| | Electrical & Electronic Equipment Wholesaling nec | 4,480 | 3.5% | 214 | 18.0% | 1.7 | 454 |
| | Electrical Equipment Manufacturing nec | 1,011 | -1.4% | 189 | 3.7% | 1.3 | 107 |
| | Electronic Equipment Manufacturing nec | 1,385 | 3.5% | 72 | 14.9% | 1.7 | 141 |
| | Household Appliance Manufacturing | 1,265 | -5.5% | 183 | 5.1% | 2.3 | 141 |
| | Professional and Scientific Equipment Manufacturing nec | 340 | 2.7% | 121 | 16.5% | 1.6 | 42 |
| | Household Appliance Wholesaling | 886 | -0.6% | 63 | 45.3% | 2.4 | 148 |
| Machinery | Machine Tool and Part Manufacturing | 443 | -3.9% | 25 | 3.8% | 1.1 | 38 |
| | Pump and Compressor Manufacturing | 149 | 4.1% | 91 | 11.8% | 1.2 | 13 |
| | Industrial Machinery and Equipment Manufacturing nec | 3,275 | 0.1% | 95 | 3.1% | 0.9 | 271 |
| | Food Processing Machinery Manufacturing | 192 | 11.1% | 58 | -4.7% | 2.0 | 10 |
| | Lifting and Material Handling Equipment Manufacturing | 583 | 4.3% | 34 | 6.0% | 1.5 | 71 |
| | Machinery and Equipment Wholesaling nec | 4,716 | 2.8% | 139 | 3.6% | 1.6 | 355 |
| Food | Cereal Food and Baking Mix Manufacturing | 454 | -0.5% | 22 | 4.6% | 2.1 | 45 |
| | Confectionery Manufacturing | 724 | 1.9% | 62 | 3.9% | 1.3 | 56 |
| | Food Manufacturing nec | 3,787 | 0.6% | 762 | 17.1% | 2.0 | 381 |
| | Ice Cream Manufacturing | 493 | 4.2% | 34 | 12.8% | 2.8 | 123 |
| | Milk and Cream Processing | 224 | 1.9% | 859 | -3.1% | 0.6 | 48 |
| | Soft Drink, Cordial and Syrup Manufacturing | 971 | 3.9% | 74 | 5.0% | 2.3 | 455 |
| | Spirit Manufacturing | 433 | 8.3% | 44 | -8.2% | 2.8 | 5 |
| | Wine Manufacturing | 942 | -0.9% | 202 | 12.4% | 0.8 | 188 |
| | Fruit and Vegetable Wholesaling | 1,153 | 1.0% | 540 | 0.0% | 1.1 | 92 |
| | Meat Wholesaling | 672 | 7.9% | 287 | -0.1% | 1.2 | 35 |
| | Liquor Wholesaling | 745 | -0.5% | 29 | 26.5% | 1.7 | 92 |
| | Grocery Wholesaling nec | 4,697 | 4.5% | 131 | 1.6% | 1.3 | 299 |
| Marine | Boatbuilding | 2,007 | 1.3% | 121 | 0.4% | 1.6 | 166 |
| Health | Medical and Surgical Equipment Manufacturing | 1,980 | 17.8% | 175 | 6.3% | 2.4 | 154 |
| | Medicinal and Pharmaceutical Product Manufacturing | 1,283 | 3.3% | 170 | 5.9% | 2.1 | 116 |
| | Pharmaceutical and Toiletry Wholesaling | 3,598 | 1.7% | 97 | 3.4% | 2.4 | 388 |
| Tourism | Non-Scheduled Air and Space Transport | 253 | 14.0% | 38 | 67.9% | 0.7 | 26 |
| | Scheduled Domestic Air Transport | 2,062 | 0.0% | 333 | 7.3% | 1.5 | 159 |
| | Scheduled International Air Transport | 4,133 | 2.4% | 2,758 | 3.7% | 2.5 | 894 |
| | Travel Agency Services | 3,157 | -0.5% | 1,866 | 5.0% | 1.5 | 202 |
| Technical Services | Computer Consultancy Services | 10,041 | 8.2% | 286 | 4.9% | 1.6 | 1,136 |
| | Consultant Engineering Services | 6,188 | 7.1% | 94 | 2.4% | 1.3 | 819 |
| | Scientific Research | 1,974 | 12.1% | 84 | 22.8% | 0.8 | 27 |
| | Market Research Services | 2,639 | -0.5% | 19 | 6.6% | 2.5 | 128 |
| | Technical Services nec | 1,162 | 5.0% | 21 | -5.3% | 1.0 | 67 |
| | Professional Equipment Wholesaling | 1,764 | 4.3% | 52 | 5.2% | 2.6 | 136 |
| | Computer Wholesaling | 2,082 | -2.4% | 58 | 5.3% | 1.8 | 198 |
| | Telecommunication Services | 5,894 | 2.9% | 146 | 8.5% | 1.7 | 1,770 |
| Transport Services | Road Freight Forwarding | 768 | 3.1% | 31 | -0.7% | 1.4 | 16 |
| | Road Freight Transport | 6,755 | 2.4% | 52 | 3.4% | 0.9 | 625 |
| | International Sea Transport | 505 | 2.9% | 749 | 0.0% | 2.6 | 60 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Courier Services | 2,011 | 3.3% | 81 | 5.2% | 1.5 | 149 |
| | Freight Forwarding (except Road) | 2,583 | 3.5% | 1,345 | 5.9% | 2.4 | 227 |
| | Services to Transport nec | 570 | 8.9% | 126 | 16.3% | 1.5 | 48 |
| | Services to Water Transport nec | 443 | 18.2% | 310 | 8.7% | 1.4 | 20 |
| Paper | Paper Product Manufacturing nec | 410 | -9.90% | 41.3 | 15.60% | 1.8 | 73 |
| Products | Paper Product Wholesaling | 1931 | -2.10% | 239.6 | 18.70% | 1.8 | 204 |

Nec – not elsewhere classified

1 = this is based on a combination of different datasets such as the AES, Zero Rated GST Sales and Harmonised System information and should be interpreted with caution. In addition the values may differ from the values used in the report due to different timeframes. Estimates are for 2008 and have been augmented with 2007 data in a selection of cases.

