



# The New Zealand Knowledge Economy

A REFINED METHODOLOGY AND FURTHER FINDINGS ON THE STRUCTURE AND GROWTH OF THE KNOWLEDGE ECONOMY



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## EXECUTIVE SUMMARY

The purpose of this paper is to provide baseline evidence on the performance of local and regional knowledge economies in New Zealand. This is the second phase of the Department of Labour's knowledge economy project, after the first phase established that New Zealand's knowledge economy could be measured using methodologies developed in the UK.

The knowledge economy consists of those sectors with a highly skilled workforce and which invest heavily in knowledge-based assets (intangibles) such as R&D, staff development, product design and development, and brand equity. These sectors represent an increasing share of the New Zealand economy's output and employment, and are the most likely source of the future gains in innovation and knowledge that will be needed to improve productivity.

This paper defines the knowledge-intensive sectors as those industries that meet the following two criteria: at least 25 per cent of the workforce must be qualified to degree level or higher, and at least 30 per cent of the workforce must be employed in the professional, managerial and scientific and technical occupations.<sup>1</sup>

The summary findings include:

- Employment in the knowledge intensive sectors grew more quickly than in the rest of the economy over the period 2000 to 2008. The knowledge intensive industries in the 'Professional, Scientific & Technical Services' sector accounted for most employment growth in the private sector, though 'Financial & Insurance Services' also grew. In the public sector there was significant growth in knowledge intensive sectors across health, education and public administration.
- Among the major individual industries seeing the most rapid growth were 'Professional and Scientific Equipment Manufacturing', 'Management and Related Consulting Services', 'Computer System Design and Related Services' and 'Architectural, Engineering and Technical Services'. The most significant employment drop was in 'Newspaper, Periodical, Book and Directory Publishing', while there was sharp growth in the much smaller industries of 'Software Publishing' and 'Internet Publishing and Broadcasting'.
- An increasing share of national GDP is generated by the private knowledge intensive sectors, with the 'Communications' sector growing particularly quickly and 'Real Estate and Business Services' and 'Finance and Insurance' also growing over the past ten years. Early signs are that the economic downturn has only accelerated the growth in the share of national GDP represented by these industries. The public knowledge intensive sectors also generated a slightly increased share of national GDP compared to ten years previously, mostly due to output growth from 'Education, Health and Other Services'.
- Private sector employment in the knowledge-based economy is centred in the Auckland and Wellington regions, while public sector employment is

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<sup>1</sup> These criteria were adopted from the paper 'Graduate Economics in Britain – A Local and Regional Analysis', produced by 'Geoeconomics' (a UK research consultancy).

much more decentralised. Central government administration is focussed around Wellington but the education, health and local government sectors provide knowledge intensive employment across the country.

- There is an urban hierarchy of knowledge economies. Auckland and Wellington cities constitute the top tier. The second tier is headed up by North Shore City, Hamilton City and Christchurch City.
- The fastest growing territorial authorities in terms of private knowledge-based sectors lie outside the main urban areas of central Auckland and Wellington. Manukau City, Hamilton City and Christchurch City are the three fastest growing major urban areas. There has also been some rapid growth outside of the main centres, in areas such as Queenstown-Lakes District.

In formulating initiatives to improve productivity and increase skills levels, it is important to know how the knowledge-intensive sectors are distributed around the country and where they are growing.

This methodology can be used to track knowledge economy trends at the regional and sub-regional level, identifying which knowledge intensive sectors are growing most quickly and where. This information can be used to ensure that adequate and relevant training is available locally, to plan the development of local economies, to market the area to skilled workers and to help employers identify where there are pools of workers with the skills they require.

# 1 INTRODUCTION

## 1.1 Background

This report presents the findings of the second phase of the Knowledge Economy project. In the first phase it was established that New Zealand's knowledge economy could be measured using methodologies developed in the UK.<sup>2</sup> In the second phase we have approached key stakeholders to discuss the most appropriate methodology for New Zealand, and have subsequently adopted a refined methodology that allows us to produce a broad range of outputs describing the size and growth of New Zealand's knowledge economy.

'Knowledge Economy' is a term that has been widely used in international discussions of economic development. The OECD, the EU and various research consultancies have discussed it and attempted to define it. But there is still some fuzziness around the term, and its meaning is often refined to meet the needs of a specific piece of research.

While the meaning of 'knowledge economy' may differ slightly depending on the context, it is reasonable to say that the term refers to the impact of highly skilled individuals (who possess knowledge that is not easily transferred) on performance in their workplace. It is commonly reported that highly skilled people add more on average per person to the development and performance of an economy. While it is recognised that having all workers of an economy being highly skilled is not practical or even desired, most if not all OECD countries are attempting to raise average skill levels of their workers.

Developed economies have seen a steady shift towards becoming knowledge economies, with investment moving from physical capital towards knowledge-based assets (intangibles). These include areas such as research and development, software, product design and development, staff training, and brand equity. These intangible assets are not captured well by national income accounts.

These changes are driven by market demand for more sophisticated products, increased market competition resulting from globalisation, and the rapid pace of technological development removing some low-skill jobs while opening up new possibilities for innovation for firms with highly skilled workers. The move towards mass education to graduate level has provided a supply of workers who are able to exploit these opportunities, and will seek knowledge-intensive work (often moving to find it).

A country's knowledge economy tends to be focussed around its cities. This is where highly skilled workers, affluent customers and opportunities for mutually-beneficial knowledge sharing coincide.<sup>3</sup> The first phase of this project found that central Wellington and Auckland stood out from the rest of New Zealand on all criteria for knowledge economy development. It is important that the main cities are able to drive economic growth across their regions and the country overall, by

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<sup>2</sup> These methodologies were developed by the research consultancies 'Local Futures' and 'The Work Foundation', and are covered in the methodology section of this paper.

<sup>3</sup> "Ideopolis: Knowledge City-Regions" – The Work Foundation, March 2006

fostering productive economic relationships with the smaller cities and producing useful innovations that benefit the wider economy.

## **1.2 Why is it important to measure the knowledge economy?**

“Economic crises tend to reinforce and accelerate the underlying, long-term trends within an economy. In this case, the economy is shifting away from manufacturing and toward idea-driven creative industries...”<sup>4</sup>

Labour markets around the world are changing, and most countries recognise that it is important to enhance labour market skills if the economy is to be able to take advantage of an economic recovery. Developing labour market skills now means that workers will be more productive when a recovery comes, and able to produce higher ‘value added’ products. The measurement of skills – at least partially measured by stocks of knowledge – is important in understanding the characteristics of the current labour market. Without an idea of the current level of labour market skills across industries, occupations and regions, processes which target the improvement in skills would be inefficient if not misdirected.

Improving the skill levels of New Zealand employees means that the jobs of these employees become decreasingly susceptible to replacement by lower wage economies. Highly skilled workers are also more likely to be able to remain in employment during difficult economic times, such as the current global crisis.

The measurement of knowledge and the change in the stocks of that knowledge are central to the development of desired levels of worker productivity and job security. If New Zealand is to achieve GDP growth at a rate that moves New Zealand up the order of OECD countries, increasingly this development will be dependent on productivity improvements.

## **1.3 Objectives for this paper**

The first objective for this paper was to establish a methodology for measuring the status and growth of New Zealand’s knowledge economy, disaggregated by industrial sector and geographical area. This was done by reviewing the recent international literature on the subject and consulting with stakeholders.

It was important that, if possible, the methodology allowed us to use data sources produced more frequently than the census. This has been achieved by making extensive use of Business Demography data, allowing us to look at the situation up to 2008.

Finally we wanted to produce a broad range of results, and present them in an accessible way, to enable stakeholders to quickly assess the trends and state of knowledge-intensive economic development around the country. These results should go beyond the obvious, of highlighting the dominance of Auckland and Wellington, to identify other areas experiencing high growth and provide analysis of what is happening.

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<sup>4</sup> Richard Florida (March 2009), “Meltdown Geography: How the Crash Will Reshape America”, <http://www.theatlantic.com/doc/200903/meltdown-geography>

## 2 METHODOLOGY

### 2.1 Description of methodology

The first phase of this project, completed in 2007, established that it was possible to replicate two methodologies developed by research consultancies (The Local Futures Group<sup>5</sup> and The Work Foundation<sup>6</sup>) in the UK to track the knowledge economy.

The Local Futures methodology uses educational qualifications as a proxy for knowledge and defines the knowledge economy with reference to the proportion of the workforce in each sector who held university degrees or a higher qualification. This proxy is widely used as a measure of the level of generic analytical and cognitive capabilities in a workforce.

The Work Foundation approach was based around the proportion of the workforce in the occupational groups of 'Legislators & Managers', 'Professionals' and 'Technicians & Trades Workers'. This approach recognised that qualifications are an imperfect proxy for the abilities of workers, and that not all graduates are working in occupations that make full use of their abilities. But identifying knowledge workers by their occupation is also problematic. For example, some managers are simply running small stores and cannot plausibly be considered as knowledge workers.

In fact both of the above groups recognised that it will often be useful to mix and match methodologies to get a fuller picture. A recent report produced by another UK research consultancy, Geoeconomics<sup>7</sup>, combines the two methodologies to define the knowledge economy as follows:

"Knowledge-intensive sectors are industries that satisfy two basic criteria: at least 25 per cent of the workforce must be qualified to degree level and at least 30 per cent of the workforce must be employed in professional, managerial and scientific and technical occupations."<sup>8</sup>

This methodology has the advantage that the sectors meeting our criteria will be those that generally require a high level of cognitive/analytical skills (so employ a high proportion of graduates), and where staff are commonly employed in occupations where they will be able to make full use of these skills.

It is worth stressing that the "25% of the workforce are graduates" criteria is being used as a proxy to identify those industries with a highly skilled workforce. We are interested in concentrations of skills and knowledge, rather than the employment of graduates, but the qualifications of the workforce are the best available guide to their skill levels.

This paper adopts the methodology used by Geoeconomics, and in large part replicates their work in the New Zealand context. But when this methodology is applied to New Zealand it produces a distinct list of knowledge intensive sectors,

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<sup>5</sup> <http://www.localfutures.com/>

<sup>6</sup> <http://www.theworkfoundation.com/index.aspx>

<sup>7</sup> <http://www.geoeconomics.com/>

<sup>8</sup> 'Graduate Economics in Britain – A Local and Regional Analysis'. Geoeconomics for Graduates Yorkshire, October 2007

so the final definition of the knowledge economy and subsequent results are specific to New Zealand.

The “25/30 per cent” criteria were applied to data from the 2006 Census to derive the list of knowledge intensive sectors at the level of three digit ANZSIC06 codes. The results are shown in chart 2.1, grouped by private/public sector and broad industrial classification.

The individual industries have been grouped into their broader classifications, such as ‘Education and Training’, and these broad classifications have then been classified as private or public sector. This will only provide an approximate public/private sector split of employment as, for instance, some schools are private schools. So it is worth noting that, when this paper presents results on the public/private sector split of knowledge intensive employment, these are the industries that are being counted in each sector.

This classification is broadly similar to the one Geoeconomics derived for the UK. In the private sector there is a focus around ‘Information, Media & Telecommunications’, ‘Finance & Insurance’, and ‘Professional, Scientific & Technical Services’ (this latter sector is the only one that falls entirely within our classification). But parts of several other sectors are included, such as high-tech manufacturing, utility supply and the creative and performing arts. Within the public sector, most of the individual sectors within the broad areas of government administration, education and health met the knowledge intensive criteria and are included.<sup>9</sup>

Business Demography data, from Statistics New Zealand, for the years 2000-2008 was then used to map the development of these knowledge intensive sectors around the country. We have focussed on the proportion of each area’s workforce employed in these sectors, how the workforce is split between the private and public sectors, and how the situation has changed over the last eight years.

There are two important caveats attached to this approach. The first is that some individual employers, whose workforce would meet our criteria, are based within sectors that do not qualify overall as knowledge intensive. The results are based on a highly disaggregated list of sectors but this does not remove the issue entirely.

The second caveat is that we have defined the knowledge intensive sectors using national data. This allows us to compare areas around the country on a consistent basis, but it may be the case that the knowledge intensive part of a sector is concentrated in one region (perhaps at a business headquarters) while lower value activities (local branches, call centres) constitute the bulk of the sector in another region. This paper includes an in-depth look at the Canterbury region, and in the Appendix we have presented those sectors that would qualify as knowledge intensive based upon the specific workforce demographics in Canterbury.

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<sup>9</sup> Charts 4.1 and 4.2 in the Appendix show the number of employees in each sector as at 2008, according to Business Demography data.

