



High Value Manufacturing and Services

13 April 2012

Final Report

A sector profile prepared for the Ministry of
Science and Innovation

MARTIN^IJENKINS

Preface

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Introduction

- 1 This report describes the current nature and key characteristics of New Zealand's high value manufacturing and services (HVMS) sector and provides insights into different HVMS sub-sectors. The report:
 - defines the boundaries of the HVMS sector using Statistics New Zealand standard ANZSIC¹ industry codes for the sub-sectors that would most likely be of interest to an Advanced Technology Institute (ATI)
 - develops national and sub-national profiles of the HVMS sector based on available statistics and existing research, including:
 - the scale and location of participating firms (concentrations of industrial production and scale of output and labour force)
 - the nature of the sector (export intensity, ownership, research and development, innovation activities and areas of comparative strength - including in relation to revealed comparative advantage)
 - explains known issues and challenges constraining HVMS firms' innovation, and
 - discusses how the above might influence the role and functions of an ATI and the demand for its services.
- 2 For this exercise it has been critical to ensure that the definition is a) relevant to the proposed ATI and b) allows for easy extraction and analysis of data. As a result, our approach has been to build a definition of the HVMS sector by selecting and aggregating ANZSIC sub-sectors that we consider are likely to be important to an ATI.
- 3 The HVMS sector has deliberately been defined broadly. This analysis is designed to support the development of an ATI targeting approach and, at this point in the development of that approach, it is appropriate to provide a broad analysis to ensure that sub-sectors are not ruled out unduly.
- 4 Taking this approach means that the sectors covered here may not incorporate all New Zealand HVMS firms and will not completely align with the set of KIMS² firms identified by the Ministry of Economic Development (MED).

For example: within the food and beverage industry we are not interested in farms, supermarkets and wholesalers, but we are interested in firms associated with food and beverage manufacturing and providing digital, scientific and engineering services to the food and beverage industry. Using an ANZSIC-based approach provides a reasonable

¹ Australian and New Zealand Standard Industrial Classification, 2006.

² KIMS: Knowledge Intensive Manufacturing and Services – a term used by MED and others to describe essentially the same sector as HVMS.

approximation of the HVMS firms of interest. However, it does not allow us the precision to include and exclude individual firms below the six-digit ANZSIC reporting level.

Defining the HVMS sector

- 5 The HVMS sector is important to New Zealand because HVMS exports generate high returns to labour and therefore increase the country's productivity.³ Firms in these areas have the potential to propel New Zealand's export diversification.⁴
- 6 HVMS firms offer a significant potential contribution to New Zealand's economic growth, but the sector is considered to be highly differentiated from other sectors of the economy. HVMS firms have different markets and use different technologies, business models and strategies⁵ compared to non-HVMS firms, so it is likely that they will have different business needs (particularly around the development of new products and services) and face different barriers to business growth.
- 7 Defining the sector helps us to draw together information about the similarities between high-performing firms, to assist policy decisions on the most effective ways to provide support and assistance.
- 8 Several definitions of the HVMS sector have been applied in New Zealand, each using a different method (e.g. knowledge intensity of activities within industries, occupational criteria, building a list on a firm-by-firm basis).⁶ Though the underlying industry sub-sectors may be different across the various definitions of the HVMS sector, there is some value in comparing findings and we have done this where possible in this report.
- 9 There is no easy way to categorise HVMS firms without capturing some firms that do not meet the criteria. Defining the sector is made more difficult because many HVMS firms are involved in combinational technology that integrates existing technologies in new ways⁷ and the distinction between HVMS sub-sectors has become blurred by the underlying technologies applied (for example IT is ubiquitous among HVMS sub-sectors). The distinction between manufacturing and services has also become increasingly blurred as many manufacturers define themselves as providers of a lifetime service around a manufactured product.⁸

³ MED (2011) – BIM.

⁴ MED (2011) – BIM.

⁵ MED – Industry Policy and KIMS Businesses (not publicly available).

⁶ See Appendix 3 for more detail on other methods.

⁷ MED – Industry Policy and KIMS Business (not publicly available).

⁸ Deloitte (2011), Taking a closer look: New Zealand high value manufacturing and services value proposition report – for NZTE.

- 10 The definition of the HVMS sector for this analysis was initially based on mapping the OECD/Eurostat⁹ sector classifications to the ANZSIC industry codes used by Statistics New Zealand.
- 11 However, the OECD/Eurostat sub-categories were not considered fully suitable for this report because they are based on the level of technology intensity (e.g. high, medium-high tech) rather than on the underlying business activity or product. For this report, sub-sectors within the HVMS sector have instead been grouped, to the extent possible, by the capabilities and technologies underpinning them.
- 12 There are two key distinctions between the HVMS sector defined in this report and the OECD definition:
- The HVMS sector includes non high-tech sectors which we consider to be “high value” in the New Zealand context. For example, textiles, clothing, wood and furniture manufacturing may not be considered high tech industries, but in New Zealand they present significant opportunities for high value productivity gains through the application of new technologies.
 - There are also considerable differences in the service sub-sectors included in the HVMS and OECD definitions. The HVMS service sub-sectors are considered to be more relevant for New Zealand and to the Ministry of Science and Innovation (MSI) and the proposed ATI. They exclude services included by the OECD such as real estate, legal, accounting, recreational and education related services.
- 13 A key focus in selecting and grouping ANZSIC data has been to ensure that industry sub-sectors do not include large numbers of firms that are irrelevant and that may therefore hide the trends and information important to an ATI. There are likely to be many small firms (or small divisions that are part of larger firms) operating in sectors that are dominated by low tech operations and, where this is the case, we have tried to exclude them from the data because it would provide misleading results.

For example: although some architectural firms may develop and use high tech equipment, the ANZSIC subsector is dominated by architects and firms that will not be involved in such activity. Accordingly, the Architectural Services ANZSIC code has not been included because any data would be dominated by the low tech activities.

⁹ The OECD definition is based on the level of technology specific to the sector - measured by the ratio of R&D expenditure to value added. Other methods for defining the KIMS sector were considered by the OECD but were dismissed primarily due to lack of reliable data. Also see Eurostat 2008: http://europa.eu.int/estatref/info/sdds/en/htec/htec_sectors.pdf.

- 14 Table 1 outlines the sub-sectors that form the HVMS sector for the purposes of this analysis. A full description of the HVMS sub-sectors and their associated ANZSIC codes is contained in Appendix 1. The detailed sub-sector analysis beginning on page 53 also provides a full description of the ANZSIC codes within each sub-sector.

Table 1: HVMS sub-sectors

HVMS sub-sectors	
Manufacturing	<ul style="list-style-type: none"> • Food & Beverage • Textiles, Clothing and Footwear • Wood & Paper • Printing • Petroleum & Coal • Non-metal Materials • Metal Materials • Furniture & Other • Basic Chemicals • Polymers & Rubber • Pharmaceuticals • Electrical Equipment & Appliances • Machinery & Equipment • Motor Transport Equipment • Marine Transport Equipment • Other Transport Equipment • Scientific Instruments • Electronic Equipment
Services	<ul style="list-style-type: none"> • Digital & Creative • Heavy & Civil Engineering • Engineering, Surveying & Mapping • Scientific Research & Testing • ICT Services, Design & Publishing • Telecommunications
Energy & Mining	<ul style="list-style-type: none"> • Mining – Extraction & Exploration • Energy Generation & Transmission

- 15 The Energy & Mining sub-sectors are analysed separately because of their high capital intensity and, therefore, labour productivity. Greater emphasis is placed on describing the Manufacturing and Services sub-sectors.

NOTE TO READER:

Graphs throughout the report use the colours in the first column of Table 1 to help the reader distinguish between the high level groupings within the HVMS sector.