Source: Based on Statistics New Zealand, Annual Enterprise Survey, Business Directory (export values are estimates using different datasets – interpret with caution)

## Special Sectors – Base data

| | Export | $VA_{2008}$ | Export Growth | VA Growth |
|---|---|---|---|---|
| Export Education | 1,342.8 | 225.1 | 0.1 | 7.9% |
| Screen Production | 129.2 | 167.7 | 0.0 | 2.4% |

ADDITIONAL INFORMATION

| **1 Digit Sectors** | **Export Growth (2002-2007)** | **VA/Worker ($)** | **VA Growth Rate 2002-2007** |
|---|---|---|---|
| Agriculture, Forest & Fishing | 0.3% | 67,600 | -4.1% |
| Mining | -12.8% | 119,900 | 16.0% |
| Manufacturing | 3.5% | 94,400 | 2.2% |
| Electricity, Gas & Water Supply | 0.0% | | 15.4% |
| Construction | 7.1% | 88,000 | 13.4% |
| Wholesale | 0.0% | 106,000 | 7.3% |
| Retail Trade | 3.5% | 42,400 | 5.0% |
| Accommodation, Cafes and Rest. | 5.8% | 24,700 | 5.7% |
| Transp. & Storage | 4.8% | 100,100 | 7.3% |
| Comm. Services | 8.1% | 174,000 | 2.1% |
| Finance and Insurance | 40.0% | 195,500 | 10.1% |
| Property & Business Services | -6.8% | 97,200 | 9.8% |
| Government Administration and Defense | 6.7% | 95,200 | 9.6% |
| Education | 8.2% | 50,300 | 8.3% |
| Health and Community Services | 14.8% | 55,900 | 9.2% |
| Cultural and Recreation Services | 0.6% | 70,200 | 6.9% |
| Personal and other Services | 9.6% | 41,400 | 6.5% |
| **Key Sectors** | | | |
| Business services | 10.3% | 76,800 | 6.2% |
| Metals and metal products. | -0.6% | 118,000 | 1.8% |
| Electronics and Electrical Equipment | 6.2% | 101,800 | 4.8% |
| Machinery | 5.5% | 78,000 | -0.5% |
| Food | 3.2% | 120,700 | 0.8% |
| Marine | 1.9% | 75,800 | 8.6% |
| Health | 4.2% | 95,100 | 4.4% |
| Tourism | 5.7% | 126,600 | 7.0% |
| Technical services. | 7.6% | 133,400 | -0.1% |
| Transport services | 2.3% | 81,100 | 1.5% |
| Paper Products | 11.7% | 113,400 | 8.8% |

The growth rates are based on current values, and use different datasets so aren't strictly comparable. The datasets used were zero rated GST sales and the HS system

# Appendix 7: Purchasing Power Index Data

| Index, 2005=100 | Annual | | | | Quarterly | | | | | | | Monthly | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2009 | | | | 2010 | | | | | | | | | | | |
| Total producer prices - Industrial Activities | 2006 | 2007 | 2008 | 2009 | Q1-2009 | Q2-2009 | Q3-2009 | Q4-2009 | Q1-2010 | Q2-2010 | Q3-2010 | Jan-2010 | Feb-2010 | Mar-2010 | Apr-2010 | May-2010 | Jun-2010 | Jul-2010 | Aug-2010 | Sep-2010 |
| Austria | 101.7 | 104.5 | 108.2 | 106.5 | 107.3 | 106.0 | 106.4 | 106.3 | 107.0 | 109.1 | .. | 106.6 | 107.0 | 107.5 | 108.4 | 109.2 | 109.8 | 110.2 | .. | .. |
| Belgium | 106.2 | 109.0 | 117.3 | 111.0 | 109.1 | 110.6 | 111.9 | 112.5 | 115.3 | 118.6 | .. | 114.4 | 115.0 | 116.4 | 117.8 | 118.8 | 119.1 | 119.0 | 119.6 | .. |
| Czech Republic | 100.1 | 102.7 | 103.2 | 101.6 | 104.8 | 101.8 | 99.8 | 100.2 | 100.6 | 102.2 | .. | 100.9 | 100.7 | 100.4 | 101.1 | 102.4 | 103.2 | 102.4 | .. | .. |
| Denmark | 107.3 | 107.6 | 121.1 | 110.3 | 108.9 | 109.2 | 111.4 | 111.9 | 117.1 | 118.1 | .. | 116.4 | 118.2 | 116.7 | 118.3 | 118.2 | 117.9 | 118.9 | 118.8 | .. |
| Finland | 104.1 | 106.5 | 111.5 | 103.4 | 104.1 | 103.1 | 102.7 | 103.5 | 106.2 | 108.7 | .. | 105.2 | 106.4 | 107.0 | 107.7 | 108.9 | 109.4 | 109.6 | 109.6 | .. |
| France | 102.9 | 105.3 | 110.3 | 104.0 | 104.6 | 103.4 | 103.7 | 104.4 | 105.5 | 107.0 | .. | 105.1 | 105.4 | 105.9 | 106.9 | 107.0 | 107.1 | 107.3 | 107.2 | .. |
| Germany | 104.0 | 105.3 | 109.7 | 106.0 | 107.7 | 106.1 | 105.1 | 105.1 | 106.1 | 108.0 | .. | 105.8 | 105.9 | 106.6 | 107.5 | 107.9 | 108.5 | 108.8 | 108.9 | .. |
| Greece | 106.8 | 110.9 | 121.2 | 114.0 | 111.3 | 112.9 | 115.2 | 116.7 | 119.2 | 122.1 | .. | 118.4 | 118.7 | 120.5 | 122.2 | 121.6 | 122.5 | 121.2 | 121.5 | .. |
| Hungary | 106.6 | 106.9 | 111.9 | 117.1 | 120.0 | 117.9 | 115.1 | 115.3 | 119.0 | 124.9 | .. | 118.4 | 119.4 | 119.2 | 121.3 | 125.8 | 127.5 | 127.6 | 127.4 | .. |
| Ireland | 100.8 | 98.8 | 97.4 | 97.9 | 98.6 | 98.1 | 98.1 | 96.7 | 97.0 | 98.4 | .. | 96.9 | 97.3 | 96.9 | 97.8 | 98.9 | 98.5 | 97.9 | 98.2 | .. |
| Italy | 104.8 | 108.0 | 113.7 | 108.4 | 109.1 | 108.0 | 108.0 | 108.3 | 109.4 | 111.6 | .. | 109.0 | 109.3 | 109.8 | 111.0 | 111.8 | 112.0 | 112.0 | 112.2 | .. |
| Luxembourg | 107.6 | 113.4 | 122.1 | 111.8 | 118.0 | 110.8 | 109.0 | 109.5 | 110.7 | 116.8 | .. | 109.3 | 111.7 | 111.1 | 113.4 | 117.1 | 120.0 | 120.6 | .. | .. |
| Netherlands | 108.0 | 112.2 | 122.9 | 108.5 | 110.0 | 107.0 | 107.6 | 109.2 | 111.8 | 116.3 | .. | 110.6 | 111.7 | 113.3 | 115.5 | 116.2 | 117.3 | 117.7 | 117.5 | .. |
| **New Zealand** | **106.4** | **108.3** | **122.0** | **118.3** | **122.8** | **118.8** | **116.1** | **115.4** | **119.9** | **122.2** | **..** | **..** | **..** | **..** | **..** | **..** | **..** | **..** | **..** | **..** |
| Norway | 112.8 | 112.8 | 138.6 | 137.5 | 129.4 | 137.0 | 141.0 | 142.6 | 152.8 | 162.4 | 164.7 | 149.5 | 152.6 | 156.2 | 161.7 | 160.9 | 164.5 | 164.5 | 165.1 | 164.5 |
| Poland | 101.8 | 103.9 | 106.4 | 110.5 | 111.4 | 111.4 | 109.8 | 109.6 | 109.8 | 112.8 | .. | 109.8 | 109.8 | 109.7 | 111.0 | 113.1 | 114.2 | 114.4 | 114.3 | .. |
| Slovak Republic | 102.9 | 101.5 | 104.0 | 97.1 | 98.6 | 97.0 | 96.2 | 96.5 | 95.3 | 97.1 | .. | 95.5 | 94.9 | 95.6 | 96.4 | 97.2 | 97.6 | 98.2 | 98.2 | .. |
| Slovenia | 102.3 | 107.0 | 111.3 | 109.9 | 111.0 | 109.6 | 109.5 | 109.5 | 109.7 | 111.8 | .. | 109.3 | 109.7 | 110.1 | 110.7 | 112.1 | 112.4 | 112.7 | 112.9 | .. |
| Spain | 105.1 | 108.4 | 114.7 | 110.8 | 110.8 | 110.3 | 110.9 | 111.0 | 112.5 | 114.8 | .. | 112.0 | 112.4 | 113.2 | 114.3 | 114.8 | 115.1 | 114.9 | 115.0 | .. |
| Sweden | 105.1 | 108.8 | 113.6 | 114.9 | 116.4 | 115.4 | 114.3 | 113.6 | 116.0 | 115.2 | .. | 116.3 | 116.7 | 114.9 | 114.7 | 114.6 | 116.2 | 116.3 | 115.7 | .. |
| Switzerland | 101.8 | 104.3 | 107.6 | 105.6 | 106.1 | 105.6 | 105.4 | 105.1 | 105.5 | 106.2 | .. | 105.5 | 105.3 | 105.6 | 106.3 | 106.4 | 105.9 | 105.6 | 105.7 | .. |
| United Kingdom | 106.9 | 108.1 | 123.7 | 122.5 | 122.5 | 121.0 | 121.6 | 124.8 | 127.2 | 128.3 | 127.8 | 126.3 | 126.3 | 129.0 | 128.6 | 128.3 | 127.9 | 128.0 | 127.6 | 127.8 |
| Euro area (16 countries) | 104.4 | 106.7 | 112.2 | 107.0 | 108.0 | 106.7 | 106.5 | 106.7 | 108.1 | 110.2 | .. | 107.6 | 108.0 | 108.6 | 109.7 | 110.2 | 110.6 | 110.8 | 110.8 | .. |
| European Union (27 countries) | 104.7 | 107.0 | 113.7 | 109.5 | 110.4 | 109.1 | 108.9 | 109.5 | 111.0 | 113.0 | .. | 110.6 | 110.9 | 111.7 | 112.6 | 113.1 | 113.5 | 113.6 | 113.6 | .. |