**Chart 2.1: The New Zealand knowledge intensive sectors**

<b>PRIVATE SECTOR</b>	<b>PUBLIC SECTOR</b>
<p><b>Manufacturing:</b>            C184 Pharmaceutical and Medicinal Product Manufacturing            C241 Professional and Scientific Equipment Manufacturing            C242 Computer and Electronic Equipment Manufacturing</p>	<p><b>Public Administration &amp; Safety:</b>            O751 Central Government Administration            O752 State Government Administration            O753 Local Government Administration            O754 Justice            O755 Government Representation            O772 Regulatory Services</p>
<p><b>Utilities:</b>            D262 Electricity Transmission            D264 On Selling Electricity and Electricity Market Operation            D270 Gas Supply            D281 Water Supply, Sewerage and Drainage Services</p>	<p><b>Education &amp; Training:</b>            P802 School Education            P810 Tertiary Education            P821 Adult, Community and Other Education            P822 Educational Support Services</p>
<p><b>Wholesale Trade:</b>            F372 Pharmaceutical and Toiletry Goods Wholesaling</p>	<p><b>Health Care &amp; Social Assistance:</b>            Q840 Hospitals            Q851 Medical Services            Q852 Pathology and Diagnostic Imaging Services            Q853 Allied Health Services            Q859 Other Health Care Services</p>
<p><b>Information, Media &amp; Telecommunications:</b>            J541 Newspaper, Periodical, Book and Directory Publishing            J542 Software Publishing            J551 Motion Picture and Video Activities            J561 Radio Broadcasting            J562 Television Broadcasting            J570 Internet Publishing and Broadcasting            J580 Telecommunications Services            J591 Internet Service Providers and Web Search Portals            J592 Data Processing, Web Hosting and Electronic Information Storage Services            J601 Libraries and Archives            J602 Other Information Services</p>	
<p><b>Finance &amp; Insurance:</b>            K621 Central Banking            K623 Non-depository Financing            K624 Financial Asset Investing            K631 Life Insurance            K633 Superannuation Funds            K641 Auxiliary Finance and Investment Services</p>	
<p><b>Rental, Hiring &amp; Real Estate Services:</b>            L664 Non-Financial Intangible Assets Leasing</p>	
<p><b>Professional, Scientific &amp; Technical Services:</b>            M691 Scientific Research Services            M692 Architectural, Engineering and Technical Services            M693 Legal and Accounting Services            M694 Advertising Services            M695 Market Research and Statistical Services            M696 Management and Other Consulting Services            M697 Veterinary Services            M699 Other Professional, Scientific and Technical Services            M700 Computer Systems Design and Related Services</p>	
<p><b>Administrative &amp; Support Services:</b>            N729 Other Administrative Services</p>	
<p><b>Arts &amp; Recreation Services:</b>            R891 Museum Operation            R892 Parks and Gardens Operations            R900 Creative and Performing Arts Activities</p>	
<p><b>Other Services:</b>            S954 Religious Services            S955 Civic, Professional and Other Interest Group Services</p>	

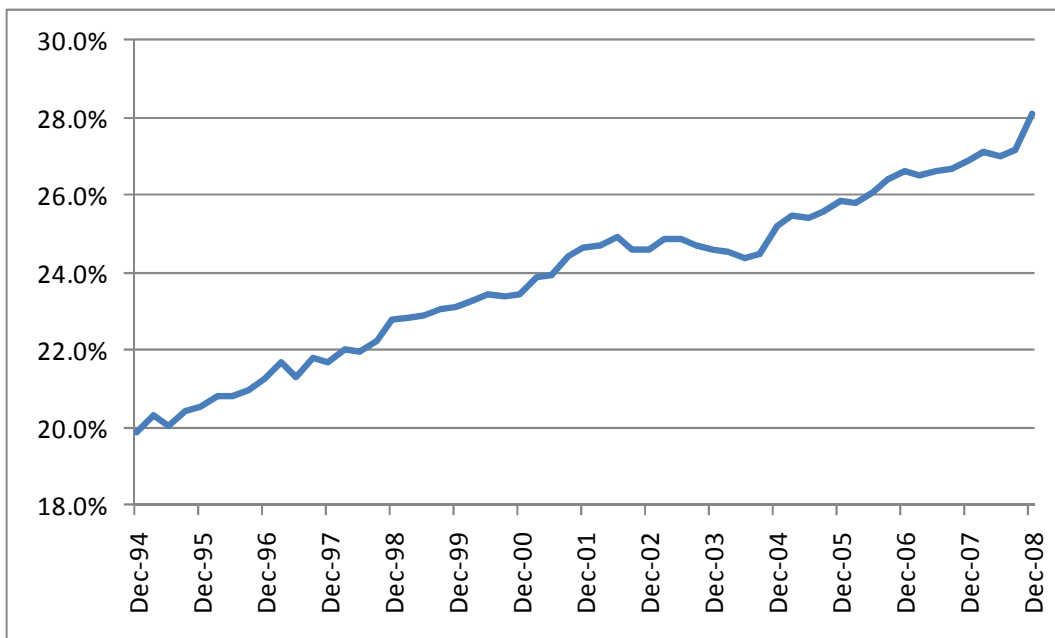
### 3 RESULTS

#### 3.1 Contribution to national GDP

GDP statistics are not available at a sufficiently fine industry level to precisely map the contribution of the knowledge intensive (KI) sectors presented in Chart 2.1. But we can pick out the high level sectors that are mostly made up of knowledge intensive businesses, and track the contribution of these to GDP to get an indicative picture of the output of the private sector knowledge economy over time.

Of the broad industrial sectors for which GDP data are available, the ones that are closely related to the knowledge economy are 'Communication Services', 'Finance & Insurance' and 'Real Estate & Business Services'. All of these categories include some industries that do not fall within our definition of the knowledge economy, but they are mostly composed of knowledge economy industries.

**Chart 3.1: Indicative trend of percentage contribution to total real GDP made by the private knowledge intensive sectors, 1994 to 2008**



Source: Statistics New Zealand

Overall the trend is of steady growth in the proportion of total real GDP generated by these sectors over the past fourteen years, following on from a much flatter trend prior to 1994.<sup>10</sup> They made up 19.9% of total real GDP in Dec 1994, rising to 28.1% by Dec 2008. This growth was made up of a 3.4 percentage points increase from Communications (from 3.0% to 6.4% of total real GDP), 2.7 percentage points from Real Estate & Business Services (from 11.7% to 14.4%) and 2.1 percentage points from Finance & Insurance (from 5.2% to 7.3%). This

<sup>10</sup> Seasonally adjusted quarterly real GDP data have been used throughout this section.

represents very strong growth for Communications as it is the smallest of the three sectors.

The rising trend of percentage contribution to total real GDP was broken from mid-2002 to mid-2004. In fact all three knowledge intensive sectors continued to grow during that period but not as quickly as the overall economy. This was a period of high net inward migration and marked the start of the construction boom. By the end of 2004 the knowledge economy sectors had resumed their upward trend in output, relative to the rest of the economy.

Over the six months from June 2008 to December 2008, these three knowledge intensive sectors combined increased their share of total real GDP by a further percentage point from 27.0% to 28.1%. This indicates that the economic downturn is only accelerating the movement of New Zealand's economy from manufacturing towards knowledge-based services.

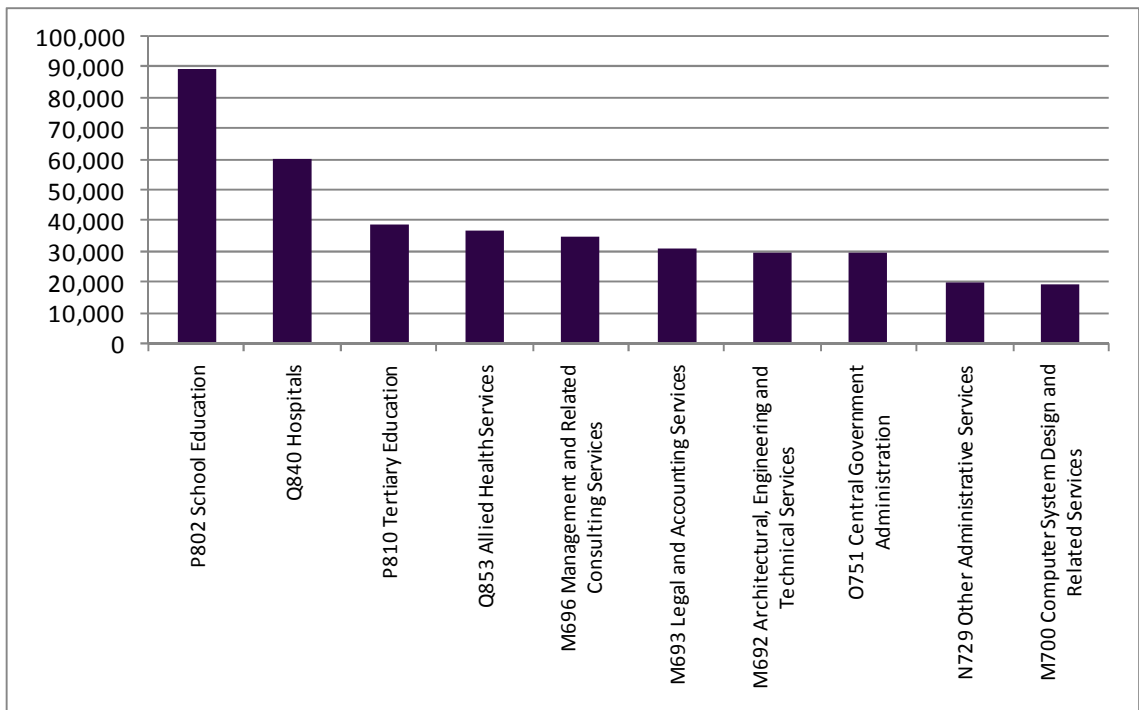
The public knowledge intensive industries can be broadly identified by 'Central Government Administration and Defence', 'Local Government Services' and 'Education, Health and All Other Services'. The proportion of GDP represented by these industries combined rose slightly, from 15.7% in December 1994 to 17.4% in December 2008. This increase was mostly due to 'Education, Health and Other Services', which increased its contribution to total real GDP from 11.0% to 12.5% over the period.

### 3.2 Employment change at national level

Over the eight year period from 2000 to 2008, employment across the combined KI industries increased by 28% (from 459,000 to 587,000).<sup>11</sup> This is significantly higher than the 23% employment growth seen across the rest of the economy over the same period. So the KI industries are responsible for an increasing share of national employment, as well as national GDP.

Chart 3.2 shows the numbers employed in the ten largest knowledge intensive industries, as at 2008, while chart 3.3 shows the percentage change in employment in each of these industries over the period 2000-08.

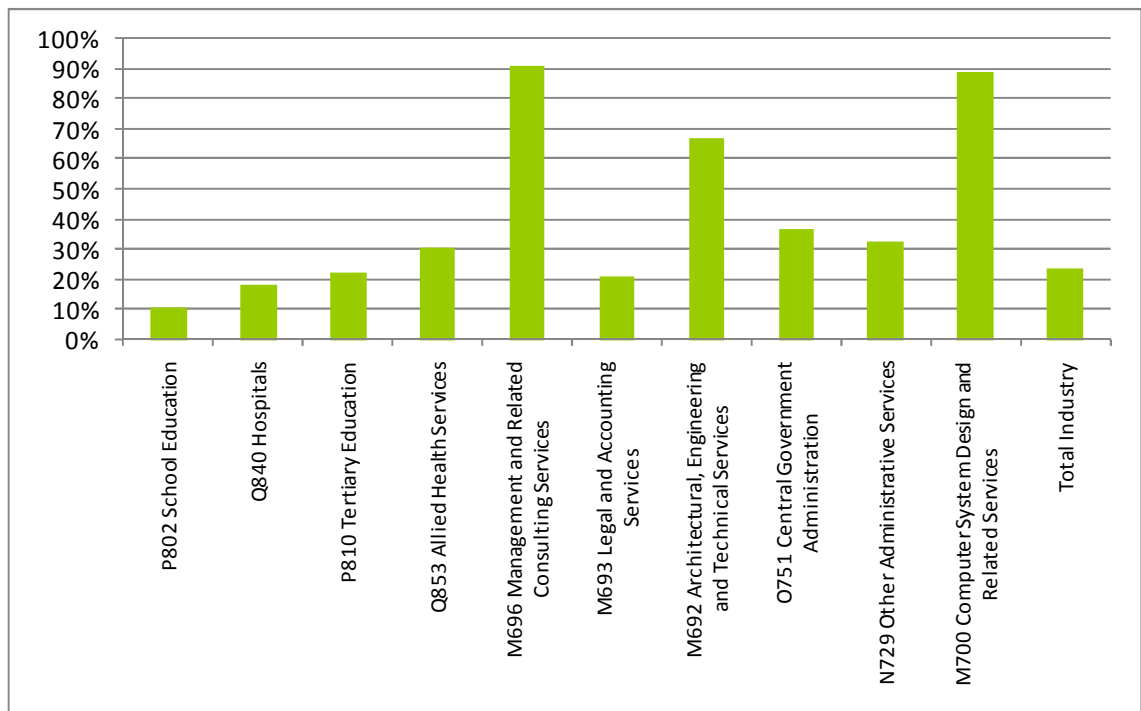
**Chart 3.2 Top ten knowledge intensive industries by employment, 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

<sup>11</sup> The employment figures for the knowledge intensive industries represent their total employment. We have not attempted to identify a subset of 'knowledge workers' within these industries.

**Chart 3.3 Employment growth in the ten largest knowledge intensive industries and in the whole economy, 2000-2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

Chart 3.2 shows that the four knowledge intensive industries that employed the most people in 2008 were all in the public sectors of health and education. Central government administration is the other public sector industry to appear in the top ten, as the eighth largest employer.

Chart 3.3 shows that all of these industries have increased their employment over the period 2000-08, but the fastest growth has been in the private sector. The industries 'Management and Related Consulting services', 'Computer System Design and Related Services' and 'Architecture, Engineering and Technical Services' have all expanded by more than 60%. The fastest growth in the public sector was for 'Central Government Administration', which expanded by 37%.

When we broaden the focus to look at all of the individual KI industries, the variation in employment growth is even wider. Chart 3.4 shows the sectors that have seen the strongest growth. The complete employment growth table for all KI industries is Chart 4.6 in the appendix.