Summary of findings

NOTE TO READER:

HVMS sector firms are diverse. The use of averages throughout this document helps to convey key messages, but it will mask significant differences between firms even within sub-sectors. Further work could be performed to look at distributions of firms within sub-sectors, but this would require significant additional data.

- 16 Compared to other firms, HVMS firms:
- have higher labour productivity rates (value added per employee)
 - have a higher proportion of large firms (20+ employees)
 - are more likely to undertake innovative activities and spend more on product development (particularly very large HVMS firms)
 - are more likely to undertake R&D
 - are more likely to have introduced 'new to market' products
 - are more likely to have significant amounts (>25%) of foreign investment.

Table 2: Key HVMS Figures

Measure	HVMS	All NZ	% of total
Total value added (\$m)	37,513	130,607	29%
Total employment (000)	297	1,910	16%
Added value per employee (average) ¹⁰	\$121,000	\$86,000	-
Proportion of firms undertaking R&D ¹¹	14%	6%	-
Proportion of large firms (20+ employees)	7%	3%	-

- 17 These findings are consistent with MED's assessment of KIMS firms, which found that KIMS firms are:
- more productive
 - export a larger proportion of their total sales

¹⁰ HVMS average includes Energy & Mining sub-sector. The Labour Productivity section also provides a figure excluding this sub-sector because it has a very high level of labour productivity even compared with other HVMS sub-sectors.

¹¹ From R&D survey population.

- larger by employment
- more likely to be conducting research and development (R&D), and
- more likely to have foreign direct investment (FDI).¹²

18 The table on the following page shows the indicative rankings of the HVMS sub-sectors based on the key measures derived in this report.

¹² MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

Key findings for HVMS sub-sectors

Indicative Ranking of Sub-sectors	Full sub-sector data								Approximate sub-sector data*				
	Gross output 2010	Value added 2010	Value added growth 2005-10 (% change)	Total employment	Employment growth 2006-11	Labour productivity (value add / RME)	R&D Active	Ownership >25% Foreign	R&D and design share of prod dev spend	Businesses with product innovation	Products new to market (NZ)	Products new to market (world)	
Manufacturing													
Food & Beverage	1	1	1						23	4			
Textiles, Clothing & Footwear				26	24								
Wood & Paper	5		22	4	22		24						
Printing							24		2				
Petroleum & Coal	3	2		25		1	5	2		4	1		
Non-metal Materials			25						25	5	24		
Metal Materials	4			2			22		21	5			
Furniture and Other			21		25	21	21	25					
Basic Chemicals			23			5		5					
Polymers & Rubber			24		23								
Pharmaceuticals	25	25		24		22	2	4					
Electrical Equipment and Appliances		21	26			23			4		1	2	
Machinery and Equipment								23				5	
Motor Transport Equipment	26	26		21	24							5	
Marine Transport Equipment	24	23				25						5	
Other Transport Equipment												5	
Scientific Instruments	22			22					4		1	2	
Electronic Equipment (ICT)	23	24					4		4		1	2	
Services													
Digital & Creative								22	26	24		23	
Heavy and Civil Engineering			2		2			26		22	26	25	24
Engineering, Surveying & Mapping			4	5						1			
Scientific Research and Testing	21	22	3		5	26	1			1			
ICT Services, Design & Publishing		4	5	3	3				3	3			
Telecommunications		3			4	4			4			21	
Energy and Mining													
Mining - Extraction & Exploration			1	26	21	2	5	1	1	25	26	26	
Energy Generation & Transmission	2	5		23	1	3	3		26	24		21	

Key:
Top 5
Middle
Bottom 5
 (Total: 26)

*Approximate sub-sector data is based on data received in sub-sectors that do not exactly align with the HVMS sub-sectors
 In such cases, sub-sectors were combined and/or matched on a nearest fit basis.

The size, scale and location of the HVMS sector

- 19 This section provides information about the size, scale and geographic spread of the HVMS sector – measured by the contribution that the HVMS sector makes to the New Zealand economy (value added), the number of employees in the sector and the spread of geographic units across the country.
- 20 Some of the information in this section is provided at the aggregated HVMS sector level. A separate summary for each HVMS sub-sector provides more detailed information later in the report.

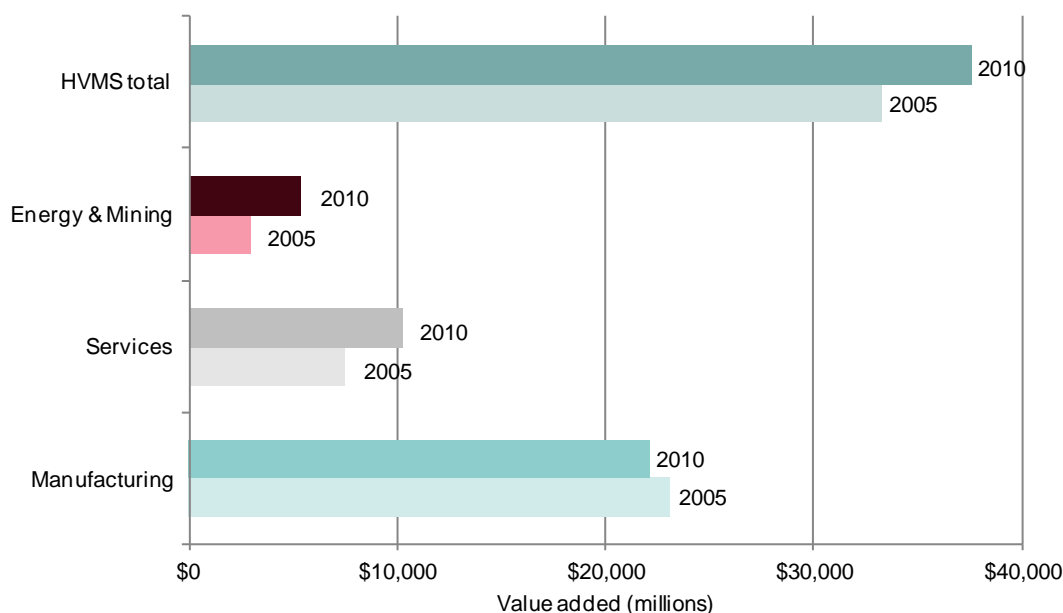
Value Added

- 21 HVMS firms produced approximately 29% (\$37.5 billion) of New Zealand's total value added¹³ in 2010.¹⁴ Growth in value added in the HVMS sector was slightly lower than value added growth for all other industries over the 5 years to 2010 (12% and 15% respectively).
- 22 The growth for the HVMS sector came from the Services and Energy & Mining sub-sectors, while value added attributed to the Manufacturing HVMS sub-sector declined. Despite the decline, Manufacturing remains the greatest contributor to HVMS value added (59%) with Services making up 27% and Energy & Mining 14%.

¹³ Total value added excludes Central Government. Value added is therefore an estimate for the measured economy.

¹⁴ Data for Food & Beverage include Tobacco Manufacturing, due to confidentiality restrictions.

Figure 1. Nominal value added by HVMS industries¹⁵



Source: Statistics New Zealand Annual Enterprise Survey

23 In 2010, the top three sub-sectors contributing to HVMS value added were Food & Beverage Manufacturing¹⁶, Petroleum & Coal, and Telecommunications. Between them, they produced over one-third (37%) of HVMS value added (\$13.7 billion).

24 Approximately half of the HVMS sub-sectors had an increase in nominal value added between 2005 and 2010. The top five sub-sectors in terms of percentage value added growth were:

Energy & Mining	<ul style="list-style-type: none"> Mining – Extraction & Exploration: 140% (\$1,097m to \$2,628m)
Services	<ul style="list-style-type: none"> Heavy & Civil Engineering: 78% (\$808m to \$1,438m) Scientific Research & Testing: 74% (\$190m to \$330m) Engineering, Surveying & Mapping: 62% (\$1,208m to \$1,958m), and ICT Services, Design & Publishing: 59% (\$1,692m to \$2,691m).