Appendix 8: Ease of doing business Indicators (World Bank 2009)

| Economy | Ease of Doing Business Rank | Starting a Business | Dealing with Construction Permits | Employing Workers | Registering Property | Getting Credit | Protecting Investors | Paying Taxes | Trading Across Borders | Enforcing Contracts | Closing a Business |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Singapore** | 1 | 4 | 2 | 1 | 16 | 4 | 2 | 5 | 1 | 13 | 2 |
| **New Zealand** | 2 | 1 | 5 | 15 | 3 | 4 | 1 | 9 | 26 | 10 | 17 |
| **Hong Kong SAR, China** | 3 | 18 | 1 | 6 | 75 | 4 | 3 | 3 | 2 | 3 | 13 |
| **United States** | 4 | 8 | 25 | 1 | 12 | 4 | 5 | 61 | 18 | 8 | 15 |
| **United Kingdom** | 5 | 16 | 16 | 35 | 23 | 2 | 10 | 16 | 16 | 23 | 9 |
| **Denmark** | 6 | 28 | 10 | 9 | 47 | 15 | 27 | 13 | 6 | 28 | 7 |
| **Ireland** | 7 | 9 | 30 | 27 | 79 | 15 | 5 | 6 | 21 | 37 | 6 |
| **Canada** | 8 | 2 | 29 | 17 | 35 | 30 | 5 | 28 | 38 | 58 | 4 |
| **Australia** | 9 | 3 | 62 | 1 | 34 | 4 | 57 | 47 | 27 | 16 | 14 |
| **Norway** | 10 | 35 | 65 | 114 | 8 | 43 | 20 | 17 | 9 | 4 | 3 |
| **Georgia** | 11 | 5 | 7 | 9 | 2 | 30 | 41 | 64 | 30 | 41 | 95 |
| **Thailand** | 12 | 55 | 13 | 52 | 6 | 71 | 12 | 88 | 12 | 24 | 48 |
| **Saudi Arabia** | 13 | 13 | 33 | 73 | 1 | 61 | 16 | 7 | 23 | 140 | 60 |
| **Iceland** | 14 | 33 | 31 | 56 | 13 | 30 | 73 | 31 | 73 | 2 | 16 |
| **Japan** | 15 | 91 | 45 | 40 | 54 | 15 | 16 | 123 | 17 | 20 | 1 |
| **Finland** | 16 | 30 | 47 | 132 | 27 | 30 | 57 | 71 | 4 | 8 | 5 |
| **Mauritius** | 17 | 10 | 42 | 36 | 66 | 87 | 12 | 12 | 19 | 66 | 73 |
| **Sweden** | 18 | 43 | 19 | 117 | 20 | 71 | 57 | 42 | 7 | 51 | 18 |
| **Korea, Rep.** | 19 | 53 | 23 | 150 | 71 | 15 | 73 | 49 | 8 | 5 | 12 |
| **Bahrain** | 20 | 63 | 14 | 13 | 22 | 87 | 57 | 13 | 32 | 117 | 26 |
| **Switzerland** | 21 | 71 | 36 | 16 | 15 | 15 | 165 | 21 | 39 | 29 | 38 |
| **Belgium** | 22 | 31 | 46 | 48 | 167 | 43 | 16 | 73 | 43 | 21 | 8 |
| **Malaysia** | 23 | 88 | 109 | 61 | 86 | 1 | 4 | 24 | 35 | 59 | 57 |
| **Estonia** | 24 | 37 | 20 | 161 | 13 | 43 | 57 | 38 | 3 | 49 | 61 |
| **Germany** | 25 | 84 | 18 | 158 | 57 | 15 | 93 | 71 | 14 | 7 | 35 |
| **Lithuania** | 26 | 99 | 64 | 119 | 4 | 43 | 93 | 51 | 28 | 17 | 36 |
| **Latvia** | 27 | 51 | 78 | 128 | 58 | 4 | 57 | 45 | 22 | 15 | 88 |
| **Austria** | 28 | 122 | 55 | 60 | 39 | 15 | 132 | 102 | 24 | 11 | 20 |
| **Israel** | 29 | 34 | 120 | 90 | 147 | 4 | 5 | 83 | 11 | 99 | 41 |
| **Netherlands** | 30 | 70 | 104 | 123 | 29 | 43 | 109 | 33 | 13 | 30 | 10 |
| **France** | 31 | 22 | 17 | 155 | 159 | 43 | 73 | 59 | 25 | 6 | 42 |
| **Macedonia, FYR** | 32 | 6 | 138 | 58 | 63 | 43 | 20 | 26 | 62 | 64 | 115 |
| **United Arab Emirates** | 33 | 44 | 25 | 50 | 7 | 71 | 119 | 4 | 5 | 134 | 143 |
| **South Africa** | 34 | 67 | 52 | 102 | 90 | 2 | 10 | 23 | 148 | 85 | 76 |
| **Puerto Rico** | 35 | 15 | 149 | 22 | 124 | 30 | 16 | 104 | 105 | 97 | 30 |
| **St. Lucia** | 36 | 36 | 12 | 20 | 76 | 87 | 27 | 40 | 103 | 165 | 47 |
| **Colombia** | 37 | 74 | 32 | 63 | 51 | 61 | 5 | 115 | 97 | 152 | 32 |
| **Azerbaijan** | 38 | 17 | 158 | 33 | 9 | 15 | 20 | 108 | 177 | 26 | 84 |
| **Qatar** | 39 | 68 | 28 | 68 | 55 | 135 | 93 | 2 | 41 | 95 | 33 |
| **Cyprus** | 40 | 25 | 77 | 93 | 64 | 71 | 93 | 37 | 15 | 107 | 21 |
| **Kyrgyz Republic** | 41 | 14 | 40 | 47 | 19 | 15 | 12 | 156 | 154 | 54 | 140 |
| **Slovak Republic** | 42 | 66 | 56 | 81 | 11 | 15 | 109 | 119 | 113 | 61 | 39 |
| **Armenia** | 43 | 21 | 72 | 62 | 5 | 43 | 93 | 153 | 102 | 62 | 49 |
| **Bulgaria** | 44 | 50 | 119 | 53 | 56 | 4 | 41 | 95 | 106 | 87 | 78 |
| **Botswana** | 45 | 83 | 123 | 71 | 44 | 43 | 41 | 18 | 150 | 79 | 27 |
| **Taiwan, China** | 46 | 29 | 97 | 153 | 30 | 71 | 73 | 92 | 33 | 90 | 11 |
| **Hungary** | 47 | 39 | 87 | 77 | 61 | 30 | 119 | 122 | 70 | 14 | 58 |
| **Portugal** | 48 | 60 | 112 | 171 | 52 | 87 | 41 | 80 | 19 | 25 | 22 |
| **Chile** | 49 | 69 | 67 | 72 | 42 | 71 | 41 | 45 | 56 | 69 | 114 |
| **Antigua and Barbuda** | 50 | 59 | 21 | 54 | 103 | 113 | 27 | 128 | 53 | 71 | 64 |