**Chart 3.4 Knowledge intensive industries experiencing the most rapid employment growth, 2000-2008**

Industry	Employment in 2008	Change 2000-08
J542 Software Publishing	40	567%
D262 Electricity Transmission	540	468%
J570 Internet Publishing and Broadcasting	85	372%
L664 Non-Financial Intangible Assets (Except Copyrights) Leasing	960	174%
C241 Professional and Scientific Equipment Manufacturing	3,390	113%
K624 Financial Asset Investing	2,610	107%
J591 Internet Service Providers and Web Search Portals	930	94%
M696 Management and Related Consulting Services	35,280	91%
M700 Computer System Design and Related Services	19,730	89%
P822 Educational Support Services	1,230	86%
R892 Parks and Gardens Operations	3,850	83%
K623 Non-Depository Financing	2,140	73%
M692 Architectural, Engineering and Technical Services	29,670	67%
K641 Auxiliary Finance and Investment Services	8,600	59%
M697 Veterinary Services	4,060	52%
M694 Advertising Services	4,770	51%

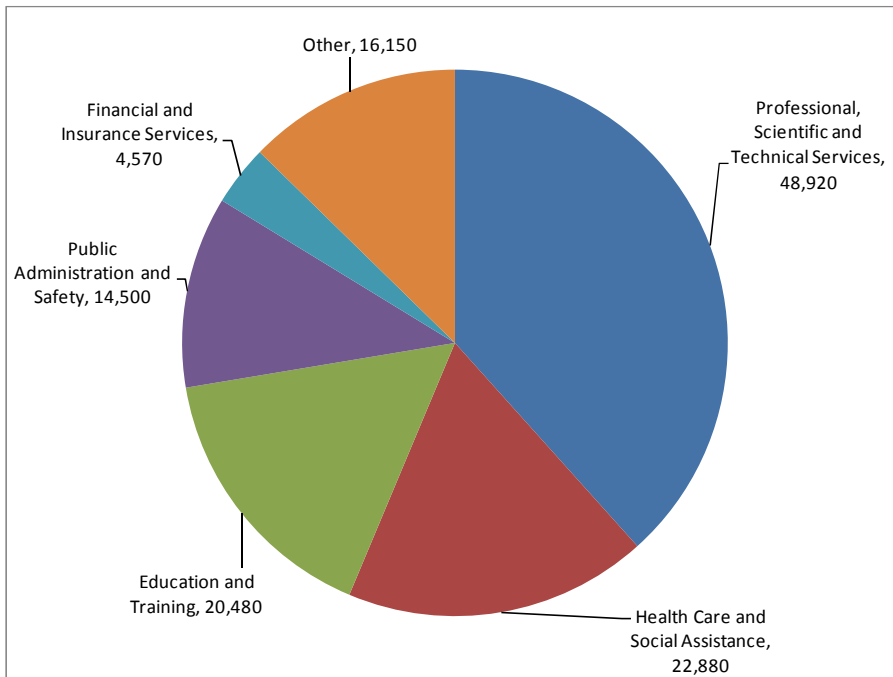
Source: Business Demography data (Statistics NZ)

Some of the smaller industries have seen the biggest percentage growth, including the expanding fields of 'Software Publishing' and 'Internet Publishing and Broadcasting'. The much larger publishing sector of 'Newspaper, Periodical, Book and Directory Publishing' is one of the few KI sectors where employment has decreased over the period, down by 26% to 14,610. So there is clear evidence of a decline in traditional forms of publishing (though these still dominate), while software and internet publishing are still small but growing quickly.

Several of the KI industries within finance have grown quickly but employment in 'Life Insurance' declined by 21% over the period 2000-08, representing a net loss of 430 people.

The biggest employment gains have been in 'Management and Related Consulting Services', 'Computer System Design and Related Services' and 'Architectural, Engineering and Technical Services'. These three sectors employed an additional 38,000 people between them by the end of the period.

**Chart 3.5 Employment growth in knowledge intensive industries by broad sector, 2000-2008<sup>12</sup>**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

Chart 3.5 summarises the employment growth in the knowledge intensive industries by broad sector. The 'Professional, Scientific and Technical Services' sector has seen the most growth. Next are the public sectors of health, education and public administration. There has also been significant growth in 'Financial and Insurance Services'.

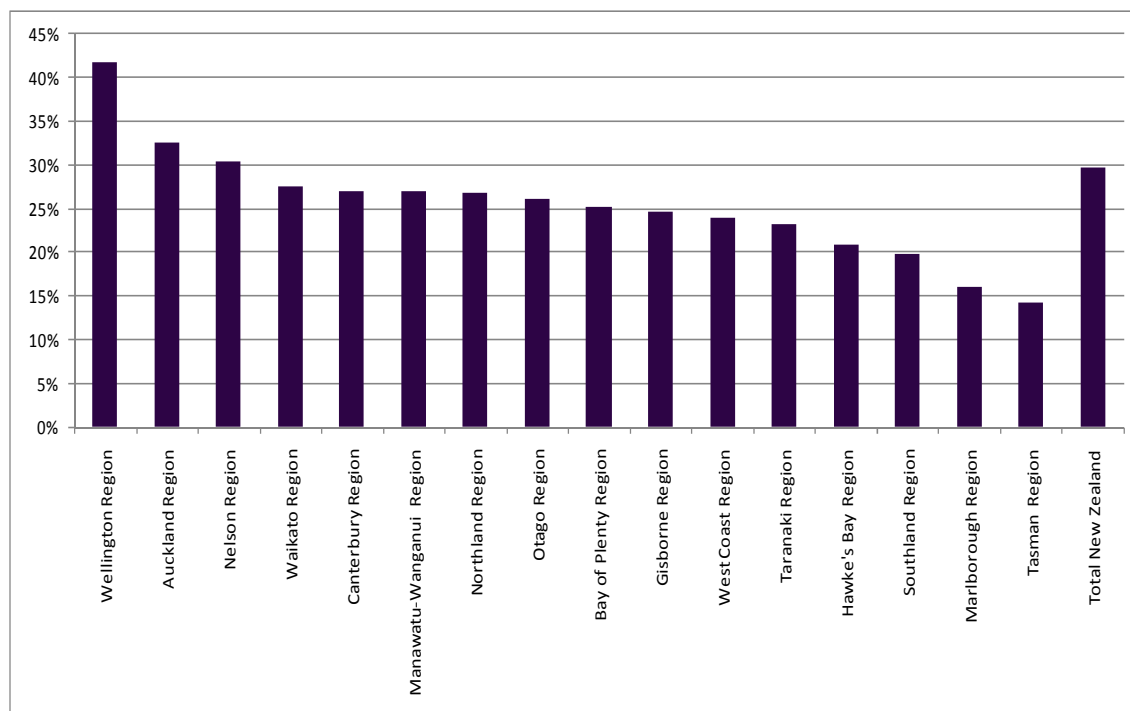
Individual industries, outside these big growth sectors, that have seen strong growth include 'Professional and Scientific Equipment Manufacturing' (1,800 growth), Telecommunications Services (1,020 growth) and 'Civic, Professional and Other Interest Groups' (3,430 growth).

<sup>12</sup> The figures in this chart represent the sum of the knowledge intensive industries in each sector, not the entire sector (which will usually include some industries that are not knowledge intensive).

### 3.3 Inter-regional comparisons

In 2008, the private and public knowledge intensive (KI) sectors combined generated around 30 per cent of all employment across New Zealand. The Wellington and Auckland regions were above the national average for proportion of their workforce in these sectors, while the rural regions of Tasman, Marlborough and Southland were furthest below the national average (chart 3.6).

**Chart 3.6: Employment share of all knowledge intensive sectors by region, 2008**



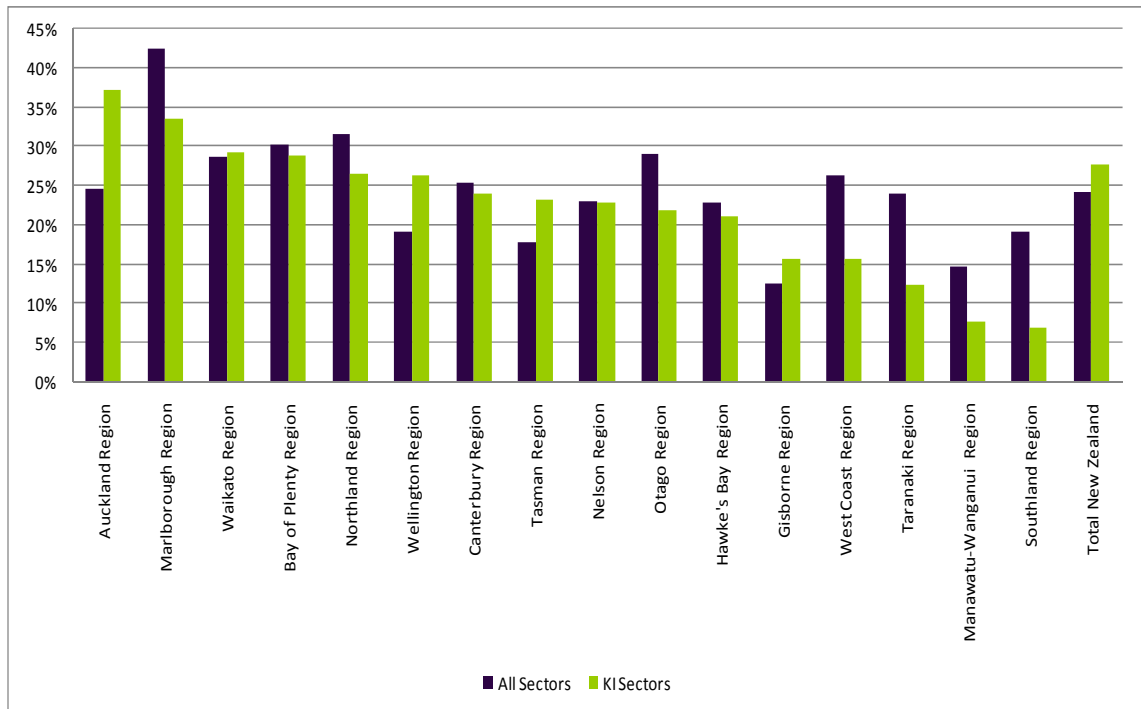
Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

When the regions are compared by employment growth in their KI industries Auckland comes top, with growth of 37% over the period 2000-08 (chart 3.7). This is considerably faster than the 25% employment growth seen across Auckland's whole economy over the same period. Employment in Auckland has increased by over 90% during the past eight years in the KI industries of 'Professional and Scientific Equipment Manufacturing', 'Scientific Research Services', 'Management and Related Consulting Services' and 'Computer System Design and Related Services'. There has also been strong growth in numerous other KI industries, including 'Architectural, Engineering and Technical Services' (up by 66%).

Marlborough has seen rapid employment growth between 2000 and 2008, both in its KI sectors and broader economy. The growth is from a low base in the KI sectors and has been partly driven by the public sector (local government, health services) and partly by the private sector industries of 'Legal and Accounting Services' and 'Architecture, Engineering and Technical Services'. While encouraging for the region, we should not put too much emphasis on percentage employment growth from such a low base.

The Waikato region saw the third highest overall employment growth in its KI sectors, up by 29% over the 2000-08 period. This was driven in particular by rapid growth in the private KI sectors of 'Market Research and Statistical Services', 'Management and Related Consulting Services', 'Computer System Design and Related Services'. Each of these three industries more than tripled their employment in Waikato.

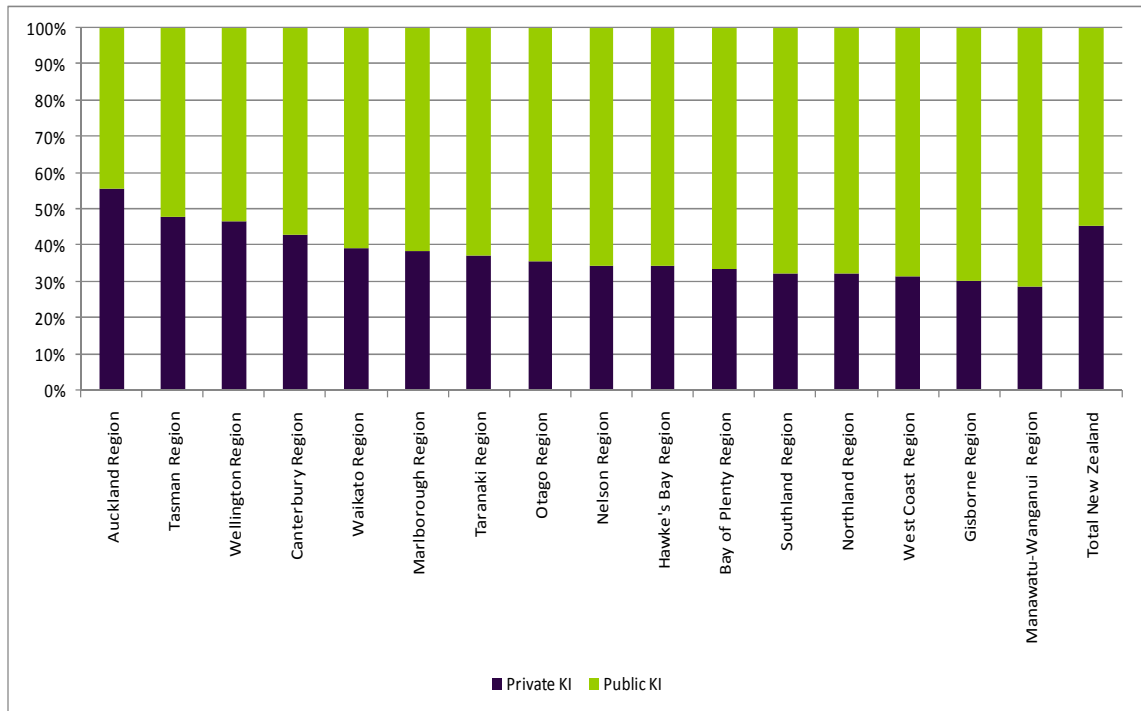
**Chart 3.7: Employment change in all knowledge intensive sectors by region, 2000 to 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

The public sector is a major knowledge economy employer, accounting for 55% of KI sector employment nationally (chart 3.8). It accounts for most KI sector employment in every region other than Auckland (44%), and more than two thirds of KI sector employment in the regions of Southland, Northland, West Coast, Gisborne and Manawatu-Wanganui. Dependence on public services, and hence government spending, for KI job opportunities is therefore common across much of the country.