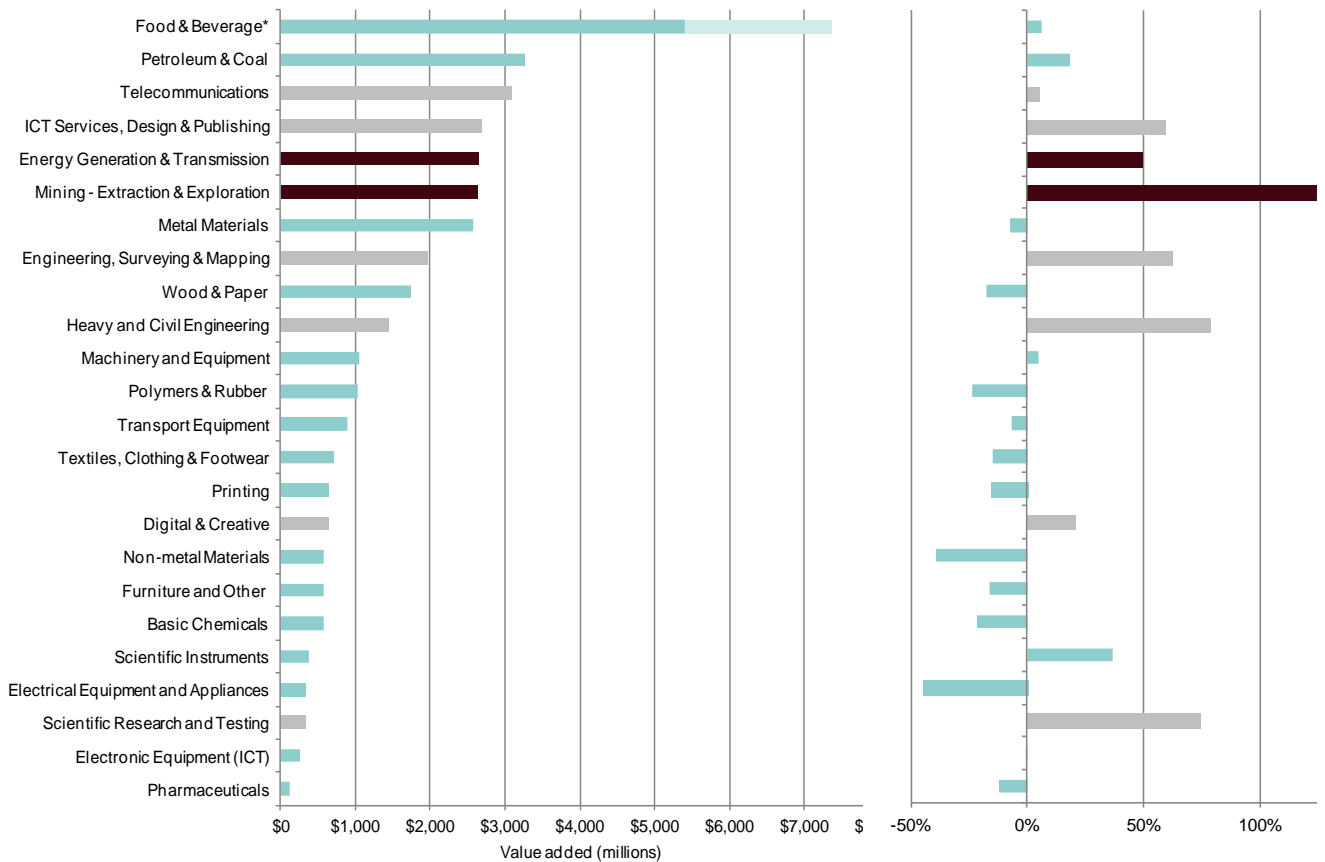
¹⁵ Measured in nominal dollars – therefore not inflation adjusted.

¹⁶ Data for Food & Beverage include Tobacco Manufacturing, due to confidentiality restrictions.

25 Manufacturing HVMS firms produced less value added in 2010 than they did in 2005. The two sub-sectors with the largest contractions as a percentage of nominal value added were:

Manufacturing	<ul style="list-style-type: none"> • Electrical Equipment & Appliances: -44% (\$621m to \$345m) • Non-metal Materials: -39% (\$961m to \$582m).
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Figure 2. Value Added by HVMS sub-sector (\$ million)^{17 18} and Nominal Value Added Growth 2005 to 2010



Source: Statistics New Zealand Annual Enterprise Survey.

* Value added for Beverage & Tobacco Manufacturing in lighter shade

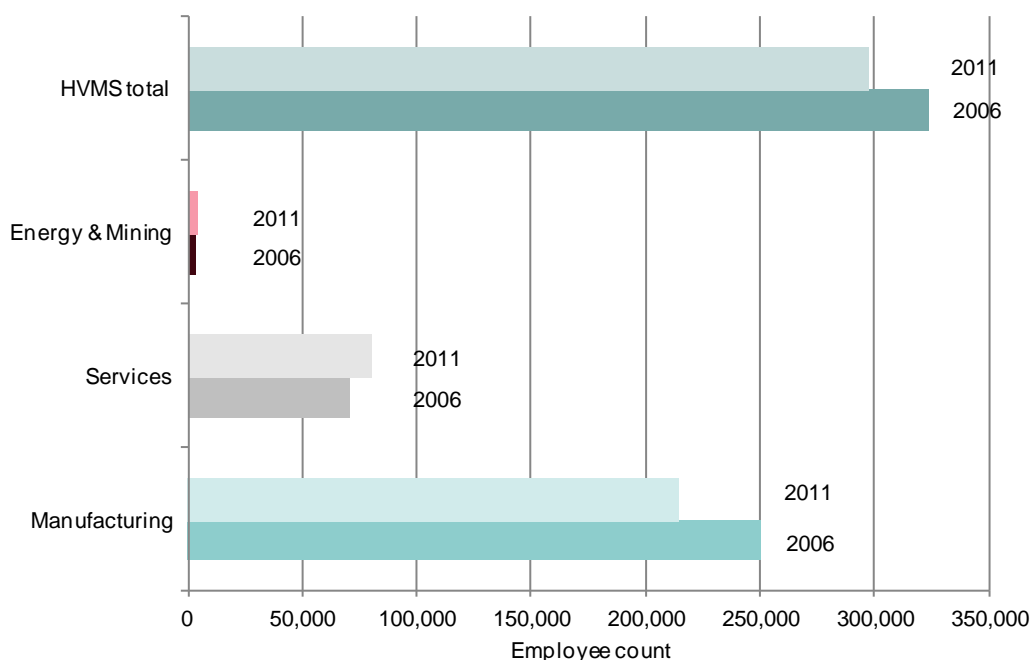
¹⁷ For confidentiality reasons, data for Food & Beverage include tobacco manufacturing

¹⁸ Note that changes over time are expressed in nominal values not real \$. This may affect the quantum of the change, and for marginal shifts may change the shift direction, however the relative difference between sub-sectors should not be materially affected.

Employment

- 26 The HVMS sector employs 16% (297,000 employees) of all employees in New Zealand. Although the HVMS sector achieved growth in value added over the last five years, it experienced a decline in total employment, in effect, this means that labour productivity increased (See page 25 for an analysis of labour productivity trends).
- 27 Employment in the HVMS sector declined by 8% between 2006 and 2011 (25,783 jobs) despite an increase in the total number of HVMS geographic units. Over the same period, total New Zealand employment grew by 1%.
- 28 The majority of the decline can be attributed to Manufacturing, which had a reduction in its workforce of 15% (36,576 employees). The reduction corresponds to a reduction in value added of 5%.