**Source: World Bank and IDRD. Doing Business 2010. http://www.doingbusiness.org/documents/fullreport/ 2010/DB10-full-report.pdf**

Appendix 9: Auckland's Skills Shortage

| | | |
|---|---|---|
| **Construction and related** | | |
| Construction Project Manager | Electrical Engineering Technician | Gasfitter |
| Project Builder | Mechanical Engineering Draftsperson | Roof Plumber |
| Architect | Bricklayer | Electrician (General) |
| Surveyor | Carpenter | Airconditioning and Refrigeration Mechanic |
| Urban and Regional Planner | Floor Finisher | Crane, Hoist or Lift Operator |
| Quantity Surveyor | Painting Trades Worker | Paving Plant Operator |
| Architectural Draftsperson | Glazier | Earthmoving Labourer |
| Surveying or Cartographic Technician | Solid Plasterer | Scaffolder |
| Civil Engineering Draftsperson | Plumber (General) | |
| Civil Engineering Technician | Drainlayer | |
| **Business and related** | | |
| Accountant | Auditor | |
| **Education** | | |
| Early Childhood Teacher | Secondary School Teacher | University Lecturer |
| Primary School Teacher | Special Education Teachers nec | |
| **Health and medical** | | |
| Medical Photographer | Clinical Oncologist | Dermatologist |
| Anatomist or Physiologist | Endocrinologist | Emergency Medicine Specialist |
| Veterinarian | Gastroenterologist | Obstetrician and Gynaecologist |
| Medial Physicist | Intensive Care Specialist | Ophthalmologist |
| Dietitian | Neurologist | Pathologist |
| Nuclear Medicine Technologist | Paediatrician | Radiologist |
| Sonographer | Renal Medicine Specialist | Medical Practitioners nec |
| Optometrist | Rheumatologist | Midwife |
| Retail Pharmacist | Thoracic Medicine Specialist | Registered Nurses nec |
| Osteopath | Internal Medicine Specialists nec | Educational Psychologist |
| Occupational Therapist | Psychiatrist | Anaesthetic Technician |
| Physiotherapist | Surgeon (General) | Cardiac Technician |
| Audiologist | Cardiothoracic Surgeon | Medical Laboratory Technician |
| Speech Pathologist (Aus) / Speech Language The | Neurosurgeon | Pharmacy Technician |
| General Medical Practitioner | Orthopaedic Surgeon | Optical Dispenser (Aus) / Dispensing Optician (NZ) |
| Resident Medical Officer | Otorhinolaryngologist | Ambulance Officer |
| Anaesthetist | Paediatric Surgeon | Ambulance Paramedic |
| Specialist Physician (General Medicine) | Plastic and Reconstructive Surgeon | Dental Technician |
| Cardiologist | Urologist | Dental Therapist |
| Clinical Haematologist | Vascular Surgeon | Dental Assistant |
| **ICT and Electronics** | | |
| ICT Project Manager | Developer Programmer | ICT Systems Test Engineer |
| Electronics project managers | Software Engineer | ICT Support and Test Engineers nec |
| Organisation and Methods Analyst | Software and Applications Programmers nec | Telecommunications Engineer |
| Multimedia Designer | Database Administrator | Telecommunications Network Engineer |
| Electrical Engineer | ICT Security Specialist | Electrical Engineering Draftsperson |
| Electronics Engineer | Systems Administrator | Electronic Engineering Draftsperson |
| ICT Business Analyst | Computer Network and Systems Engineer | Electronic Engineering Technician |
| Systems Analyst | Network Administrator | Electrical Line Mechanic |
| Multimedia Specialist | Network Analyst | Telecommunications Technician |
| Web Developer | ICT Quality Assurance Engineer | |
| Analyst Programmer | ICT Support Engineer | |
| **Automotive** | | |
| Automotive Electrician | Motorcycle Mechanic | Vehicle Painter |
| Motor Mechanic | Small Engine Mechanic | Autoglazier |
| Motor Mechanic (General) | Panelbeater | Bicycle Mechanic |
| Diesel Motor Mechanic | Vehicle Body Builder | |
| **Agriculture** | | |
| Fruit or Nut Grower | Pig Farmer | Arborist |
| Field Crop Grower | Poultry Farmer | Agricultural and Horticultural Mobile Plant Operator |
| Mixed Crop Farmer | Sheep Farmer | Sheep Farm Worker |
| Market Gardener | Surveyor | Livestock Farm Workers nec |
| Dairy Cattle Farmer | Shearer | |
| **Hospitality, travel and recreation** | | |
| Cafe or Restaurant Manager | Waiter | Sky dive Instructor |
| Baker | Travel Consultant | |
| Chef | Snowsport Instructor | |
| **Manufacturing and processing** | | |
| Petroleum Engineer | Textile, Clothing and Footwear Mechanic | Boat Builder and Repairer |
| Marine Designer | Electronic Instrument Trades Worker | Plastics Technician |
| Food Technologist | Binder and Finisher | Reinforced Plastic and Composite Production Worker |
| Sheetmetal Trades Worker | Screen Printer | Textile Dyeing and Finishing Machine Operator |
| Fitter and Turner | Printing tradesworkers | Plastics Die Setter |
| Fitter-Welder | Printing Machinist | |
| **Other** | | |
| Graphic Designer | Social Worker | Furniture Finisher |
| Chemist | Florist | Truck Driver (General) |
| Environmental Research Scientist | Upholsterer | Jockey |
| Microbiologist | Cabinetmaker | |