**Chart 3.8: Public and private shares of all knowledge intensive sector employment by region, 2008**

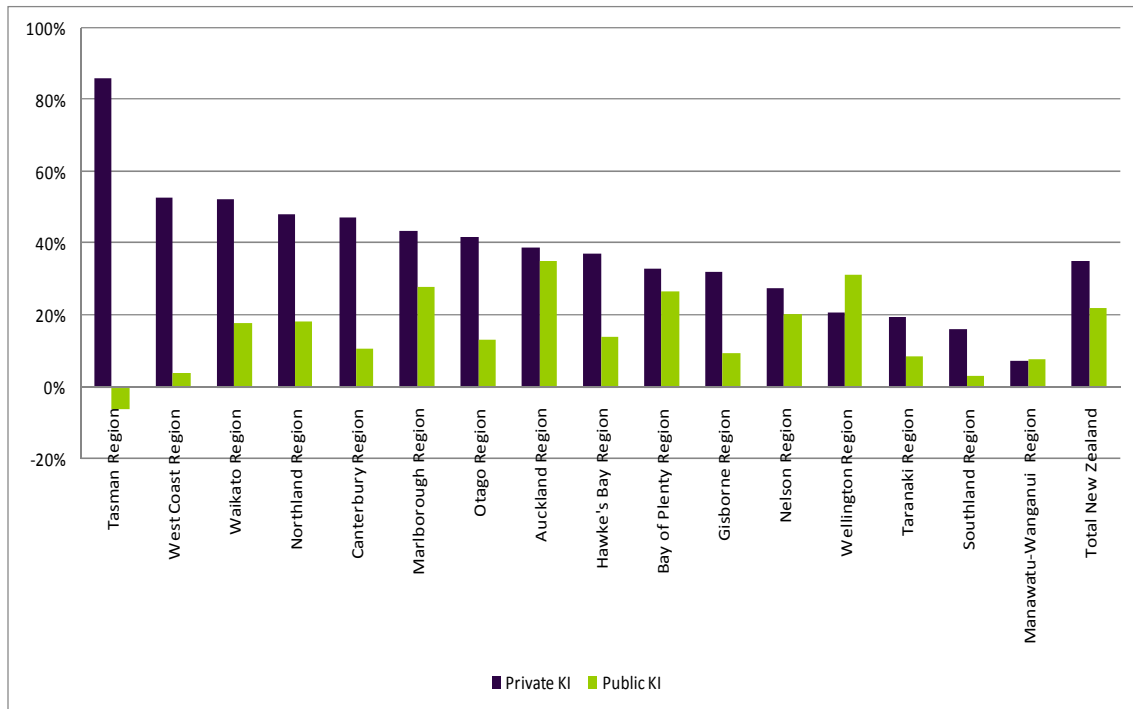


Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

Wellington is the only region where employment growth in the public KI sectors has out-stripped growth in the private KI sectors (chart 3.9). Every region has seen growth in both the private and public KI sectors with the exception of Tasman, where public KI sector employment contracted by 6% while private KI sector employment jumped by 86%. These unusual figures are probably related to the relatively small number of KI sector workers in Tasman.

It is encouraging that all regions are seeing growth in their private KI sector employment, and generally quicker growth than in the public KI sectors. This indicates a broad development towards a more business-driven knowledge economy in New Zealand.

**Chart 3.9: Employment change in private and public knowledge intensive sectors by region, 2000-2008**



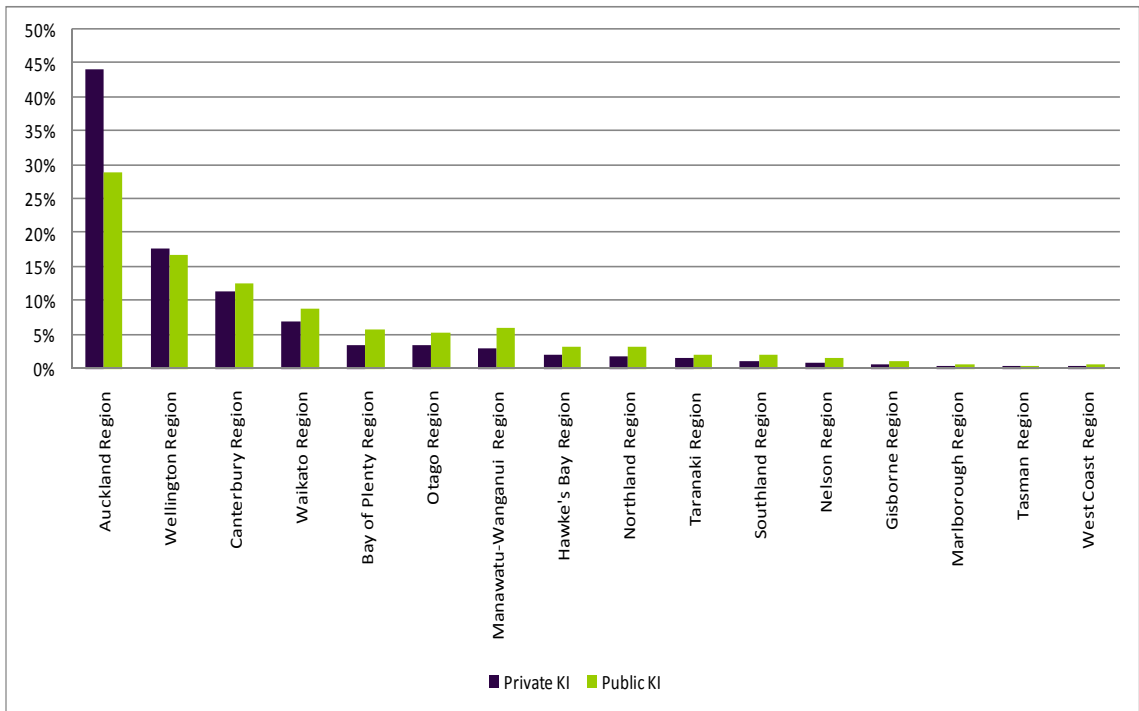
Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

In terms of scale the Auckland region dominates private KI sector employment, employing 44% of all New Zealand's workers in these sectors (chart 3.10). As expected, the Wellington and Canterbury regions also have significant shares with 18% and 11% respectively. The Waikato region, driven by Hamilton City, has 7% of these workers and all other regions have fewer than 5% each.

Chart 3.11 shows how the regional shares of private and public KI industry employment compare with the regional shares of total employment (across all sectors). This allows us to see where KI industry employment is more or less concentrated than general employment. For example, Wellington's value of around 1.4 for private KI sector employment means its share of the national private KI sector workforce (16.8%) is 40% higher than its share of the total national workforce (12.3%).

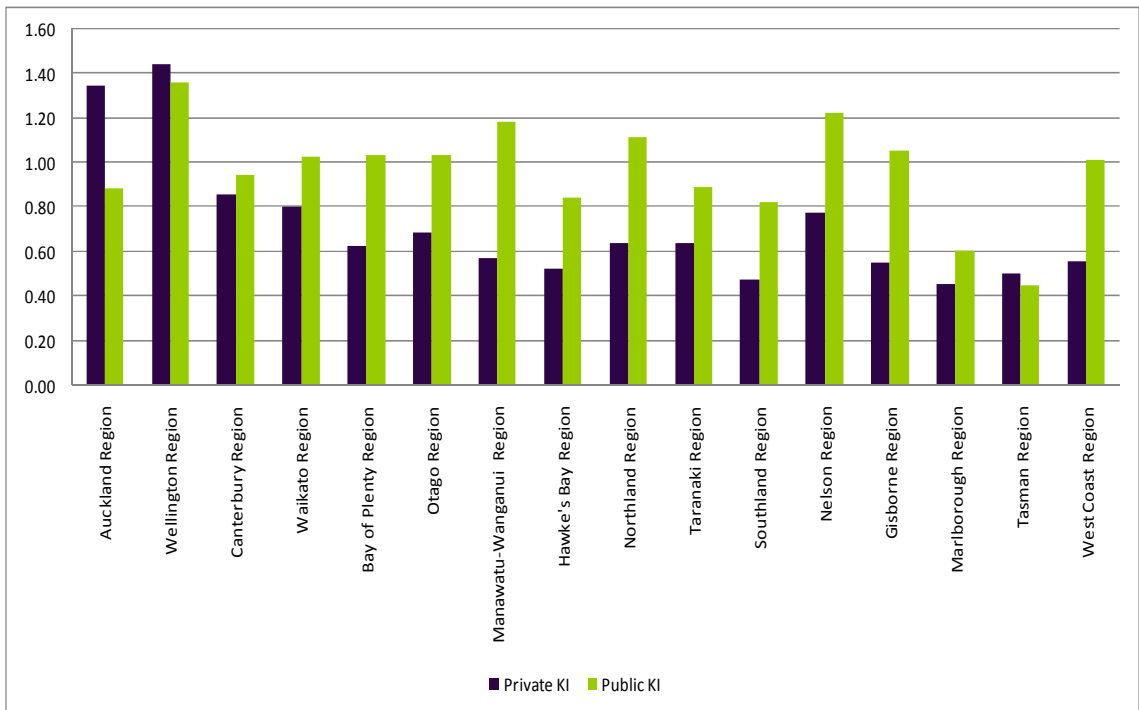
When total employment share for each region is taken into account then Wellington and Auckland stand out as the only regions with more than their share of private KI sector workers. The public KI sectors are much more decentralised with most regions having a similar proportion of their workforce in these sectors. The regions of Wellington, Nelson, Manawatu-Wanganui and Northland have the highest proportions of their workforces in these sectors, while Marlborough and Tasman have the lowest.

**Chart 3.10: Regional shares of knowledge intensive sector employment, 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 3.11: Regional shares of knowledge intensive sector employment – standardised by regional shares of total employment\*, 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

\*A value higher than one means that the region's share of national knowledge intensive employment is higher than the region's share of national employment across all sectors.

Chart 4.1, in the appendix, shows the proportion of the national workforce by private KI sector who work in each of the three largest regions of Auckland, Wellington and Canterbury. Each region has its own speciality industries, where it employs a greater share of the workforce than its share of the workforce across all private KI sectors.

The Canterbury region is particularly strong in 'Computer and Electronic Equipment Manufacturing', and also in 'Scientific Research Services' and 'Selling Electricity and Electricity Market Operation'.

The Wellington region employs nearly 80% of workers in 'Electricity Transmission' and is also very strong in 'Data Processing, Web Hosting and Electronic Information Storage Services' and 'Life Insurance'. There are further strengths in 'Computer Systems Design and Related Services' and 'Other Professional, Scientific and Technical Services'.

Auckland has numerous strengths where it dominates national employment, including:

- Pharmaceutical and Medicinal Product Manufacturing
- Professional and Scientific Equipment Manufacturing
- Pharmaceutical and Toiletry Goods Wholesaling
- Television Broadcasting
- Non-depository financing
- Advertising Services
- Market Research and Statistical Services

Chart 4.2, also in the appendix, shows the proportion of the national workforce in the public KI sectors who work in each of the above three regions. As would be expected, Wellington is very strong in 'Central Government Administration', 'Justice' and also 'Educational Support Services'. Auckland is strong in adult and community education. Canterbury's strongest area is in health, particularly 'Pathology and Diagnostic Imaging Services' and 'Other Health Care Services'.

### 3.4 The sub-regional picture

Chart 3.12 provides a national overview of the knowledge intensity of the economies in each of New Zealand's 72 territorial authorities (TAs).<sup>13</sup> The areas highlighted in red or orange have the highest proportion of their workforce in the KI sectors, while those areas coloured blue have the lowest proportion of their workforce in these sectors.

The map clearly shows that the knowledge economy is associated with urban centres. The TAs with the highest proportion of workers in the KI sectors are Wellington City, Auckland City, Porirua City, Hamilton City, Palmerston North City and Dunedin City. It is notable that these are all TAs with a local university or polytechnic. Christchurch City is a little further down the list behind North Shore City, Whakatane District, Nelson City and Whangarei District.

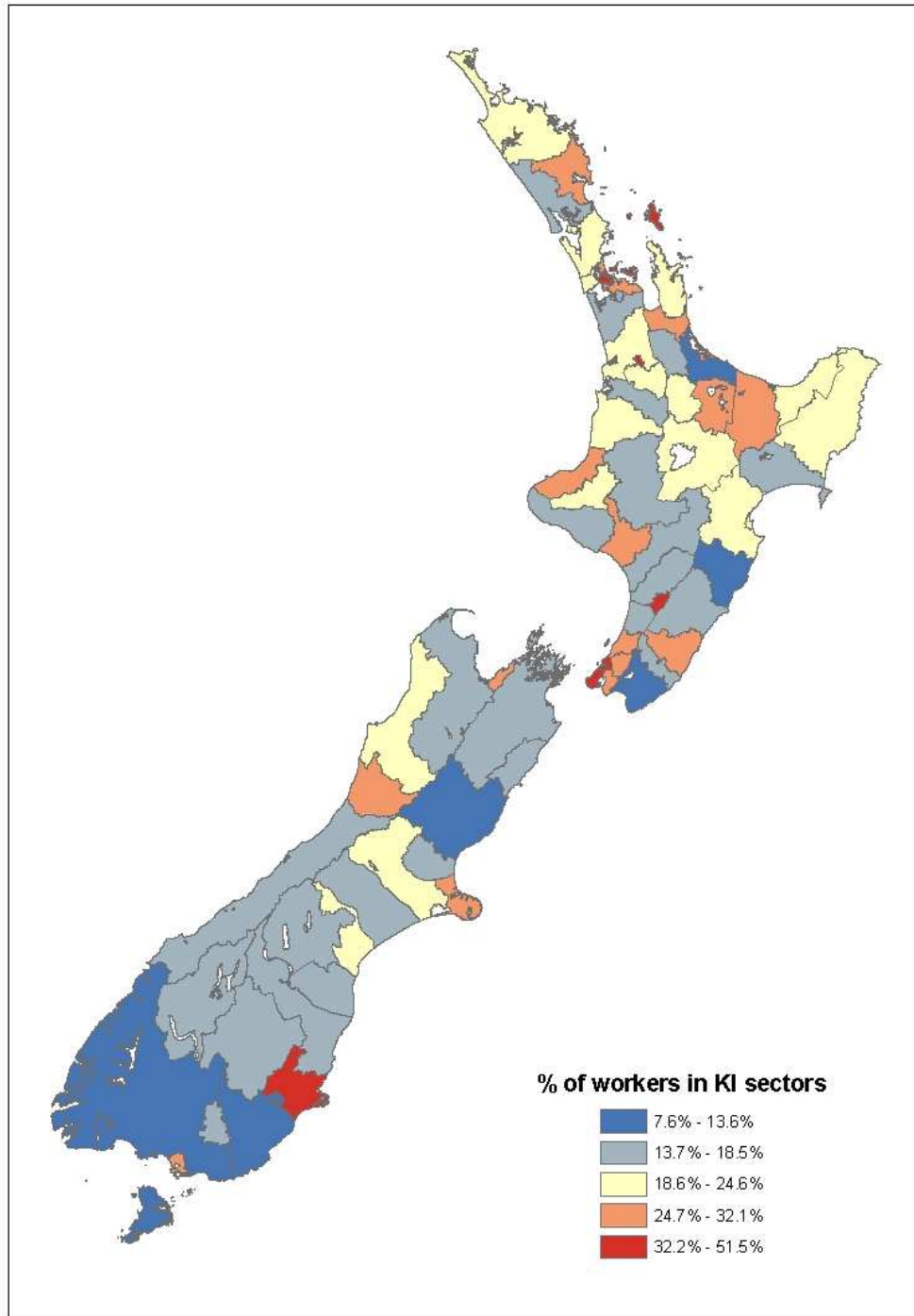
There are clusters of knowledge intensive employment around Wellington (Porirua City, Lower Hutt City, Kapiti Coast District, Upper Hutt City) and around Auckland (North Shore City, Manukau City). The other hotspots are more isolated.