Figure 3. Employment Growth (2006-2011)

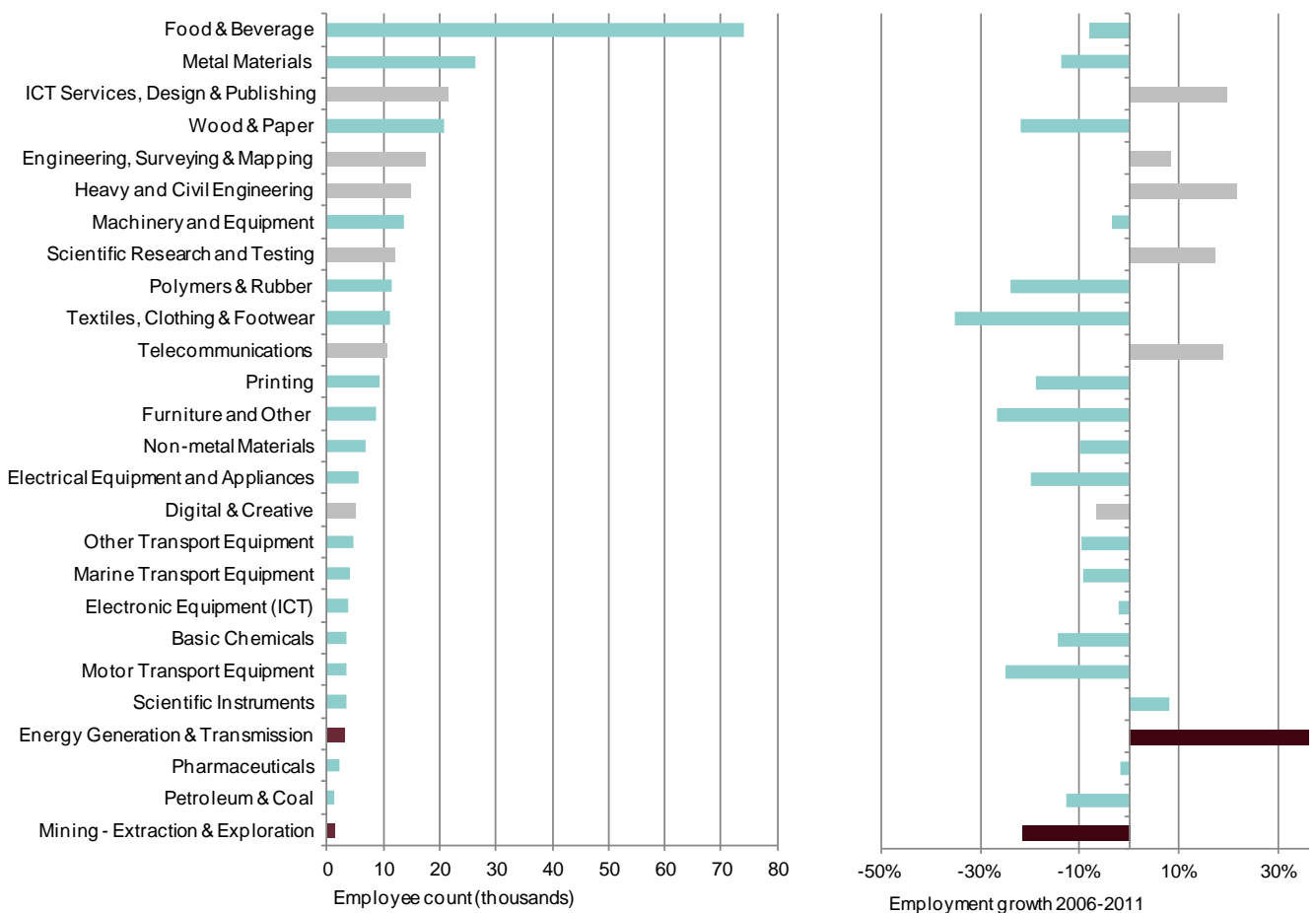


Source: Statistics New Zealand Business Frame

- 29 Even with the decline in employment in the Manufacturing sector, it still contributes almost 75% of total HVMS employment. 25% of employment is in Services, and 1% is in Energy & Mining.

- 30 Food & Beverage Manufacturing is the dominant HVMS sector employer, with 74,080 employees (25% of all HVMS employees), though the total number of employees in this sub-sector has declined since 2006.
- 31 One-quarter of the HVMS sub-sectors recorded employment growth between 2006 and 2011. Scientific Instrument Manufacturing was the only manufacturing sub-sector to record employment growth, but five of the six Services sub-sectors achieved employment growth – Digital & Creative recorded a decline.

Figure 4. Employment Count (2011) and Employment Growth 2006 to 2011



Source: Statistics New Zealand Business Frame

Occupations

- 32 Data collected from the R&D Survey show that (for firms engaged in R&D) the sub-sectors with the highest average number of R&D staff per firm are: Scientific

Instruments (18 FTEs per firm), Electrical Equipment & Appliances (13 FTEs per firm) and Electronic Equipment (ICT) (12 FTEs per firm). This compares with an average of 4 FTEs for HVMS firms in general and 1 FTE for non-HVMS firms.

- 33 The Department of Labour (DoL) uses knowledge intensity to plot improvements in productivity. The following table shows regional employment based on knowledge intensity, and compares the findings in terms of regions' proportion of highly knowledge intensive¹⁹ employment with the proportion of employment in the same region attributed to HVMS firms.

Table 3: Comparison of regional employment in knowledge intensive industries vs the HVMS sector

Proportion of knowledge intensive employment ²⁰	Proportion of HVMS employment
Wellington (18%)	Wellington (12%)
Auckland (11%)	Auckland (17%)
Otago (8%)	Otago (11%)
Tasman (8%)	No regional break down at this level
Canterbury (7%)	Canterbury (18%)

- 34 It is likely that the reason for the significant difference in Wellington is that the DoL definition includes industries such as Government Administration and Legal & Accounting Services. The HVMS sub-sector definition excludes both these sectors, where a significant proportion of the Wellington workforce is employed. Similarly, the large difference for Canterbury may be explained by the size of its manufacturing base, where degree qualifications may not be required.

Location

- 35 A feature of urban development trends over the last two decades has been that high value knowledge intensive economic activities have become increasingly concentrated in larger cities.²¹
- 36 Auckland is the only New Zealand city approaching global city status. Auckland's share of total HVMS employment is 36%, slightly higher than its share of total New Zealand employment in 'other industries' (32%). Auckland's share of total HVMS

¹⁹ Reporting K1 industries only – that is industries in which more than 40% of those employed are tertiary graduates.

²⁰ Department of Labour (2009), The New Zealand Knowledge Economy.

²¹ Grimes, Le Vaillant and McCann (2011), Auckland's Knowledge Economy: Australasian and European Comparisons.

geographic units is 40%, higher than its share of total New Zealand geographic units in 'other industries' (31%). Its share of HVMS geographic units and employment did not change between 2006 and 2011.

According to Grimes, Le Vaillant and McCann (2011), Auckland has maintained a major Knowledge Intensive Services (KIS) role within Australasia. In contrast, Auckland's medium/high-tech manufacturing (HTM) intensity has suffered a sharp decline. Christchurch, with its comprehensive engineering school, now has the highest HTM intensity in New Zealand.²²

Our employment data support these findings. The Auckland region accounts for 34% of all HVMS Manufacturing employment compared with 44% of HVMS Services employment. Canterbury employs a slightly higher proportion of HVMS Manufacturing employees (16%) than Services employees (13%).