Source: Infometrics, 2009

# 10 REFERENCES

ADELAIDE AIRPORT. 2010. Flights & Airlines. http://www.aal.com.au/air-travel/flights-and-airlines

AMERICAN COLLEGE OF SPORTS MEDICINE (2010) American Fitness Index Report.

ASSOCIATION OF DANISH MORTGAGE BANKS (06/09/2009) Average SQM prices, owner occupied dwellings in Denmark, http://www.realkreditraadet.dk/Statistics-1.aspx?M=News&PID=993&NewsID=302

AUCKLAND AIRPORT. (04/02/2010) December 2009 Monthly Traffic Update.

AUCKLAND CITY COUNCIL. Our Collective Taonga: Places for People, Places for Nature. A framework for the future of Auckland's open spaces. http://www.aucklandcity.govt.nz/council/documents/places/docs/final.pdf. Date accessed 22 Jul. 10

AUCKLAND INTERNATIONAL AIRPORT (2008) Airline Contacts.

AUCKLAND REGIONAL COUNCIL. (2010). A brief history of Auckland's urban form. Report downloadable from http://knowledgeauckland.org.nz/

AUCKLAND REGIONAL COUNCIL, 2008. The People of the Auckland Region. Auckland Regional Council

AUCKLAND REGIONAL COUNCIL, 2010. State of Environment Report. Auckland Regional Council.

AUCKLAND UNIVERSITY OF TECHNOLOGY, www.aut.ac.nz

AUSTRALIAN BUREAU OF STATISTICS (30/03/2010) Internet Activity, Australia Dec 2009 Reference Number: 8153.0

AUSTRALIAN BUREAU OF STATISTICS, 2009 Education and Training Experience, State and Territory Tables, Australia, 2009, reference number: 6278.0.55.005 released 5/5/2010.

AUSTRALIAN BUREAU OF STATISTICS, Cat. No. 3218.0, Regional Population Growth Australia, 2008-09 released (30/03/2010)

AUSTRALIAN BUREAU OF STATISTICS, Census 2006. Internet Connections

AUSTRALIAN BUREAU OF STATISTICS, Consumer Price Index Reference Number 6401.0

AUSTRALIAN BUREAU OF STATISTICS, Labour Force Statistics by Sex, States and Territories, Reference Table 6202.0, released 08/07/2010

AUSTRALIAN BUREAU OF STATISTICS, Regional Population Growth at 30 June (2001+), Reference 3218.0, released: 30/03/2010.

BANKWEST (20/08/2008), Media Release: Escape to the Darling Downs for the Best Quality of Life in Queensland.

BEKHET, H.A. Assessing Economic Connectedness Degree of the Malaysian Economy: Input-Output Model Approach. International Journal of Economics and Finance. Vol 1: 2, August 2009.

BERTOLUCCI, J. PC WORLD (23/01/2009) Seattle Named 'Most Wired' City by Forbes.

BLUNDELL, L. 2010. Property Australia, Australian Office Markets Retain Their Shine.

BOSMA, N., ACS Z.J., AUTIO, E., CODURAS A., LEVIE J. Global Entrepreneurship Monitor, Executive Summary. 2008

BRISBANE AIRPORT (DATE) Airline Contacts.

BRISBANE CITY COUNCIL, Brisbane Community Profiles prepared *based on* Australian Bureau of Statistics

BRISBANE CITY COUNCIL, Davies Park Master Plan Project

BRISBANE CITY, Estimated Resident Population based on Australian Bureau of Statistics, Cat. No. 3235.0 –Population by Age and Sex, Regions of Australia, 2007.

BRISBANE CITY COUNCIL. Brisbane, City of Education: Economic Impact of International Students. 2007

BRITISH COLUMBIA STATISTICS. (19/01/2010) Aboriginal Peoples Labour Force Survey 2009

BRIZIUS, J. A., & CAMPBELL, M. D. (1991). *Getting results: A guide for government accountability*. Washington, DC: Council of Governors Policy Advisors.

BUREAU OF LABOUR STATISTICS, Metropolitan Area Unemployment Statistics

CAHASAN, P. & A. F. CLARK, 5 Fingers Plan, Copenhagen Denmark

CANZONERI, D., Seattle Planning Commission (24/05/2010), Understanding Seattle's Changing Households and Child Populations, slides from presentation to Special Meeting of the Committee on the Built Environment

CAPALDI E.D., LOMBARDI, J.V., ABBEY C.W., CRAIG D.D., 2008. The Center for Measuring University Performance. The Top American Research Universities.

CAREER SERVICES, (2006). Overworked New Zealand – a matter of choice? Career Edge, the Magazine for the Careers Industry, pp.6-8

CASSON, M., 2005. The Entrepreneur: An Economic Theory. Edward Elgar

CENTRE FOR HEALTH SERVICES AND POLICY RESEARCH, UNIVERSITY OF BRITISH COLUMBIA, Primary Health Care in British Columbia

CENTRE FOR HEALTH SERVICES AND POLICY RESEARCH, UNIVERSITY OF BRITISH COLUMBIA, (August 2006) Who are the Primary Health Care Physicians in British Columbia?

CHRISTIAN, J. (date) Capture Copenhagen Case Study: PrioBus –Bus Service Improvements, http://www.eltis.org/studies/copenhagen.htm

CICCCONE, A. & HALL,R.E. Productivity and the Density of Economic Activity, The American Economic Review, Vol. 86, No.1. (Mar., 1996), pp.54-70.