The KI sector employment in Porirua City, Palmerston North City and Dunedin City is predominantly in the public sector. Hamilton City has a high proportion of its workforce in the private KI sectors of 'Architectural, Engineering and Technical Services', 'Legal and Accounting Services', 'Management and Related Consulting Services' and 'Other Administrative Services'. North Shore City has developed a niche in the sector of 'Computer System Design and Related Services', and also has a high percentage of workers in 'Architectural, Engineering and Technical Services', 'Management and Related Consulting Services' and 'Life Insurance'.

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<sup>13</sup> The Chatham Islands Territory is not included in the maps. The complete tables for charts 3.8, 3.9 and 3.10 are in the appendix (charts 4.3, 4.4 and 4.5).

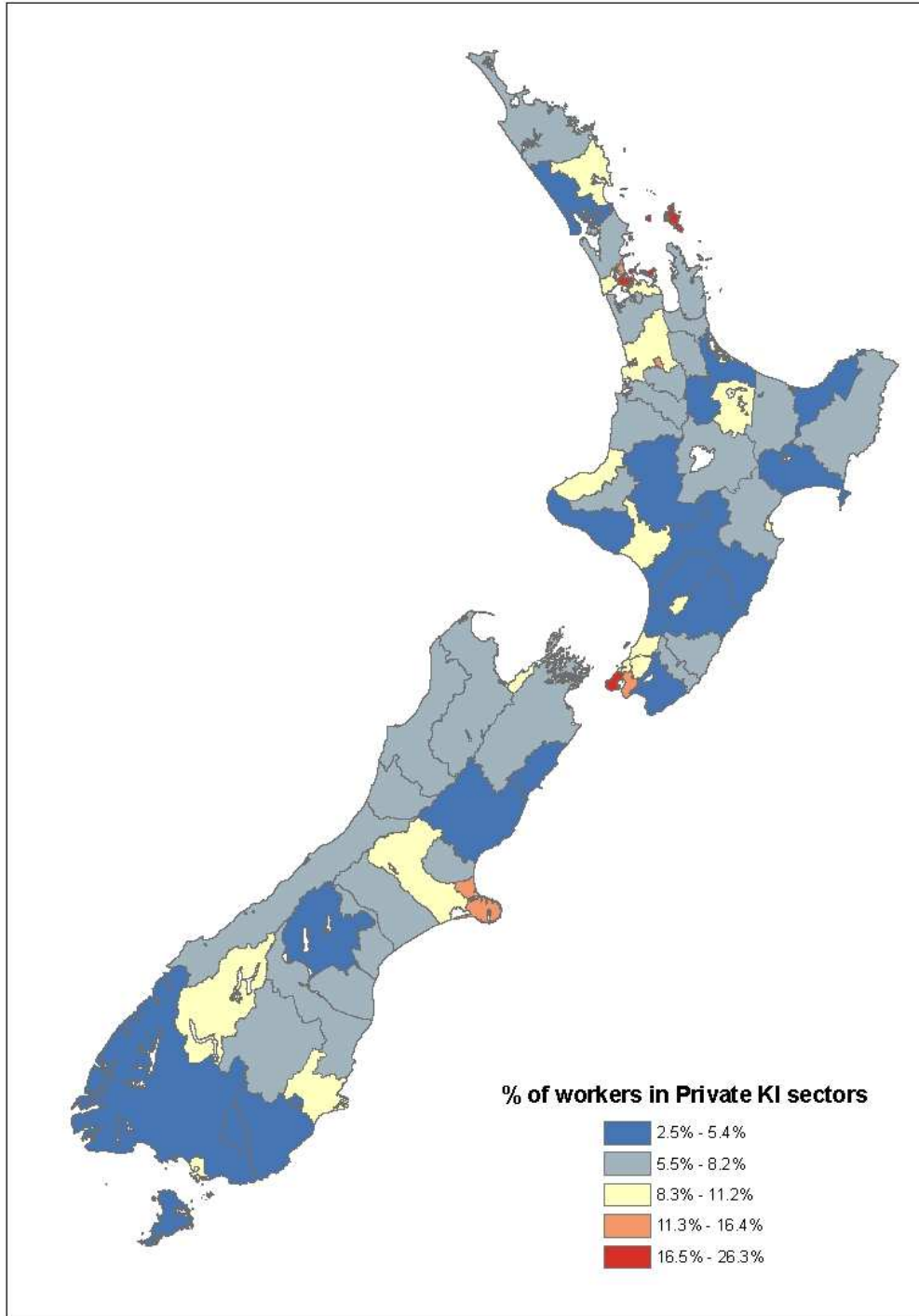
**Chart 3.12: The sub-regional geography of all knowledge intensive sector employment, 2008\***



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)  
\*Figures for each area are shown in chart 4.3 in the appendix

Chart 3.13 shows how private sector KI employment is focussed around Auckland and Wellington, with Christchurch the leading area in the South Island.

**Chart 3.13: The sub-regional geography of private knowledge intensive sector employment, 2008\***



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)  
\*Figures for each area are shown in chart 4.4 in the appendix

Wellington City and Auckland City are well ahead of all the other TAs in terms of the proportion of their workforce in the private KI sectors. Compared to Auckland, Wellington has a higher proportion of its private KI sector workforce in:

- Computer System Design and Related Services
- Civic, Professional and Other Interest Group Services
- Life Insurance
- Data Processing, Web Hosting and Electronic Information Storage Services

Auckland has a greater concentration of workers than Wellington in the sectors:

- Advertising Services
- Television Broadcasting
- Pharmaceutical and Toiletry Goods Wholesaling
- Computer and Electronic Equipment Manufacturing

Lower Hutt City's relative strengths are in the 'Scientific Research Services', 'Architectural, Engineering and Technical Services' and 'Management and Related Consulting Services' sectors.

Compared to the other major cities of Wellington and Auckland, Christchurch has a high proportion of its workers in 'Computer and Electronic Equipment Manufacturing', and is slightly higher in 'Newspaper, Periodical, Book and Directory Publishing' and 'Architectural, Engineering and Technical Services'. Christchurch has a relatively low proportion of its workers in 'Management and Related Consulting Services'.

The picture is quite different when we look at growth in employment in the private KI sectors over the period 2000-2008 (chart 3.14). Christchurch has experienced the fastest growth of the three major cities, with its 50% increase being significantly higher than Auckland's 32% increase and Wellington's 23% increase. Christchurch has seen growth across a broad range of sectors, with particular jumps in 'Architectural, Engineering and Technical Services' and 'Computer System Design and Related Services' (both of which more than doubled in size).

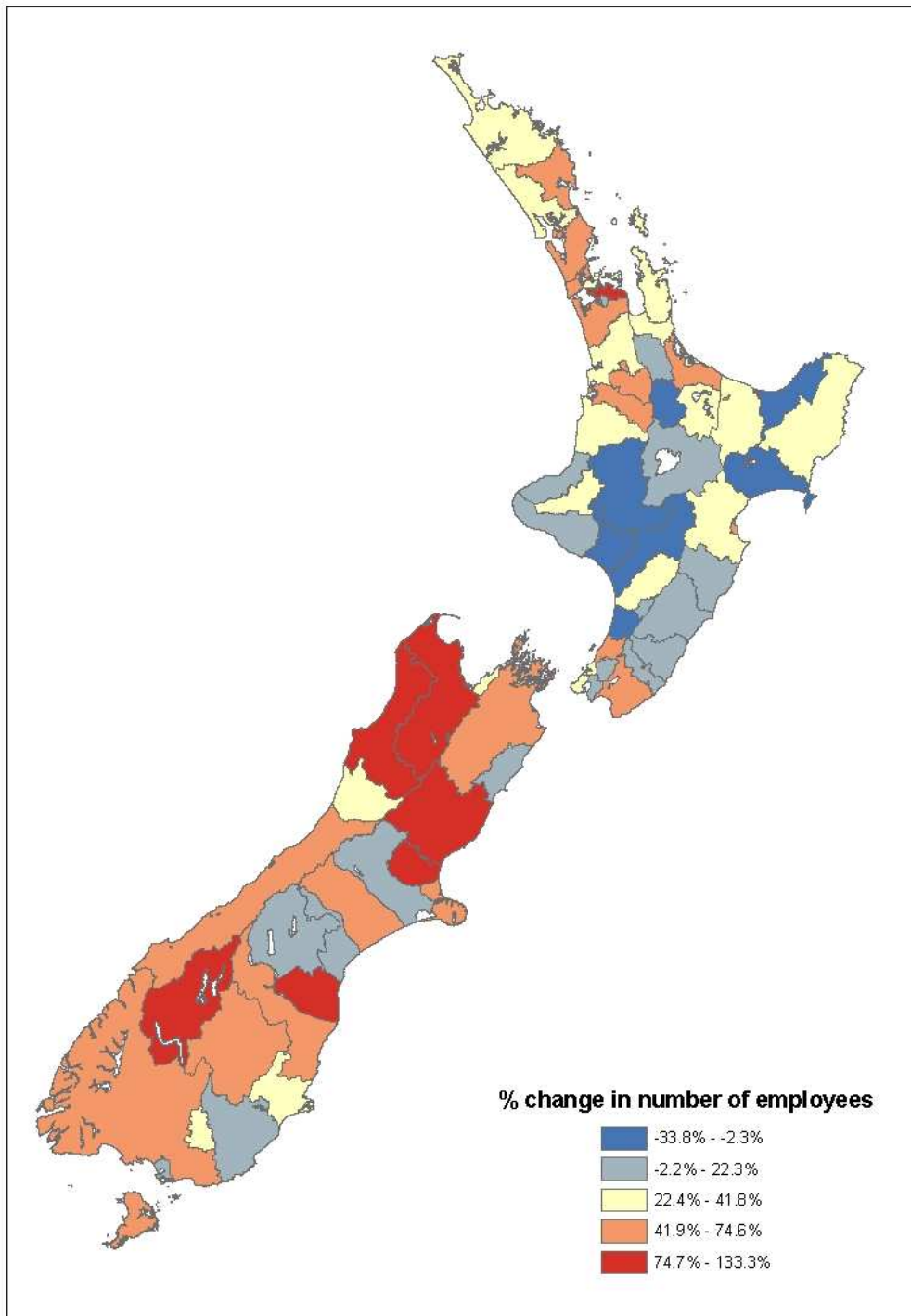
There seems to be considerable growth across many areas of the South Island. In many of the rural areas this will be from a very low base, but is nonetheless a positive result reflecting more opportunities for highly skilled workers in the private sector.

The fastest growth in the Auckland region has been in the areas surrounding Auckland City, rather than Auckland City itself. Manukau City, with private KI sector employment growth of 85%, has the fastest growth of any pre-dominantly urban TA in the country. There has also been strong growth in Rodney District (54%), North Shore City (45%) and Waitakere City (44%).

This may indicate that some of the KI sectors are now establishing their base in the areas around Auckland City, as the city continues to grow. It is a common feature of the knowledge economy to see 'satellite areas' of a major city develop their own particular niches, where they can form a mutually beneficial relationship with the main centre.

The main stories for Manukau City are the development of its 'Professional and Scientific Equipment Manufacturing' sector, from almost nothing to employing over 1,500 people, and nearly tripling the size of its 'Management and Related Consulting Services' sector, which now employs around 3,900 people.

**Chart 3.14: Employment change in private knowledge intensive sectors, 2000-2008\***



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)  
\*Figures for each area are shown in chart 4.5 in the appendix

The maps of the overall scale of private and public KI sector employment (chart 3.15) show that they are clustered in a similar way, with many TAs having very little of either type of employment. The main difference is that Auckland City dominates private KI sector employment to a much greater extent than it does the public KI sector. The public KI sector is generally more spread out with cities such as Dunedin and Palmerston North becoming more prominent.

**Chart 3.15: The scale of private and public knowledge intensive services sectors, 2008<sup>14</sup>**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

<sup>14</sup> The scale of employment in each TA is represented by the size of the circle at its centre. The circles do not represent where employment is located within each TA.

### 3.5 Inside Canterbury region

The Canterbury region is, unsurprisingly, dominated by Christchurch City in terms of its knowledge economy (chart 3.16). Christchurch City has both the highest number of KI sector workers, and the highest proportion of its workforce in these sectors (30%).

Christchurch City has seen strong employment growth of 50% in its private KI sectors over the period 2000-08. This is considerably faster growth than the growth in either Auckland City or Wellington City, and is well ahead of the overall national figure of 35% growth.

This is in contrast to the public KI sectors, where Christchurch City has only seen a modest growth of 14% from 2000 to 2008. This is well short of the growth seen in Wellington (41%) or Auckland (30%), and is below the national average (22%). It seems to be the private sector that is driving growth in KI employment in both Christchurch City and the Canterbury region generally.

After Christchurch City, the districts of Selwyn and Timaru are the only areas with more than a fifth of their workers in the KI sectors. Nearly two thirds of private KI sector employment in Selwyn is within 'Scientific Research Services' (due to a cluster of research organisations around the Lincoln township), and education dominates in the Selwyn public KI sector (with Lincoln University playing a major role). In Timaru the biggest private KI sectors are 'Legal and Accounting Services' and 'Newspaper, Periodical, Book and Directory Publishing', while education and hospitals are the significant public KI sector employers. Selwyn in particular is a good example of how small areas can develop specialisations in specific private KI sectors, particularly when they are in range of a major urban centre.