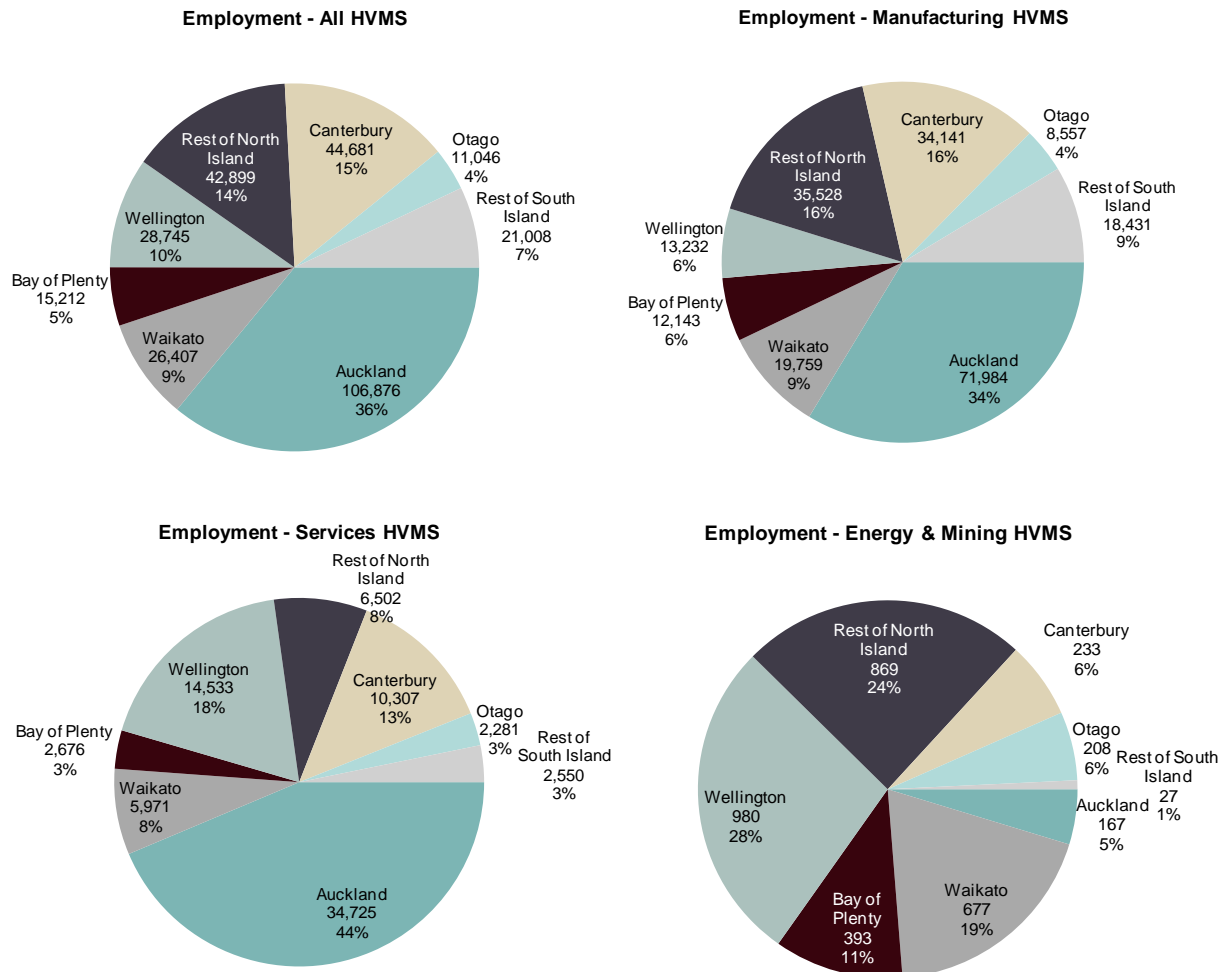
Employment by location

37 Geographically, most HVMS employment is concentrated in the North Island (75%), in particular in Auckland. But providing employment data at the HVMS sector level masks the significant difference in employment distribution between Manufacturing and Services. Some key observations are:

- Twice as many employees are employed in Manufacturing HVMS firms in the Auckland region than in Services HVMS firms.
- The Wellington region employs almost 20% of Services HVMS workers, but only 10% of Manufacturing HVMS workers. Overall, almost the same number of employees are employed in Services HVMS firms and in Manufacturing HVMS firms in Wellington.
- The Taranaki and Wellington regions share half of the employment in the Energy & Mining HVMS sub-sector.
- Three times as many employees are employed in Manufacturing HVMS firms in the Canterbury region than in Services HVMS firms.

²² Grimes, Le Vaillant and McCann (2011), Auckland's Knowledge Economy: Australasian and European Comparisons.

Figure 5: Geographical distribution of employment in HVMS sector



Source: Statistics New Zealand Business Frame

38 Several sub-sectors have very high geographic concentrations of employment (Employment distributions for all sub-sectors are shown in the Sub-sector Analysis section later in this report):

- Almost three-quarters of Pharmaceuticals sub-sector employment is in Auckland.
- Two-thirds of Scientific Instruments Manufacturing employment is in Auckland.
- Approximately one-third of Electronic Equipment employment is in Auckland and one-third in Canterbury.

- Approximately half of ICT Services, Design & Publishing employment is in Auckland, and a further one-quarter of employment is in Wellington.

Location Quotients

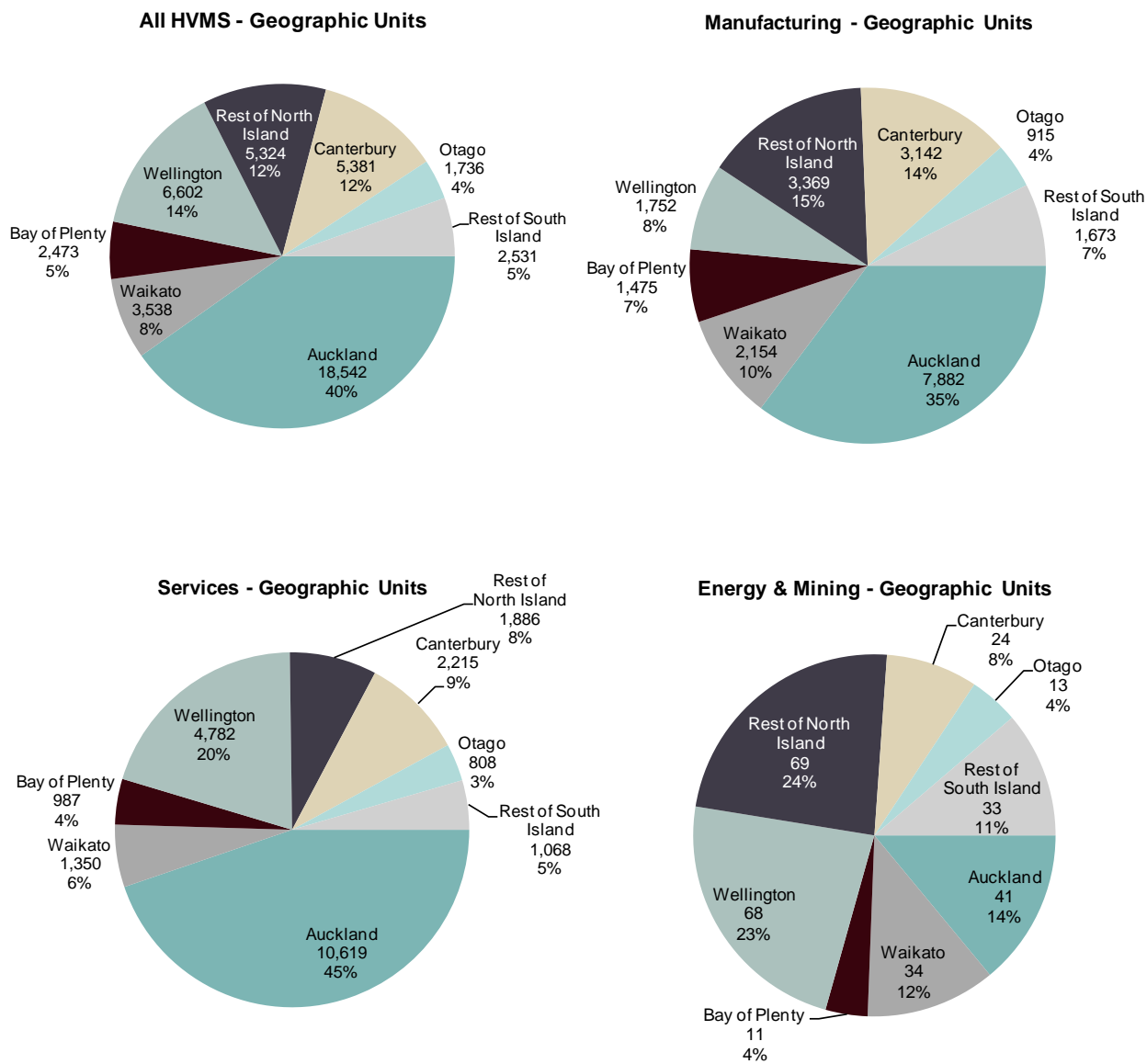
- 39 Location Quotients (LQs) are ratios that provide a way to examine the specialisation of economic activity in a region. An LQ of greater than '1' indicates a regional specialisation in that sub-sector when compared with New Zealand as a whole.
- 40 Calculating the LQs for employment count reflects what we see above in terms of Services employment – seven out of the eight Services sub-sectors had a location quotient of greater than '1' in Wellington. As a whole, HVMS Services had an LQ of close to '2' indicating that the proportion of employment in the Service sub-sectors in Wellington is two times greater than the proportion of HVMS Services employment in New Zealand.
- 41 It tends to be the extractive and energy-based industries that have very high LQs. The highest LQ score (22.14) was for Mining –Extraction & Exploration in Taranaki, confirming the importance of that industry to the region. Two sub-sectors outside the extractive and energy-based sectors had LQs of greater than '3' in at least two regions:
- Non-metal materials: Northland and the West Coast.
 - Marine Transport Equipment: Northland and Nelson.