CITY OF SEATTLE DEPARTMENT OF DESIGN, CONSTRUCTION & LAND USE (2003), Demographic Snapshots: A Monthly Look at Seattle's Changing population & Housing. From the City Demographer.

CITY OF VANCOUVER PLANNING DEPARTMENT, (2006), Information Sheet: City Facts 2006. City & Metro

COLLIERS INTERNATIONAL (2009) Highlights: Industrial: Warehouse Markets Poised to Bounce Back as Global Economy Gets Back on Track.

COLLIERS INTERNATIONAL: Asia Pacific Office Market Overview Regional Research. Quarterly Update. April. 2010

COMMITTEE FOR SYDNEY. Global Sydney: Challenges and Opportunities for a Globally Competitive Sydney. October 2009.

COPENHAGEN AIRPORT Airlines Served at Copenhagen Airport

COPENHAGEN AIRPORTS, (2010) Annual Statistics 2009.

COVEC (2009): The impact of the Louis Vuitton Pacific Series 2009 on Auckland. Report prepared for Auckland Plus and Auckland City Council.

CUSHMAN & WAKEFIELD (2010), M arketbeat: CBD Office Report Q1, 2010.

CUSHMAN & WAKEFIELD Global Real Estate Solutions: Industrial Space Across the World 2010

CUSHMAN & WAKEFIELD INC (2010) Marketbeat: Seattle (Kent Valley) Industrial Report Q1.

DE ARGAEZ, E. Broadband Usage in USA, Nielsen//NetRatings, May 2003.

DEMOGRAPHIA (2010) 6TH Annual Demographia International Housing Affordability Survey: 2010 Ratings for Metropolitan Markets (Data for 3rd Quarter 2009)

DEMOGRAPHIA, 2010. Demographia World Urban Areas & Population Projections Edition 6.1 Belleville: Demographia.

DEMOGRAPHIA, 2007. Gross Domestic Product (GDP-PPP) Estimates for Metropolitan Regions in Western Eurpe, North America, Japan and Australasia. Draft April 2007.

DEPARTMENT OF BUILDING AND HOUSING (DATE) Estimated Building Costs, http://www.dbh.govt.nz/bofficials-estimated-building-costs

DEPARTMENT OF LABOUR & MINISTRY OF SOCIAL DEVELOPMENT, Quarterly Regional Labour Market Update for March 2010: Auckland, (May 2010).

DEPARTMENT OF LABOUR. The New Zealand Knowledge Economy - A refined methodology and further findings on the structure and growth of the Knowledge Economy. May 2009. ISBN 978-0-478-33366-4

DEPARTMENT OF LABOUR - IMSED (2009) Migration Trends and Outlook. Wellington. Available from http://www.dol.govt.nz/publications/research/migration-outlook-200809/migration-trends-outlook-200809.pdf

DIXON, S. Labour Market Bulletin 1996: 2 p 71 – 88. Labour force participation over the last ten years

ECONOMIC POLICY INSTITUTE. Hidden Disadvantage Asian American Unemployment and the Great Recession. Issue Brief 277. May 28,2010

EDUCATION ADELAIDE, Fact Sheet 10. THE ECONOMIC IMPACT OF INTERNATIONAL EDUCATION 2010

EDUCATION NEW ZEALAND & THE MINISTRY OF EDUCATION. The Economic Impact of Export Education. June 2008. Report prepared by Infometrics.

EMBASSY OF THE UNITED STATES OF AMERICA COPENHAGEN, DENMARK (2009), Demark 2009 Crime & Safety Report

EPA VICTORIA, (2009) Environment Report: Air Monitoring Report 2008 –Compliance with the National Environment Protection (Ambient Air Quality) Measure, Publication 1,282 June 2009,

EUROSTAT (http://ec.europa.eu/consumers/cons_info/cons_diary2007-2008/cp_ie.pdf)

EUROSTAT: International standard classification of education (ISCED), http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:International_standard_classification_of_education_(ISCED)

EXCHANGE RATES http://www.xe.com

FUTURE MELBOURNE (2009) Prosperous Melbourne.

G.S. SANDHU & ASSOCIATES, (2006), Socio –Economic Impacts of Arts and Cultural Organizations in British Columbia: Grant Applications to the BC Arts Council, prepared for Business Research, Tourism Development Section, Tourism Policy and Development Division Ministry of Tourism, Sports and Arts, British Columbia.

GREENBAUM, R.T., AND GEORGE, E.T. The Impact of Violence Surges on Neighbourhood Business Activity. Urban Studies December 2004 vol. 41 no. 13. p 2495-2514.

GRIMES, A., LE VAILLANT, J., and MCCANN, P. (2011). Auckland's knowledge economy: Australasian and European comparisons (Occasional Paper 11/02). Wellington: Ministry of Economic Development.

HAMBLETON, R. (2008) Civic Leadership for Auckland. Royal Commission on Auckland's Governance Research Papers Part 11 Available at http://www.royalcommission.govt.nz/

HOPE (2009) Hospitals in the 27 Member States of the European Union (http://www.hope.be/03activities/1_3-facts_and_figures-book.html)

INFOMETRICS (2009) Auckland Regional Skills Assessment. Report prepared by Infometrics Ltd for Knowledge Auckland, with the support of Manukau Institute of Technology and Unitec Institute of Technology.

INFOMETRICS, NRB AND Skinnerstrategic (2008). Economic Impact of International Students. 2007/8. Economic impact. Report prepared for Education New Zealand and the Ministry of Education. http://www.educationcounts.govt.nz/publications/international/35324/35364

INTERNET WORLD STATS (date) Canada: Internet Usage, Broadband and Telecommunications Reports

KNIGHT FRANK RESEARCH (2008), Adelaide Office Market Overview, September 2008.

KNIGHT FRANK RESEARCH, Brisbane CBD Office Market Overview March 2009.

LEE, M. (17/04/2009) Letter to Hon. Steven Joyce re Proposed Establishment of an Auckland Regional Transport Authority

LIVING IN CANADA, Compare Canadian Cities

MARÉ, D.V & GRAHAM, D.J. Agglomeration Elasticities and Firm Heterogeneity SERC Discussion Paper 43.

MARÉ, D.V & GRAHAM, D.J. Agglomeration Elasticities in New Zealand. Motu Working Paper 09-06. Motu Economic and Public Policy Research.

MARÉ, D C. 2008. Labour Productivity in Auckland Firms. Motu Working Paper 08-12. Available online at www.motu.org.nz/publications.

MASSEY UNIVERSITY, www.massey.ac.nz.