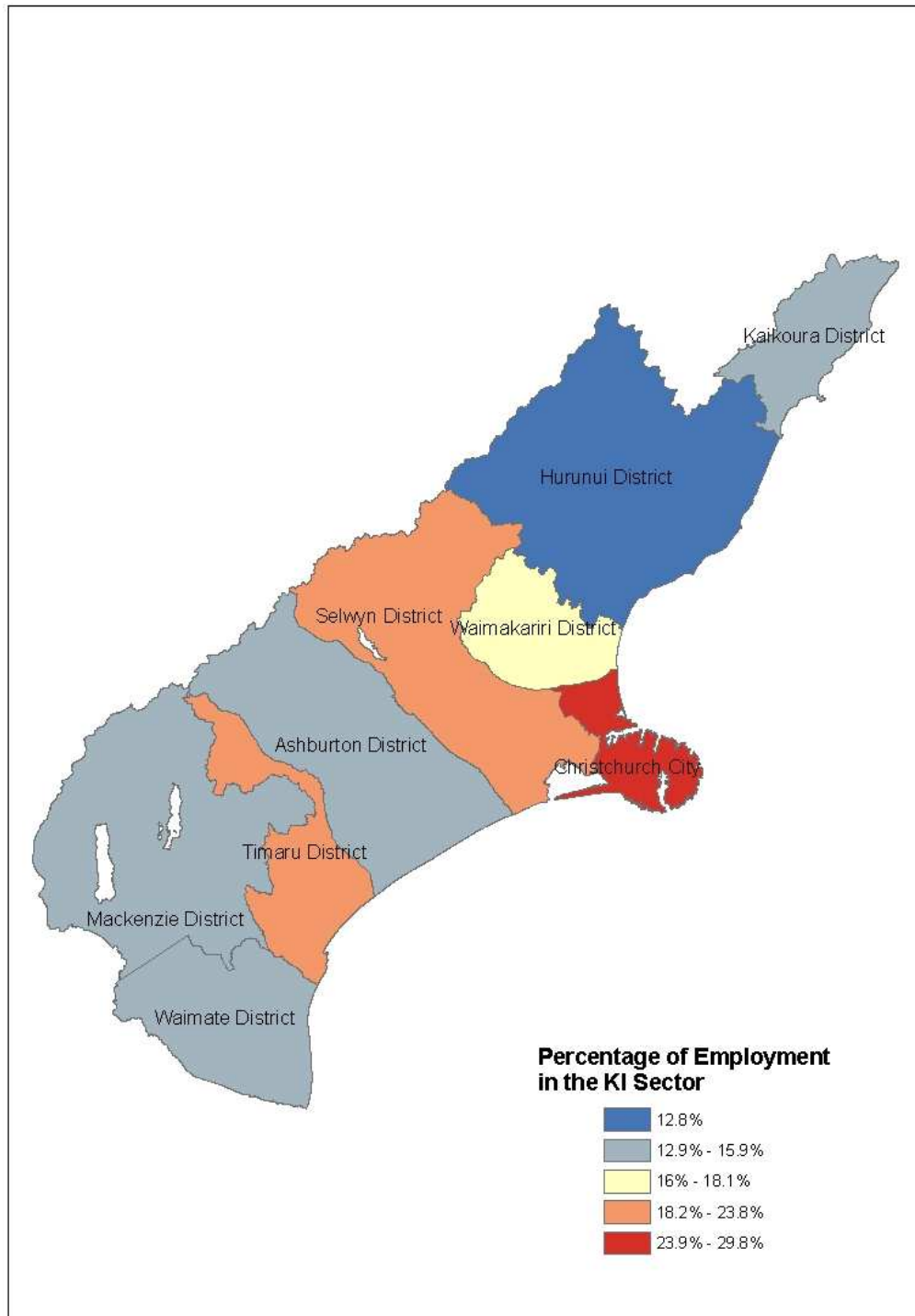
The Waimate district has actually seen the fastest private KI sector growth of any TA in the country, more than doubling its employment in this sector. However this is from a very low base and reflects modest gains in 'Management and Related Consulting Services', 'Scientific Research Services' and 'Financial Asset Investing'.

The Waimakariri district also saw very strong employment growth, from a low base, in its private KI industries. Waimakariri saw growth across these industries of 94%, which was the fourth highest in the country (after Waimate, Queenstown-Lakes and Buller). The growth was driven by increases in 'Management and Related Consulting Services', 'Civic, Professional and Other Interest Groups', 'Architectural, Engineering and Other Technical Services', 'Legal and Accounting Services' and the generic category 'Other Administrative Services'.

Overall the region's private sector knowledge economy is heavily reliant upon Christchurch City and the research hub in Selwyn District (including Lincoln University). It is encouraging that Christchurch City is growing quickly in terms of its private KI sector employment, showing that the region is competing effectively with Auckland and Wellington for high-calibre private sector workers.

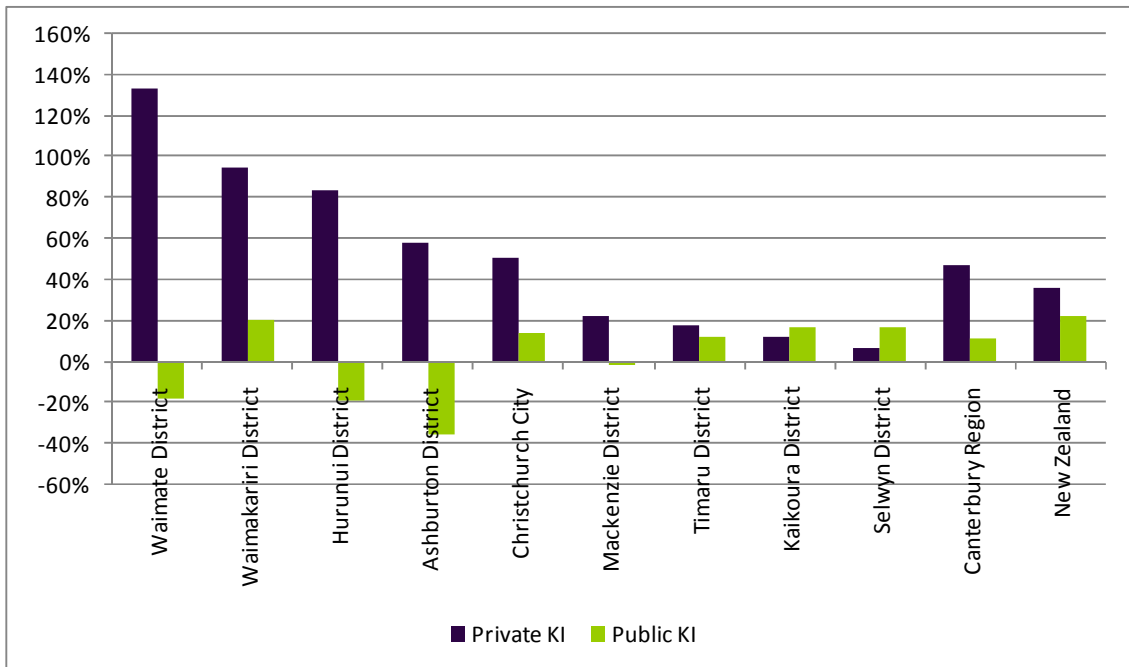
Christchurch is in a promising position for further development with an international airport, two universities and two polytechnics. If a higher proportion of South Island graduates can be attracted to develop their careers and business ideas in Christchurch then there will be a steady flow of high calibre workers available to local businesses.

**Chart 3.16: Share of employment in the knowledge intensive sectors by territorial authority in the Canterbury region, 2008**



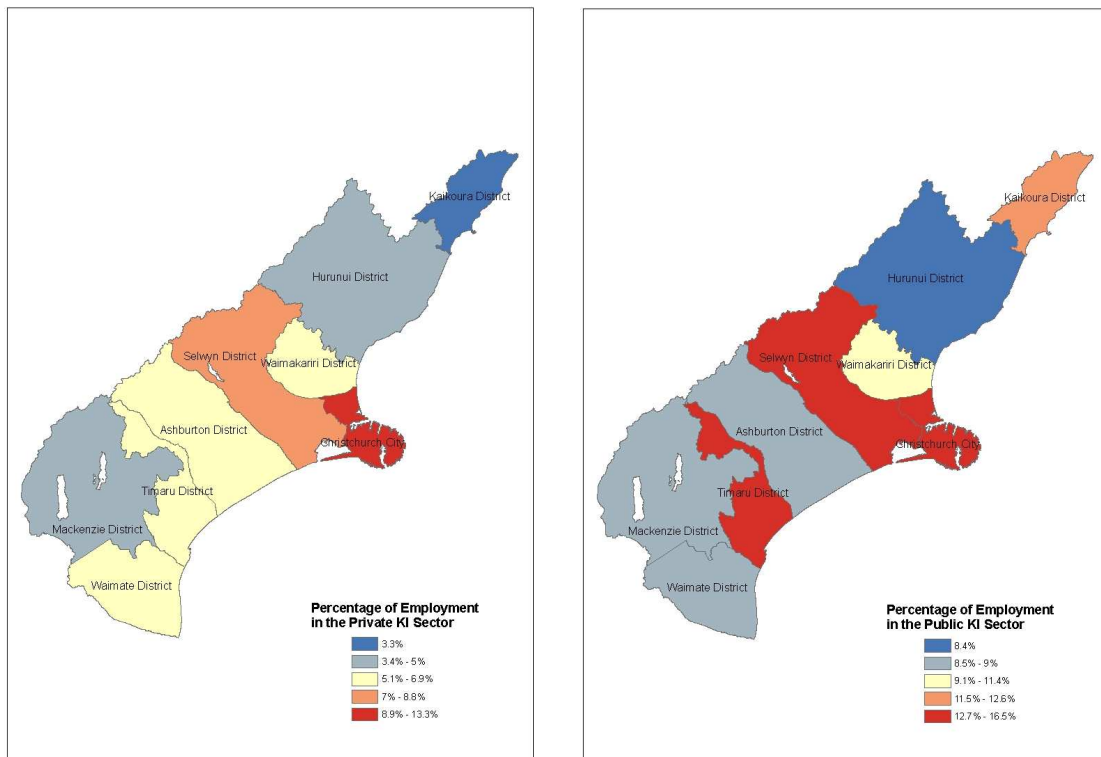
Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 3.17: Employment change in the knowledge intensive sectors by territorial authority in the Canterbury region, 2000-2008**



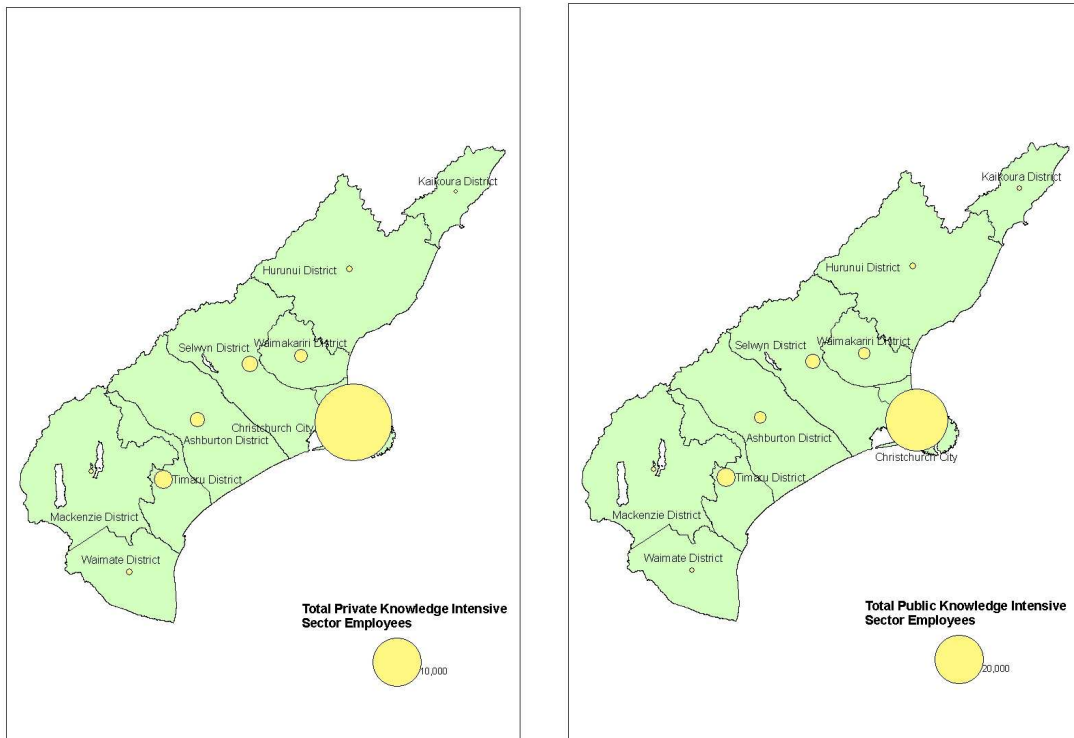
Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 3.18: The local geography of private and public knowledge intensive sectors in Canterbury region, 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 3.19: The scale of the private and public knowledge intensive sectors by Territorial Authority, 2008**



Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

### 3.6 A typology of local knowledge economies in New Zealand

This section provides a typology of knowledge economies at the TA level, which can be used as a framework for identifying areas with particularly economic characteristics. The typology is based upon the strength of an area's knowledge economy and how it is made up from private and public KI sectors.

**Chart 3.20: The typology of knowledge economies**

<b>Knowledge Economy Groups</b>	<b>Members</b>
A: Strong presence of private sector knowledge intensive services (over 20% of total employment in these sectors)	Wellington City, Auckland City
B: Significant presence of both private and public knowledge intensive services (over 10% of total employment in private KI sectors)	North Shore City, Hamilton City, Chatham Islands Territory, Christchurch City, Lower Hutt City, Dunedin City, Manukau City, Nelson City, Upper Hutt City, Whangarei District, New Plymouth District
C: Significant presence of public knowledge intensive services (over 15% of total employment in the public KI sectors)	Porirua City, Palmerston North City, Whakatane District, Grey District, Masterton District, Wanganui District, Invercargill City, Hauraki District, Tauranga City, Rotorua District, Far North District, Opotiki District, Gisborne District, Stratford District, Kapiti Coast District, South Waikato District, Waitakere City, Wairoa District, Selwyn District
D: Below average levels of both public and private knowledge intensive services	Napier City, Queenstown-Lakes District, Waikato District, Buller District, Waipa District, Rodney District, Westland District, Taupo District, Waitomo District, Otorohanga District, Carterton District, Timaru District, Tasman District, Waimakariri District, Waimate District, Waitaki District, Hastings District, Marlborough District, Matamata-Piako District, Ashburton District, Thames-Coromandel District, Central Otago District, Papakura District, Franklin District, Western Bay of Plenty District, South Taranaki District, Manawatu District, Mackenzie District, Ruapehu District, Gore District, Horowhenua District, Kaipara District, Hurunui District, Rangitikei District, South Wairarapa District, Tararua District, Kaikoura District, Kaverau District, Central Hawke's Bay District, Clutha District, Southland District

The criteria were applied sequentially, so any TA that qualifies for group B will not appear in group C.