Geographic units²³ by location

- 42 In 2011 there were 505,194 geographic units in New Zealand – 9% of these (46,127 units) belonged to the HVMS sector. Between 2006 and 2011 the HVMS sector's share of total geographic units remained the same.
- 43 The Auckland region hosts the majority of HVMS geographic units. Auckland and Wellington house a greater share of total Services geographic units than Manufacturing geographic units.

²³ A separate operating unit engaged in New Zealand in one, or predominately one, kind of economic activity from a single physical location or base.

Figure 6: HVMS Geographic Units by Location



Source: Statistics New Zealand Business Frame

44 The two most concentrated HVMS sub-sectors in terms of geographic units are Digital & Creative, and ICT Services, Design & Publishing. Almost three-quarters of each of these sub-sector’s geographic units are located in either Auckland or Wellington.

The nature of the HVMS sector

Firm size

NOTE TO READER:

It has not been possible to match published firm size data with the HVMS sub-sector definitions as firm size data were available at 3-digit ANZSIC level (not the six-digit level used to create the HVMS sector).

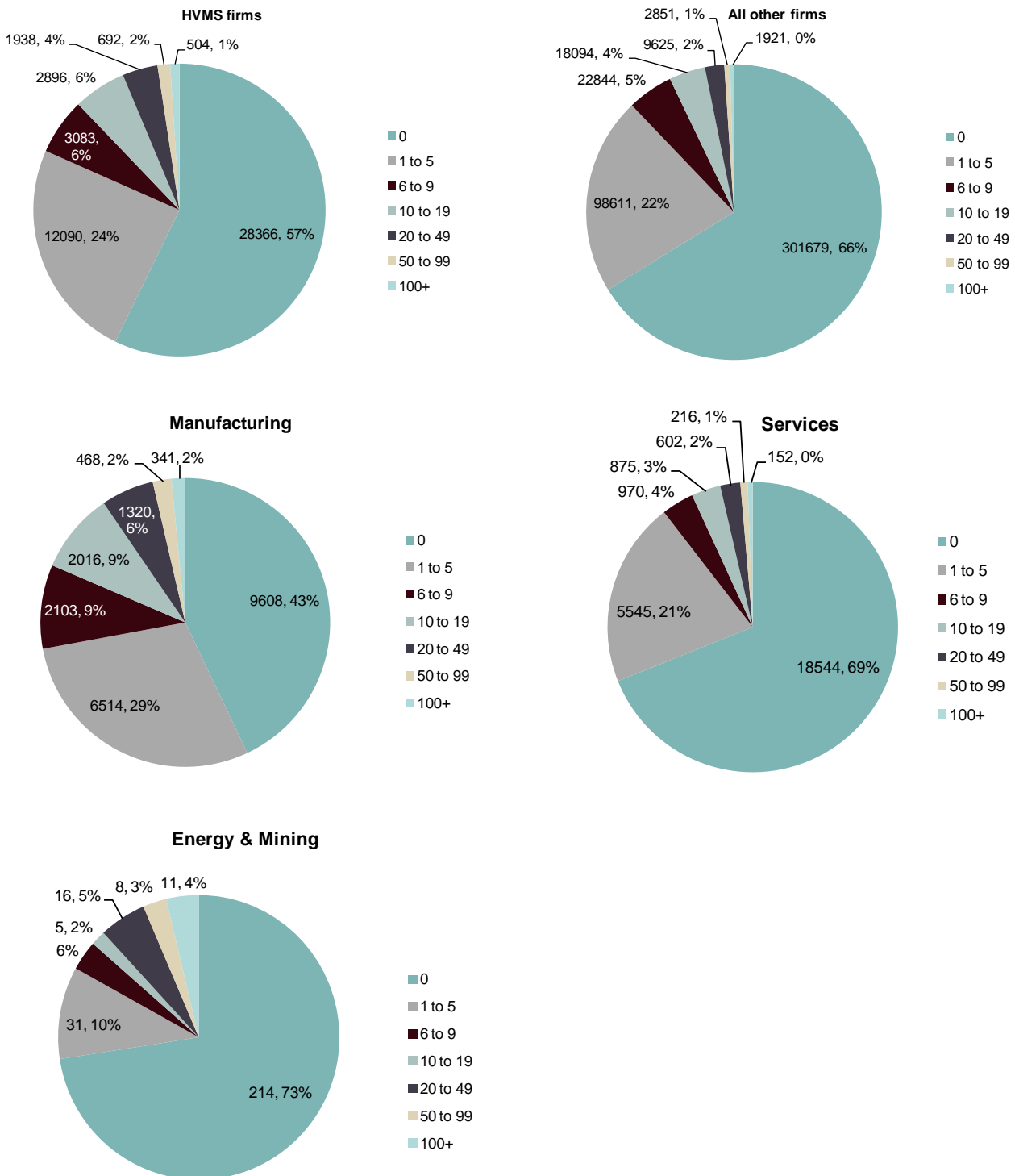
This means that the figures in this section will overstate the number of geographic units because some six-digit ANZSIC codes that would be excluded from the HVMS definition are included in this analysis. This will affect the Services sub-sector results more than the Manufacturing and Energy & Mining sub-sectors.

- 45 Like most economies, New Zealand's enterprises are mainly small and medium-sized, with 97 percent of all enterprises employing 19 or fewer people.²⁴ But New Zealand has a small pool of very large firms.²⁵
- 46 Large firms (20+ employees) make up a higher proportion of the HVMS sector than all 'other sectors' (7% vs 3%), but make up only a small proportion of HVMS firms generally. There are approximately 3,100 HVMS firms in New Zealand that employ 20 or more employees (18% of the total number of New Zealand firms in the same employment bracket).

²⁴ MED (2011), SMEs in New Zealand: Structure & Dynamics.