MCCLURE, M. (2/03/2009) Auckland Region –Population, Te Ara

MCDONALD, G., ZHANG, J. AND SMITH, N., 2010. Understanding Auckland's Role in New Zealand's Global Engagement: Exports of Merchandise Trade and Services. Report written for the Auckland Regional Council. Available from http://knowledgeauckland.org.nz/

MCDONALD, G., FORGIE, V., ZHANG, J., ANDREW, R. AND SMITH, N. (2009) A Genuine Progress Indicator for the Auckland Region: Valuation Methodology. Prepared by the New Zealand Centre for Ecological Economics and Market Economics for the Auckland Regional Council. ARC Technical Report 2009/101

MEADOWS, D. (1998) Indicators and information systems for sustainable development: a report to the Balatan Group. The Sustainability Institute, Hartland.

MELBOURNE AIRPORT Airline Information

MENGER, C. (1963) Investigations into the methods of the social sciences with special reference to economics. New York University Press, and published online at http://mises.org/books/investigations.pdf

MERCER, (2010) Mercer's 2010 Quality of Living Survey

MERCER, (2010) Mercer's 2010 Quality of Living Survey: Eco-City Ranking

METRO VANCOUVER (2009), 2008 Lower Fraser Valley Air Quality Report

METROWATER, Average Water Use, http://www.metrowater.co.nz/my-bill/Pages/average_consumption.aspx

MILLER, R AND BLAIR, P. (2009) Input-output analysis foundations and extensions. Washington: Cambridge University Press

MINISTRY OF ECONOMIC DEVELOPMENT (2005) Economic Development Indicators: Growth through Innovation

MINISTRY OF EDUCATION 2009 International Student Enrolments in New Zealand 2002 – 2008, International Division, July 2009.

MINISTRY OF EDUCATION. (2008). The Adults Literacy and Life Skills (*ALL*) Survey: Overview and International Comparisons.

MINISTRY OF RESEARCH SCIENCE AND TECHNOLOGY. Business Expenditure on Research and Development in New Zealand – Future Potential and Future Industries. August 2008.

MINISTRY OF SOCIAL DEVELOPMENT, & 12 QUALITY OF LIFE CITIES. The Quality of Living survey.

MINISTRY OF TOURISM, (Sept 2009) New Zealand Regional Tourism Forecasts 2009-2015.

MONITOR AUCKLAND- AUCKLAND REGIONAL COUNCIL (10/12/2009) Average Delay per Kilometre http://monitorauckland.arc.govt.nz/transport/transport-patterns/average-delay-per-kilometre.cfm Source Data from Beca Infrastructure Ltd.

MONTALVO, J.G AND REYNAL-QUEROL, M. Ethnic diversity and economic development Journal of Development Economics 76 (2005) 293–323.

MURAKAMI, K. & A. COHEN, Seattle PI (19/03/2008) Seattle Area Becoming Much More International.

NATIONAL ENVIRONMENTAL RESEARCH INSTITUTE UNIVERSITY OF AARTHUS –DENMARK, (2007) The Danish Air Quality Monitoring Programme: Annual Summary for 2006, NERI Technical Report No. 623, 2007.

NEALE, D. (2005) Ambient Air Quality Monitoring in Queensland 2005 Annual Summary and Trend Report: Environment Technical Report No. 61.

NEW SOUTH WALES GOVERNMENT (2009) City Brands Index, Source: Anholt City Brands Index 2009. http://www.business.nsw.gov.au/aboutnsw/lifestyle/E3_citybrandsindex.htm

NEW YORK MAYOR'S OFFICE OF IMMIGRANT AFFAIRS (2007), Message from the Commissioner, http://www.nyc.gov/html/imm/html/about/message.shtml

NEW YORK MAYOR'S OFFICE OF IMMIGRANT AFFAIRS (2007), Message from the Commissioner, http://www.nyc.gov/html/imm/html/about/message.shtml

NEW ZEALAND INSTITUTE OF ECONOMIC RESEARCH. Quarterly Survey of Business Opinion

NEW ZEALAND INSTITUTE OF MANAGEMENT, Management. August 2009. Page 24-25.

NEW ZEALAND POLICE NATIONAL HEADQUARTERS (April 2010) Auckland District Crime Statistics 2009: A Summary of Recorded and Resolved Offence Statistics

NEW ZEALAND POLICE NATIONAL HEADQUARTERS (April 2010) Waitemata District Crime Statistics 2009: A Summary of Recorded and Resolved Offence Statistics

NIELSEN, (2009) Quality of Life Survey 2008 National Report, prepared for Quality of Life Survey Team.

NOKIA SIEMENS NETWORK. Connectivity Report 2010. Report Prepared by London School of Economics and LECG. http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2010.pdf. Date accessed 22 Jul. 10

OFFICE FOR NATIONAL STATISTICS (26/08/2008) First Release: Internet Access 2008. Households and Individuals

ORGANISATION FOR ECONOMIC COOPERATION & DEVELOPMENT (OECD) (10/06/2010) OECD Broadband Portal.

ORGANISATION FOR ECONOMIC COOPERATION & DEVELOPMENT (OECD): Compendium of Productivity Indicators. 2008

ORGANISATION FOR ECONOMIC COOPERATION & DEVELOPMENT (OECD): 2008. Competitive Cities in the Global Economy. OECD Territorial Reviews. 2006.

OTTAVIANO, G. and PERI, G. (2005), 'Rethinking the gains from immigration: Theory and Evidence from The U.S.', *NBER Working Paper* No. 11672.

OTTAVIANO, G. and PERI, G. (2006), 'The economic value of cultural diversity', *Journal of Economic Geography*, 6, 9-44.

PORT OF SEATTLE (2009) Seattle- Tacoma International Airport Activity Report

QUEENSLAND GOVERNMENT, Consumer Price Index (a): All Groups, Brisbane and Weighted Average of Eight Capital Cities, March Quarter 1999 to March Quarter 2010, released 5/5/2010.

QUEENSLAND STATE GOVERNMENT, BRISBANE MARKETING & THE SAFFORD GROUP, Brisbane Regional Tourism Investment and Infrastructure Plan 2008-18.

REAL ESTATE INSTITUTE OF AUSTRALIA, Consumer Price Index December Quarter 2009, http://www.reiv.com.au/_uploads/research/CPI.pdf (Uses information from AUSTRALIAN BUREAU OF STATISTICS, Consumer Price Index Reference Number 6401.0)

REISS, J. (2007) Error in Economics: towards a more evidence-based methodology. London: Routledge.

REISS, J. (2001) Natural economic quantities and their management. *Journal of Economic Methodology* vol.8:2, 287-311

ROBERTS DAY (2010) Statement of Evidence: Amendment C129 Casey Planning Scheme –Clyde North Precinct Structure Plan.

ROSLYN KUNIN & ASSOCIATES, INC. (RKA, INC.).Economic Impaction of International Education in Canada Final Report Revised August 24, 2009. Foreign Affairs and International Trade Canada;

SAVILLS RESEARCH (2010) Spotlight On: Brisbane Industrial, March 2010

SAVILLS RESEARCH (2010) Spotlight On: Adelaide Industrial, March 2010

SCHEURER, W.T. , 2005. A Model for Strategy and Tactical Steps that Create Enterprise Capability Strategy: The Six-Factor Model. University of Minnesota.