- **Group A** are the main centres of the private sector knowledge intensive services. Wellington City and Auckland City stand out from the rest of New Zealand by some distance in this regard.
- **Group B** has a developed private sector knowledge intensive economy, though not on a par with Wellington or Auckland. Their workers in the knowledge intensive sectors are generally split quite evenly between the private and public sectors. These areas are mostly significant provincial towns and cities.
- **Group C** has quite a low level private sector knowledge intensive economy, and its members depend upon public services for most of their knowledge intensive jobs. This group includes urban centres such as Palmerston North City and Tauranga City, but also includes more rural areas such as Far North District, Otago District and Wairoa District.
- **Group D** contains the local economies that are relatively weak in both the private and public knowledge intensive sectors. These are mostly rural districts, reflecting the tendency of knowledge intensive sectors to cluster around urban areas. Napier City and Queenstown-Lakes District weren't far below the cut-off for Group B, and both have shown strong private KI sector growth over 2000-2008 so may be close to joining this group. Most of the rural falls within Group D, including the whole of the Canterbury region with the exceptions of Christchurch City and Selwyn (which is just above the cut-off for Group C).

### 3.7 Summary

The private knowledge intensive (KI) sectors have generated a steadily increasing proportion of national GDP over the past ten years. All of the private KI sectors have grown, with the Communications sector having increased its output most quickly. The public KI sectors generated a slightly increased proportion of national GDP, mostly due to 'Education, Health and Other Services'. Overall the KI sectors increased their share of national GDP from 36.9% in December 1996 to 45.5% in December 2008.

The KI sectors have also seen more rapid employment growth than the rest of the economy, expanding by 28% overall during the period 2000-08. The KI industries in the "Professional, Scientific & Technical Services" sector accounted for most growth in the private sector, though "Financial & Insurance Services" also grew. In the public sector there was significant employment growth across health, education and public administration.

Among the major individual industries seeing the most rapid growth were 'Professional and Scientific Equipment Manufacturing', 'Management and Related Consulting Services', 'Computer System Design and Related Services' and 'Architectural, Engineering and Technical Services'. The most significant employment drop was in 'Newspaper, Periodical, Book and Directory Publishing', while there was sharp growth in the much smaller industries of 'Software Publishing' and 'Internet Publishing and Broadcasting'.

At the regional level this report found that, similarly to the UK, the private sector knowledge economy is highly clustered while the public sector knowledge economy is much more decentralised and provides the large majority of knowledge intensive employment in the more rural regions. For the private sector, Auckland and Wellington are well ahead of all other regions in terms of the proportion of their workforce working in these sectors. Canterbury, Nelson and Waikato are developing regions that form a second tier. It was noted that Auckland, Wellington and Canterbury have different specialisations within the private knowledge intensive sectors.

The results are more interesting at the TA level, due to the significant economic differences within some regions. There were strong results for private knowledge intensive sector employment for North Shore City and Hamilton City, and one factor may be that these cities are successfully exploiting their proximity to Auckland. In the South Island, Christchurch City had the highest proportion of workers in the private KI sectors while Dunedin City had the highest proportion in the public KI sectors. Christchurch is behind Auckland, Wellington and a couple of the smaller North Island cities in terms of the proportion of its workforce in the private KI sectors. But Christchurch has seen significantly faster employment growth (50% in eight years) in the private KI sectors than Auckland or Wellington, so it is gaining ground.

There is a lot of growth happening around Auckland City, more so than in the city itself, and Manukau in particular has developed its private KI sectors quickly (85% employment growth in eight years). The suggestion is that more knowledge intensive businesses are seeing advantages in locating themselves just outside of the main city. North Shore City and Hamilton City have seen strong growth, while Auckland and Wellington continue to grow at a healthy rate. There have also been high rates of growth, albeit from a low baseline, in areas around the South Island with Queenstown-Lakes District standing out.

Christchurch City dominates the Canterbury region in terms of private KI sector employment but there is a valuable centre of 'Scientific Research Services' and Lincoln University based in Selwyn district. Recent growth in private KI sector employment in Christchurch has been across a broad range of sectors, including rapid expansion in 'Architectural, Engineering and Technical Services' and 'Computer System Design and Related Services'. The Canterbury workforce has different levels of knowledge intensity to the national workforce in some sectors, with higher skilled workers in electricity generation and supply but lower skilled workers in a range of industries including 'Telecommunication Services'.

The typology of knowledge economies highlighted the dominance of the Auckland and Wellington regions in the private KI sectors. Not only are Auckland and Wellington cities the only areas with more than a fifth of their workforce in these sectors, but they are supported by neighbouring areas in their region with a balance of private and public KI employment (North Shore and Manukau cities in Auckland region, Upper and Lower Hutt cities in Wellington region). Other cities and urban areas, such as Christchurch, are isolated by comparison. The more decentralised public sector tends to dominate knowledge intensive employment in most areas outside the urban centres. For the South Island knowledge economy to develop it is vital that Christchurch, Dunedin and the research hub in Selwyn District are able to forge productive links and be able to retain more graduates from the local universities.

This methodology can be used to track knowledge economy trends at the regional and sub-regional level, identifying which KI sectors are growing most quickly and where. This information can be used to ensure that adequate and relevant

training is available locally, to plan the development of local economies, to market the area to skilled workers and to help employers identify where there are pools of workers with the skills they require.

Further analysis could be carried out on KI industries of particular interest. For example, the rapid employment growth in 'Management and Related Consulting Services' seems to have been driven principally by growth in the sub-industry of 'Corporate Head-Office Management Services'. Over the 2000-08 period employment in this sub-industry has more than tripled in Auckland City, Manakau City, Whangarei District, Hamilton City, Wellington City and Dunedin City. Research could be undertaken to identify why these locations in particular have seen such rapid growth and how the structure of the local and national economy is changing.

## APPENDIX 1: FURTHER TABLES ON THE KNOWLEDGE ECONOMY

**Chart 4.1: Total employees by private knowledge intensive sector for New Zealand and the three largest regions (with percentage of national total), 2008**

Industry	New Zealand	Canterbury	% of total	Wellington	% of total	Auckland	% of total
C184 Pharmaceutical and Medicinal Product Manufacturing	1,930	170	8.8%	150	7.8%	1,360	70.5%
C241 Professional and Scientific Equipment Manufacturing	3,390	410	12.1%	130	3.8%	2,410	71.1%
C242 Computer and Electronic Equipment Manufacturing	3,760	1,250	33.2%	400	10.6%	1,610	42.8%
D262 Electricity Transmission	540	35	6.5%	420	77.8%	40	7.4%
D264 On Selling Electricity and Electricity Market Operation	1,010	260	25.7%	60	5.9%	580	57.4%
D270 Gas Supply	230	-	0.0%	60	26.1%	50	21.7%
D281 Water Supply, Sewerage and Drainage Services	1,670	65	3.9%	230	13.8%	730	43.7%
F372 Pharmaceutical and Toiletry Goods Wholesaling	4,810	280	5.8%	350	7.3%	3,770	78.4%
J541 Newspaper, Periodical, Book and Directory Publishing	14,610	1,980	13.6%	1,840	12.6%	5,330	36.5%
J542 Software Publishing	40	18	45.0%	3	7.5%	18	45.0%
J551 Motion Picture and Video Activities	4,040	360	8.9%	700	17.3%	2,060	51.0%
J561 Radio Broadcasting	2,660	230	8.6%	570	21.4%	940	35.3%
J562 Television Broadcasting	2,890	130	4.5%	230	8.0%	2,400	83.0%
J570 Internet Publishing and Broadcasting	85	0	0.0%	6	7.1%	75	88.2%
J580 Telecommunications Services	9,900	1,630	16.5%	1,940	19.6%	5,470	55.3%
J591 Internet Service Providers and Web Search Portals	930	130	14.0%	120	12.9%	520	55.9%
J592 Data Processing, Web Hosting and Electronic Information Storage Services	3,030	240	7.9%	1,350	44.6%	1,140	37.6%
J601 Libraries and Archives	4,510	520	11.5%	1,000	22.2%	1,350	29.9%
J602 Other Information Services	40	0	0.0%	0	0.0%	35	87.5%
K621 Central Banking	260	-	0.0%	260	100.0%	-	0.0%
K623 Non-depository Financing	2,140	280	13.1%	95	4.4%	1,400	65.4%
K624 Financial Asset Investing	2,610	290	11.1%	250	9.6%	1,280	49.0%
K631 Life Insurance	2,690	35	1.3%	1,290	48.0%	1,310	48.7%
K633 Superannuation Funds	50	0	0.0%	40	80.0%	9	18.0%
K641 Auxiliary Finance and Investment Services	8,600	890	10.3%	1,840	21.4%	4,360	50.7%
L664 Non-Financial Intangible Assets (except Copyrights) Leasing	960	180	18.8%	60	6.3%	540	56.3%
M691 Scientific Research Services	7,410	1,300	17.5%	1,480	20.0%	1,780	24.0%
M692 Architectural, Engineering and Technical Services	29,670	3,670	12.4%	4,570	15.4%	12,140	40.9%
M693 Legal and Accounting Services	31,490	3,770	12.0%	4,750	15.1%	11,810	37.5%
M694 Advertising Services	4,770	420	8.8%	520	10.9%	3,240	67.9%
M695 Market Research and Statistical Services	4,650	390	8.4%	900	19.4%	3,050	65.6%
M696 Management and Other Consulting Services	35,280	2,820	8.0%	6,050	17.1%	17,540	49.7%
M697 Veterinary Services	4,060	550	13.5%	320	7.9%	870	21.4%
M699 Other Professional, Scientific and Technical Services	1,550	190	12.3%	530	34.2%	500	32.3%
M700 Computer Systems Design and Related Services	19,730	2,480	12.6%	5,030	25.5%	10,130	51.3%
N729 Other Administrative Services	20,110	1,860	9.2%	3,570	17.8%	8,970	44.6%
R891 Museum Operation	2,480	250	10.1%	730	29.4%	500	20.2%
R892 Parks and Gardens Operations	3,850	470	12.2%	330	8.6%	630	16.4%
R900 Creative and Performing Arts Activities	2,630	220	8.4%	690	26.2%	800	30.4%
S954 Religious Services	7,810	1,270	16.3%	1,470	18.8%	2,500	32.0%
S955 Civic, Professional and Other Interest Group Services	13,870	1,450	10.5%	3,170	22.9%	4,260	30.7%
All Industries	266,745	30,493	11.4%	47,504	17.8%	117,507	44.1%

Source: Business Demography data (Statistics NZ)

**Chart 4.2: Total employees by public knowledge intensive sector for New Zealand and the three largest regions (with percentage of national total), 2008**

Industry	New Zealand	Canterbury	% of total	Wellington	% of total	Auckland	% of total
O751 Central Government Administration	29,580	1,980	6.7%	15,040	50.8%	5,470	18.5%
O752 State Government Administration	-	-	0.0%	-	0.0%	-	0.0%
O753 Local Government Administration	17,610	2,270	12.9%	2,320	13.2%	4,580	26.0%
O754 Justice	3,020	220	7.3%	1,190	39.4%	600	19.9%
O755 Government Representation	-	-	0.0%	-	0.0%	-	0.0%
O772 Regulatory Services	6,140	630	10.3%	2,290	37.3%	980	16.0%
P802 School Education	89,610	10,560	11.8%	9,560	10.7%	28,920	32.3%
P810 Tertiary Education	39,060	5,200	13.3%	6,000	15.4%	12,130	31.1%
P821 Adult, Community and Other	13,310	1,690	12.7%	2,190	16.5%	5,120	38.5%
P822 Educational Support Services	1,230	55	4.5%	730	59.3%	180	14.6%
Q840 Hospitals	60,660	9,150	15.1%	6,150	10.1%	18,250	30.1%
Q851 Medical Services	13,610	1,960	14.4%	1,450	10.7%	4,390	32.3%
Q852 Pathology and Diagnostic Imaging Services	4,170	1,000	24.0%	290	7.0%	1,220	29.3%
Q853 Allied Health Services	36,910	4,450	12.1%	6,040	16.4%	9,530	25.8%
Q859 Other Health Care Services	4,910	1,240	25.3%	540	11.0%	1,280	26.1%
<b>All Industries</b>	<b>319,820</b>	<b>40,405</b>	<b>12.6%</b>	<b>53,790</b>	<b>16.8%</b>	<b>92,650</b>	<b>29.0%</b>

Source: Business Demography data (Statistics NZ)

Charts 4.3, 4.4 and 4.5 are the complete tables from which extracts were shown in charts 3.12, 3.13 and 3.14 respectively.