²⁵ MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

Figure 7. Number of geographic units by size (employee count)

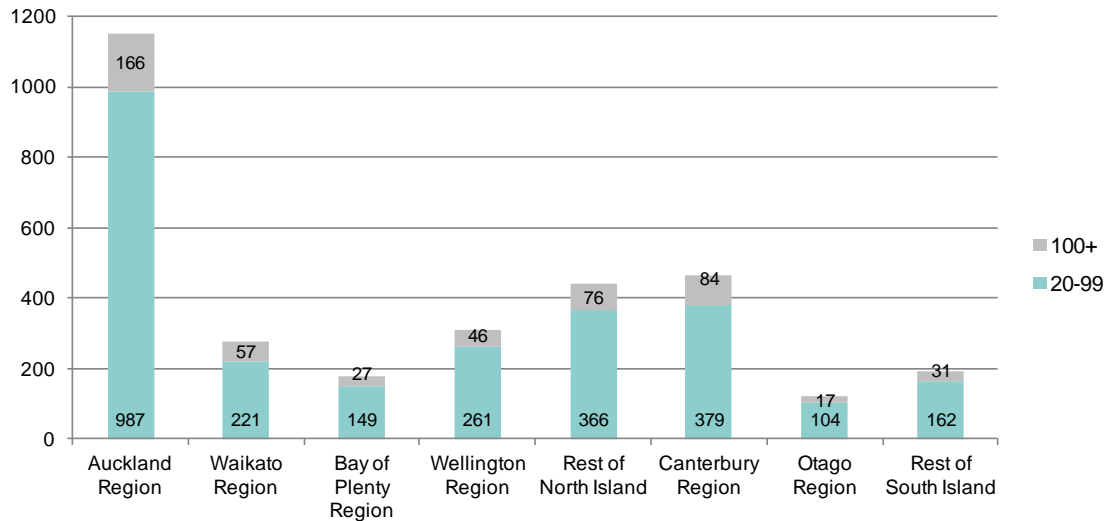


Source: Statistics New Zealand Business Frame

Geographic distribution of large firms

47 The Auckland region is home to 37% of large (20 or more employees) HVMS firms (1,153) but 40% of all HVMS firms. The Canterbury region is home to 15% of large HVMS firms, but only 11% of all HVMS firms.

Figure 8. Geographical distribution of large HVMS firms (by employee count)



Source: Statistics New Zealand Business Frame

48 Being aware of the size of HVMS firms is important because larger firms undertake more innovation-related activities and have a far higher expenditure on product development. The Innovation Section (page 35) reports on innovation activity in more detail.

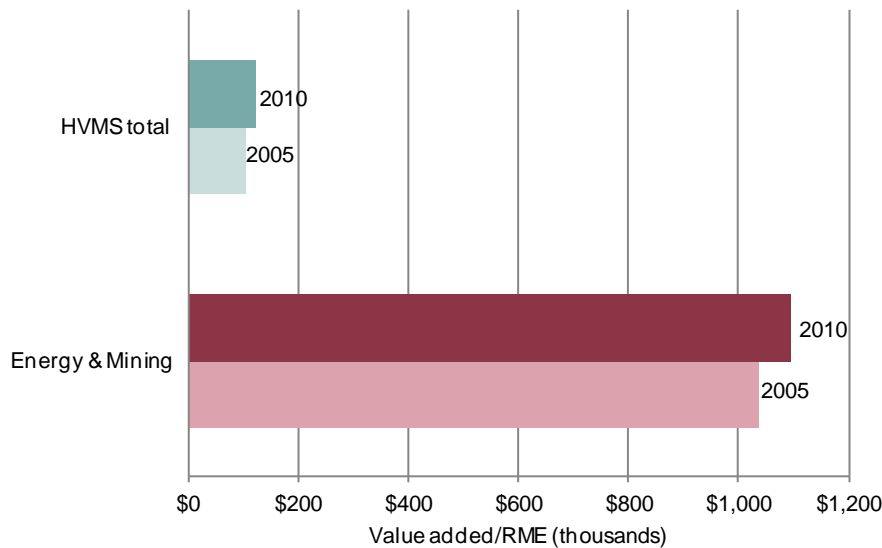
Labour productivity

49 We have used value added per rolling mean employee (RME) as the measure of labour productivity in this report.

50 It is important to note that different types of input measure give rise to different productivity results. Caution needs to be used when using partial productivity measures (i.e. measures that relate output to only one class of inputs such as capital or labour) as changes in input proportions (e.g. the ratio of capital to labour) can influence the measure.

51 This becomes apparent in the following graph which compares the average HVMS labour productivity measure with the labour productivity of the Energy & Mining HVMS sub-sector which has high capital intensity compared to employment. The Energy & Mining sub-sector's average productivity level (at well over \$1m per employee) is significantly higher than the HVMS average.

Figure 9: Labour Productivity Comparison - All HVMS and Energy & Mining



Source: Statistics New Zealand Annual Enterprise Survey

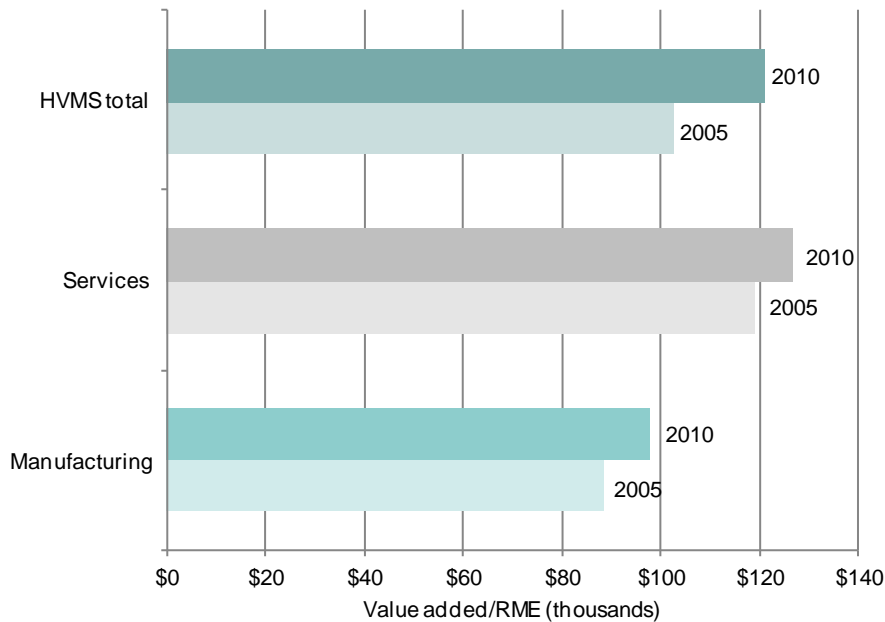
52 Average value added per employee in HVMS firms was \$121,000 in 2010 (\$105,000 excluding the Energy & Mining sub-sector). This compares with an average for all other sectors (excluding Core Government) of \$77,000. The average for the Manufacturing HVMS sub-sector was \$98,000, compared to the Service HVMS sub-sector's \$126,000.

MED assessed KIMS using two different approaches: one based on identified firms of interest, and the other on ANZSIC groupings derived from the OECD's technology intensity groupings.

MED's analysis of the KIMS sector²⁶ (using 2009 data) produced an average value added/RME of:

- All KIMS firms \$94,105 (firms of interest approach)
- Hi tech Manufacturing \$85,850 (ANZSIC approach)
- Med-high tech Manufacturing \$82,934 (ANZSIC approach)
- High-value Services \$92,870 (ANZSIC approach)
- Non-KIMS firms \$76,645 (ANZSIC approach) or \$67,162 (firms of interest approach).