SCHOOL OF HISTORICAL STUDIES DEPARTMENT OF HISTORY, THE UNIVERSITY OF MELBOURNE (25/02/2010), eMelbourne: The City Past & Present – Ethnic Population.

SEARLE, G. School of Geography, Planning and Environmental Management, University of Queensland (2009) The Fiscal Crisis of the Local State, Urban Consolidation and Local Open Space Provision in Sydney, paper presented at State of Australian Cities National Conference- Perth 2009

SEATTLE POLICE DEPARTMENT (2010) Crime Statistics

SEATTLE TACOMA INTERNATIONAL AIRPORT (Date) Airlines at Sea- Tac Airport.

SEATTLE GOVERNMENT FINANCE DEPARTMENT. Annual Seattle CPI-U, 21/4/2010, Source: U.S. Bureau of Labor Statistics; The Puget Sound Economic Forecaster, prepared by Conway Pedersen Economics, Inc.

SHORLAND, P. (2006) People on the Move: A study of migrant movement patterns to and from New Zealand. Wellington: Department of Labour.

SINOSKI, K. -VANCOUVER SUN (18/11/2009), Vancouver City Council Pushes Densification in False Creek.

SKILLING, D. 2006. The role of Auckland in meeting NZ's productivity challenge. The New Zealand Institute, Wellington.

SKILLING, D. and BOVEN, D. No country is an island: Moving the New Zealand economy forward by taking it to the world. The New Zealand Institute, Wellington

SPOONLEY, P; MEARES, C., HO, E., PEACE, R (2010). Bamboo Networks: Chinese Employers and Employees in Auckland.Integration of Immigrants Programme. College of Humanities and Social Sciences. MAssye Univeristy.

STATISTICS CANADA, Estimates of Population by Census Metropolitan Area, Sex and Age Group for July 1 (1996+), Based on the Standard Geographical Classification (SGC) 2006, annual (persons), Reference Table 051-0046 and Catalogue no. 91C0029.

STATISTICS CANADA, Immigrant Population by Place of Birth, by Census Metropolitan Area (2006 Census).

STATISTICS CANADA, Labour Force Survey, released: February 2010.

STATISTICS CANADA, Metropolitan Vancouver Consumer Price Index (2002=100), released 3/2/2010.

STATISTICS DENMARK (12/05/2010) Immigrants and Their Descendants and Foreign Nationals Table reference FOLK1.

STATISTICS DENMARK (2/06/2010) Indicator for Employment of Immigrants, reference table INDV1.

STATISTICS DENMARK, Consumer Price Index (2000=100) By Commodity Group, reference number: PRIS 6 released: 23/06/2010.

STATISTICS DENMARK, Consumer Price Index, Rate of Change Last 12 Months (2000=100) by type, reference number: PRIS 14 released: 12/07/2010.

STATISTICS DENMARK, Population by Region and Time, at 1 January, (2008-2010), released 22/2/10. http://www.statbank.dk/FOLK1

STATISTICS NEW ZEALAND (16/04/2010) Household Use of Information and Communication Technology 2009.

STATISTICS NEW ZEALAND (2009) Measuring New Zealand's progress using a sustainable development approach: 2008.

STATISTICS NEW ZEALAND, (2009) Business Demography.

STATISTICS NEW ZEALAND, Business Operations Survey.

STATISTICS NEW ZEALAND, (2009) Linked Employer-Employee Data (LEED).

STATISTICS NEW ZEALAND, 2006 Census Data –QuickStats About Education and Training –Tables.

STATISTICS NEW ZEALAND, 2004. Australia and New Zealand Standard Industrial Classification – New Zealand Use Version 1996. Wellington: Statistics New Zealand

STATISTICS NEW ZEALAND, 2001. New Zealand System of National Accounts: Inter-Industry Study 1996 Interim Release of Tables –126 Industries. Wellington: Statistics New Zealand

STATISTICS NEW ZEALAND, Consumer Price Index All Groups by Regions (Quarterly March, June, September, December), Table Reference: CPI008AA.

STATISTICS NEW ZEALAND, Household Labour force Survey: March 2010 Quarter.

STATISTICS NEW ZEALAND, Infoshare Database, Estimated Resident Population for Subnational Areas at 30 June (1996+), Reference Table DPE007AA, released: 18/11/09

SUNG, J. RADDON, A. AND ASHTON, D. (2006). Skills Abroad: A comparative assessment of international policy approaches to skills leading to the development of policy recommendations for the UK.

SUSTAINABLE CITIES COLLECTIVE (2009), European Green City Index.

SUTTON, A. and VESTER, B. (2010) Unlocking Auckland's potential: Adult literacy and numeracy skills in the new Auckland. A COMET Working Paper 035/10THE STATE OF VICTORIA DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT (2007) Census 2006 Info Sheet 6: Victoria's Born Overseas Data from Australian Bureau of Statistics Census 2006

THOMPSON AND STRICKLAND, 2003. Strategic Management – Concepts and Cases. 2003. Chapter 1. p3-19

TIMES HIGHER EDUCATION (2009) World University Rankings.

TOURISM VANCOUVER, (2009), Tourism Data for Greater Vancouver, Source: Tourism Vancouver's Visitor Volume Model, PricewaterhouseCoopers.

TOURISM VICTORIA: International Visitation Estimates (YE March 2010)

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION, (UNESCO), World Heritage Sites,

UNITED NATIONS, COMMISSION OF THE EUROPEAN COMMUNITIES, IMF, OECD, AND WORLD BANK, (1993). System of National Accounts 1993. USA: United Nations

UNITED NATIONS (2001) Indicators of sustainable development: guidelines and methodologies.

UNIVERSITY OF AUCKLAND, www.auckland.ac.nz

VANCOUVER FOUNDATION (2010) Metro Vancouver's Vital Signs 2010.

VANCOUVER INTERNATIONAL AIRPORT (DATE) Airlines at YVR & Destinations.

VANCOUVER INTERNATIONAL AIRPORT (May 2010) Passenger.

VANCOUVER SUN, Revealed: The Biggest Water Users In Vancouver, 23 June 2008.

VICTORIA POLICE, CRIME STATISTICS http://www.police.vic.gov.au

WAVERMAN, L. DASGUPTA, K. VAN DER MERWE, E. NOKIA SIEMENS NETWORKS CONNECTIVITY SCORECARD 2010. http://www.connectivityscorecard.org/images/uploads/media/TheConnectivityReport2010.pdf

WATER SUPPLY FORUM, (2009) Chapter 5: 'Characteristics of Municipal Water Demands' in Regional Water Supply Outlook 2009.

WERNER, M. (30/04/2010) Europe: TomTom's List of Most Congested Cities.

WORKER, J. (17/06/2009) Paris is Top of the 2009 Anholt-GfK Roper City Brand Index