**Chart 4.3: Full list of territorial authorities by share of employment in all knowledge intensive sectors, 2008\***

Rank	Territorial Authority	Share of Employment in KI Sector	Rank	Territorial Authority	Share of Employment in KI Sector
1	Wellington City	51%	38	Waitomo District	20%
2	Auckland City	39%	39	Rodney District	20%
3	Porirua City	38%	40	Thames-Coromandel District	20%
4	Hamilton City	38%	41	Taupo District	19%
5	Palmerston North City	35%	42	Wairoa District	19%
6	Dunedin City	34%	43	Horowhenua District	18%
7	North Shore City	32%	44	Waimakariri District	18%
8	Whakatane District	31%	45	Papakura District	18%
9	Nelson City	30%	46	Waitaki District	18%
10	Whangarei District	30%	47	Westland District	18%
11	Christchurch City	30%	48	Rangitikei District	17%
12	Grey District	29%	49	Kaipara District	16%
13	Lower Hutt City	29%	50	Franklin District	16%
14	Masterton District	28%	51	Ruapehu District	16%
15	Invercargill City	28%	52	Marlborough District	16%
16	Wanganui District	28%	53	Kaikoura District	16%
17	Chatham Islands Territory	27%	54	Waimate District	16%
18	Rotorua District	27%	55	Central Otago District	15%
19	Tauranga City	27%	56	Manawatu District	15%
20	New Plymouth District	26%	57	Gore District	15%
21	Manukau City	26%	58	Carterton District	15%
22	Kapiti Coast District	26%	59	Queenstown-Lakes District	15%
23	Hauraki District	25%	60	Ashburton District	15%
24	Upper Hutt City	25%	61	South Taranaki District	15%
25	Gisborne District	25%	62	Matamata-Piako District	15%
26	Waitakere City	25%	63	Otorohanga District	15%
27	Far North District	24%	64	Tararua District	14%
28	Selwyn District	24%	65	Tasman District	14%
29	Napier City	23%	66	Mackenzie District	14%
30	Opotiki District	22%	67	Kawerau District	14%
31	Stratford District	22%	68	Hurunui District	13%
32	Waikato District	22%	69	Clutha District	13%
33	Timaru District	22%	70	Western Bay of Plenty District	12%
34	Buller District	21%	71	Central Hawke's Bay District	12%
35	Hastings District	21%	72	South Wairarapa District	11%
36	Waipa District	21%	73	Southland District	8%
37	South Waikato District	20%			

\*This is the full table from chart 3.12.

Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 4.4: Full list of territorial authorities by share of employment in private knowledge intensive sectors, 2008\***

Rank	Territorial Authority	Share of Employment in Private KI Sector	Rank	Territorial Authority	Share of Employment in Private KI Sector
1	Wellington City	26%	38	Carterton District	7%
2	Auckland City	25%	39	Masterton District	7%
3	North Shore City	16%	40	Timaru District	7%
4	Hamilton City	16%	41	Tasman District	7%
5	Chatham Islands Territory	14%	42	Waimakariri District	7%
6	Christchurch City	13%	43	Waimate District	7%
7	Lower Hutt City	12%	44	Waitaki District	6%
8	Dunedin City	11%	45	Hastings District	6%
9	Manukau City	11%	46	Marlborough District	6%
10	Nelson City	11%	47	Matamata-Piako District	6%
11	Upper Hutt City	10%	48	Ashburton District	6%
12	Whangarei District	10%	49	Thames-Coromandel District	6%
13	New Plymouth District	10%	50	Central Otago District	6%
14	Palmerston North City	10%	51	Papakura District	6%
15	Kapiti Coast District	10%	52	Stratford District	6%
16	Napier City	10%	53	Franklin District	6%
17	Rotorua District	10%	54	Western Bay of Plenty District	5%
18	Queenstown-Lakes District	10%	55	South Taranaki District	5%
19	Waikato District	9%	56	Opotiki District	5%
20	Porirua City	9%	57	Manawatu District	5%
21	Invercargill City	9%	58	Mackenzie District	5%
22	Tauranga City	9%	59	Ruapehu District	5%
23	Selwyn District	9%	60	South Waikato District	4%
24	Waitakere City	9%	61	Gore District	4%
25	Wanganui District	8%	62	Horowhenua District	4%
26	Buller District	8%	63	Kaipara District	4%
27	Waipa District	8%	64	Hurunui District	4%
28	Whakatane District	8%	65	Rangitikei District	4%
29	Rodney District	8%	66	South Wairarapa District	4%
30	Westland District	8%	67	Tararua District	4%
31	Taupo District	8%	68	Wairoa District	3%
32	Gisborne District	7%	69	Kaikoura District	3%
33	Hauraki District	7%	70	Kawerau District	3%
34	Waitomo District	7%	71	Central Hawke's Bay District	3%
35	Otorohanga District	7%	72	Clutha District	3%
36	Far North District	7%	73	Southland District	2%
37	Grey District	7%			

\*This is the full table from chart 3.13.

Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 4.5: Full list of territorial authorities by employment change in private knowledge intensive sectors, 2000-2008\***

Rank	Territorial Authority	Change of Employment in Private KI Sector	Rank	Territorial Authority	Change of Employment in Private KI Sector
1	Waimate District	133%	38	Grey District	31%
2	Queenstown-Lakes District	120%	39	Dunedin City	31%
3	Buller District	95%	40	Stratford District	30%
4	Waimakariri District	94%	41	Nelson City	29%
5	Tasman District	86%	42	Rotorua District	27%
6	Manukau City	85%	43	Gore District	26%
7	Hurunui District	84%	44	Porirua City	26%
8	Waipa District	75%	45	Thames-Coromandel District	25%
9	Hamilton City	69%	46	Waikato District	24%
10	Central Otago District	65%	47	Wellington City	23%
11	Westland District	64%	48	Papakura District	22%
12	Western Bay of Plenty District	63%	49	Mackenzie District	22%
13	South Wairarapa District	61%	50	Central Hawke's Bay District	21%
14	Whangarei District	59%	51	Chatham Islands Territory	21%
15	Ashburton District	58%	52	New Plymouth District	20%
16	Otorohanga District	54%	53	Palmerston North City	19%
17	Rodney District	54%	54	Matamata-Piako District	18%
18	Kawerau District	51%	55	Timaru District	17%
19	Christchurch City	50%	56	Taupo District	17%
20	Napier City	48%	57	Clutha District	16%
21	Waitaki District	47%	58	Masterton District	14%
22	Kapiti Coast District	47%	59	South Taranaki District	13%
23	Franklin District	45%	60	Kaikoura District	12%
24	Southland District	45%	61	Invercargill City	11%
25	North Shore City	45%	62	Upper Hutt City	11%
26	Marlborough District	44%	63	Carterton District	8%
27	Waitakere City	44%	64	Lower Hutt City	8%
28	Kaipara District	42%	65	Selwyn District	6%
29	Waitomo District	40%	66	Tararua District	6%
30	Whakatane District	40%	67	Ruapehu District	-2%
31	Manawatu District	38%	68	Wairoa District	-4%
32	Gisborne District	32%	69	Opotiki District	-5%
33	Hauraki District	32%	70	Wanganui District	-7%
34	Tauranga City	32%	71	Rangitikei District	-16%
35	Hastings District	32%	72	South Waikato District	-22%
36	Auckland City	32%	73	Horowhenua District	-34%
37	Far North District	32%			

\*This is the full table from chart 3.14.

Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

**Chart 4.6: Employment change at national level by knowledge intensive industry, 2000-2008**

Industry	Employment in 2008	Change 2000-08
J542 Software Publishing	40	567%
D262 Electricity Transmission	540	468%
J570 Internet Publishing and Broadcasting	85	372%
L664 Non-Financial Intangible Assets (Except Copyrights) Leasing	960	174%
C241 Professional and Scientific Equipment Manufacturing	3,390	113%
K624 Financial Asset Investing	2,610	107%
J591 Internet Service Providers and Web Search Portals	930	94%
M696 Management and Related Consulting Services	35,280	91%
M700 Computer System Design and Related Services	19,730	89%
P822 Educational Support Services	1,230	86%
R892 Parks and Gardens Operations	3,850	83%
K623 Non-Depository Financing	2,140	73%
M692 Architectural, Engineering and Technical Services	29,670	67%
K641 Auxiliary Finance and Investment Services	8,600	59%
M697 Veterinary Services	4,060	52%
M694 Advertising Services	4,770	51%
O754 Justice	3,020	40%
P821 Adult, Community and Other Education	13,310	40%
R891 Museum Operation	2,480	40%
Q859 Other Health Care Services	4,910	39%
S954 Religious Services	7,810	38%
O751 Central Government Administration	29,580	37%
J602 Other Information Services	40	33%
N729 Other Administrative Services	20,110	33%
O753 Local Government Administration	17,610	33%
S955 Civic, Professional and Other Interest Group Services	13,870	33%
Q853 Allied Health Services	36,910	31%
M691 Scientific Research Services	7,410	30%
C184 Pharmaceutical and Medicinal Product Manufacturing	1,930	29%
Q851 Medical Services	13,610	28%
O772 Regulatory Services	6,140	27%
J551 Motion Picture and Video Activities	4,040	26%
Total Industry	1,969,070	24%
P810 Tertiary Education	39,060	23%
J562 Television Broadcasting	2,890	22%
M693 Legal and Accounting Services	31,490	21%
C242 Computer and Electronic Equipment Manufacturing	3,760	19%
Q840 Hospitals	60,660	19%
M699 Other Professional, Scientific and Technical Services	1,550	15%
F372 Pharmaceutical and Toiletry Goods Wholesaling	4,810	13%
R900 Creative and Performing Arts Activities	2,630	12%
J580 Telecommunications Services	9,900	11%
J561 Radio Broadcasting	2,660	11%
P802 School Education	89,610	11%
M695 Market Research and Statistical Services	4,650	10%
Q852 Pathology and Diagnostic Imaging Services	4,170	10%
J601 Libraries and Archives	4,510	10%
D281 Water Supply, Sewerage and Drainage Services	1,670	8%
D264 On Selling Electricity and Electricity Market Operation	1,010	5%
J592 Data Processing, Web Hosting and Electronic Information Storage Services	3,030	-4%
K621 Central Banking	260	-21%
K631 Life Insurance	2,690	-21%
J541 Newspaper, Periodical, Book and Directory Publishing	14,610	-26%
D270 Gas Supply	230	-30%
K633 Superannuation Funds	50	-55%

Source: Department of Labour 2009, derived from Business Demography data (Statistics NZ)

## **APPENDIX 2: APPLYING THE KNOWLEDGE ECONOMY CRITERIA TO THE CANTERBURY WORKFORCE**

Chart 4.7 shows the Canterbury sectors that would meet the knowledge intensive criteria if these were applied to the Canterbury workforce rather than the national workforce for each sector.<sup>15</sup>

The "Unique to Canterbury?" column shows those industries where the Canterbury workforce meets the knowledge-intensive criteria but the national workforce does not. So in these sectors the Canterbury workforce has a higher than average level of knowledge intensity.

Several of these industries have a very small presence in Canterbury so those results are almost meaningless. But it is significant that "Electricity Supply" and "Electricity Generation" in the private sector, and "Other Social Assistance Services" in the public sector, meet the knowledge economy criteria in Canterbury but not nationally. It may be the case that Canterbury contains some of the more technical work around the generation and supply of electricity.

Chart 4.8 shows the industries where the national workforce meets the criteria for a knowledge intensive sector, but the Canterbury workforce does not. So in these sectors Canterbury has a lower than average level of knowledge intensity. There are some significant industries including 'newspaper, periodical, book and directory publishing', 'motion picture and video activities', radio and television broadcasting, 'telecommunications services', several finance sectors including 'financial asset investing', 'advertising services' and the generic category 'other administrative services'. The 'Telecommunications services' sector stands out as a significant employer, important for economic development, where Canterbury appears to have significantly lower knowledge intensity than the national average.

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<sup>15</sup> In fact we have only been able to test for whether they meet the "25% of workforce are graduates" criteria as we did not have regional data by both industry and occupation, but at the national level every sector that met the graduates criteria also comfortably met the "30% of workforce are in professional, managerial or technical occupations" criteria.

**Chart 4.7: Definition of the knowledge economy when the criteria are applied to the Canterbury workforce, 2006**

Industry	Total workforce	Unique to Canterbury?
B060 Coal Mining	6	Y
B101 Exploration	9	Y
C122 Cigarette and Tobacco Product Manufacturing	6	Y
C184 Pharmaceutical and Medicinal Product Manufacturing	168	
C241 Professional and Scientific Equipment Manufacturing	432	
C242 Computer and Electronic Equipment Manufacturing	1,362	
D261 Electricity Generation	96	Y
D264 On Selling Electricity and Electricity Market Operation	174	
J542 Software Publishing	18	
J570 Internet Publishing and Broadcasting	12	
J591 Internet Service Providers and Web Search Portals	96	
J601 Libraries and Archives	504	
K641 Auxiliary Finance and Investment Services	1,170	
L662 Farm Animals and Bloodstock Leasing	6	Y
M691 Scientific Research Services	1,317	
M692 Architectural, Engineering and Technical Services	4,056	
M693 Legal and Accounting Services	4,101	
M695 Market Research and Statistical Services	918	
M696 Management and Other Consulting Services	3,660	
M697 Veterinary Services	528	
M699 Other Professional, Scientific and Technical Services	369	
M700 Computer Systems Design and Related Services	2,538	
O751 Central Government Administration	2,385	
O753 Local Government Administration	1,536	
O754 Justice	258	
O755 Government Representation	9	
P801 Preschool Education	1,416	Y
P802 School Education	10,173	
P810 Tertiary Education	3,969	
P821 Adult, Community and Other Education	2,589	
P822 Educational Support Services	87	
Q840 Hospitals	7,419	
Q851 Medical Services	1,857	
Q852 Pathology and Diagnostic Imaging Services	828	
Q853 Allied Health Services	4,410	
Q879 Other Social Assistance Services	1,917	Y
R891 Museum Operation	216	
R892 Parks and Gardens Operations	429	
R900 Creative and Performing Arts Activities	687	
S954 Religious Services	954	
S955 Civic, Professional and Other Interest Group Services	1,683	
S960 Private Households Employing Staff	3	Y

Source: 2006 Census, Statistics NZ

**Chart 4.8: Sectors in the national knowledge economy where the Canterbury workforce would not meet the criteria, 2006**

Industry	Canterbury workforce
D262 Electricity Transmission	36
D270 Gas Supply	24
D281 Water Supply, Sewerage and Drainage Services	135
F372 Pharmaceutical and Toiletry Goods Wholesaling	348
J541 Newspaper, Periodical, Book and Directory Publishing	1,398
J551 Motion Picture and Video Activities	447
J561 Radio Broadcasting	231
J562 Television Broadcasting	144
J580 Telecommunications Services	1,290
J592 Data Processing, Web Hosting and Electronic Information Storage Services	240
J602 Other Information Services	6
K621 Central Banking	96
K623 Non-depository Financing	198
K624 Financial Asset Investing	1,443
K631 Life Insurance	36
K633 Superannuation Funds	255
L664 Non-Financial Intangible Assets (except Copyrights) Leasing	174
M694 Advertising Services	552
N729 Other Administrative Services	2,148
O752 State Government Administration	3
O772 Regulatory Services	600
Q859 Other Health Care Services	630

Source: 2006 Census, Statistics NZ