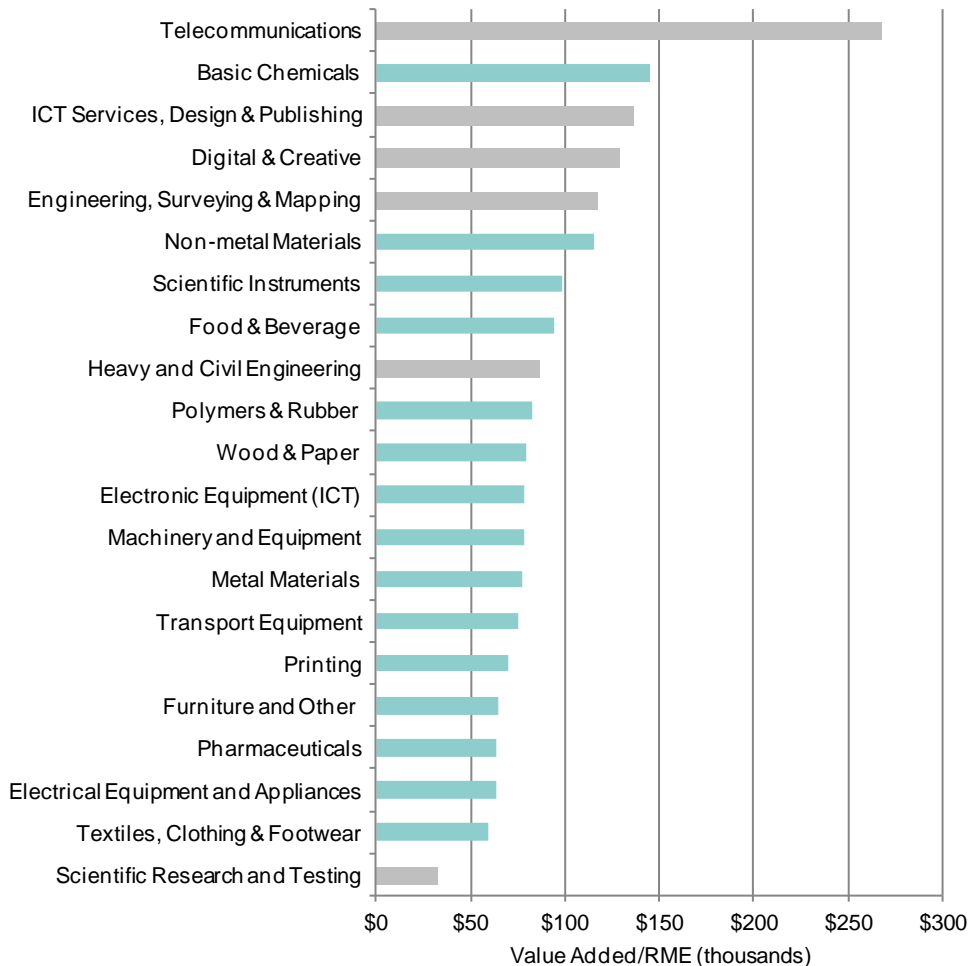
²⁶ MED (2011), The KIMS Sector: A comprehensive overview Part 2 (not publicly available).

Figure 10: Average Labour Productivity 2005 and 2010

Source: Statistics New Zealand Annual Enterprise Survey

- 53 Average value added per HVMS employee increased by \$18,000 between 2005 and 2010, and increased across each of the three high-level HVMS sub-sectors: Manufacturing, Services and Energy & Mining.
- 54 Value added per employee in the Manufacturing HVMS sub-sector is, on average, just over three-quarters (77%) that of the Service HVMS sub-sector. This ratio has increased slightly since 2005 when Manufacturing value added per employee equated to 75% of the Services sub-sector average.
- 55 When analysed by individual HVMS sub-sectors, there are considerable differences in labour productivity, but as noted above, this may be due to differences in the capital/labour ratio.
- 56 The following graph excludes three sub-sectors because their labour productivity is significantly higher than the other sub-sectors. These are:
- Petroleum & Coal Manufacturing (\$2,668,000/employee).
 - Mining – Extraction & Exploration (\$2,660,000/employee).
 - Energy Generation & Transmission (\$688,000/employee).

Figure 11: Labour Productivity in HVMS sub-sectors (figure excludes Energy & Mining and Petroleum & Coal Manufacturing)



Source: Statistics New Zealand Annual Enterprise Survey

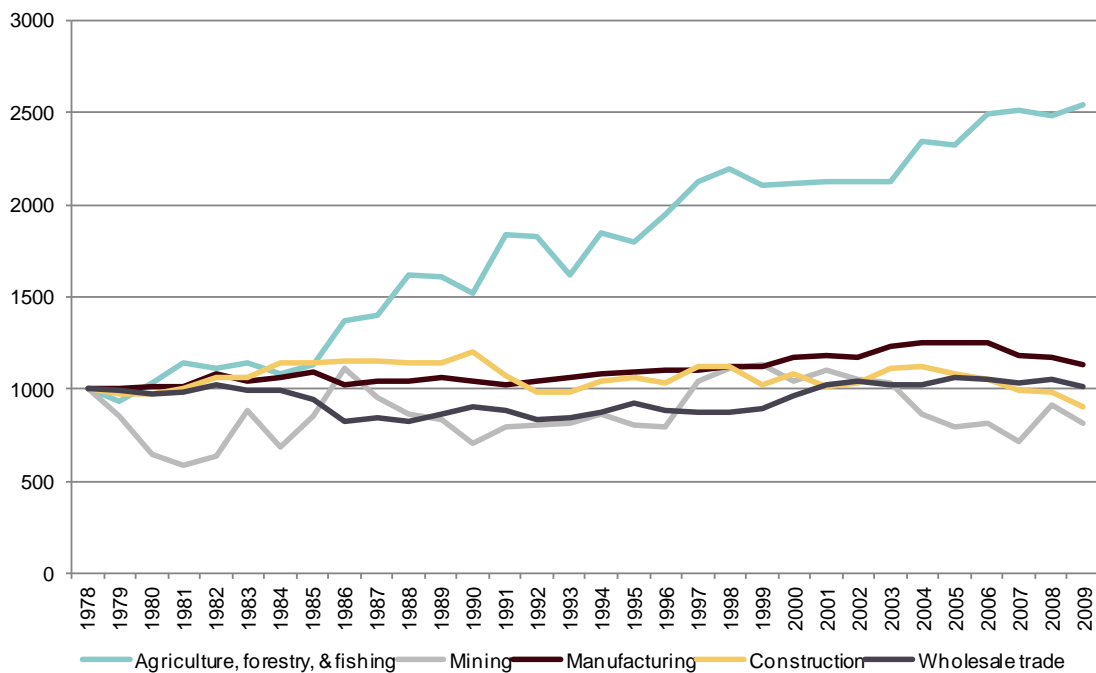
Multi-factor Productivity (MFP)

57 Whereas labour productivity measures the output per unit of labour, MFP looks at a combination of production inputs: labour, materials, and capital. It is therefore a more comprehensive measure of productivity than labour productivity, and is proxy for productivity growth attributable to technological change or innovation.

58 Despite an increase in labour productivity in the HVMS Manufacturing sub-sector between 2005 and 2010, it appears that aggregate Manufacturing MFP declined over the same period. The Energy & Mining sub-sector showed an increase in labour productivity, though the more detailed time points available for MFP show that aggregate Mining MFP growth has fluctuated considerably over the period.

59 The growth in MFP in Manufacturing averaged only 0.4% per year. By comparison, the Agriculture, Forestry & Fishing sectors had significant growth in MFP. A 3.1% average annual change (3.5% for Agriculture on its own).

Figure 12: Multifactor productivity growth (1978-2009)



Source: Statistics New Zealand, Multifactor Productivity Index

Manufacturing Exports

60 This section reports on the export value²⁷ of Manufacturing HVMS firms. It excludes Services HVMS firms as services export data is patchy and cannot easily be aligned with the HVMS sub-sectors. Manufacturing exports contribute 93% of all New Zealand’s merchandise exports.

61 Exporting indicates the competitiveness of firms and provides them with greater growth potential than servicing the domestic market alone. The government has highlighted the importance of exporting as part of its Economic Growth Agenda and it therefore makes sense to prioritise government efforts where there is greatest opportunity for impact. In terms of supporting exporting, this could be in areas where New Zealand has:

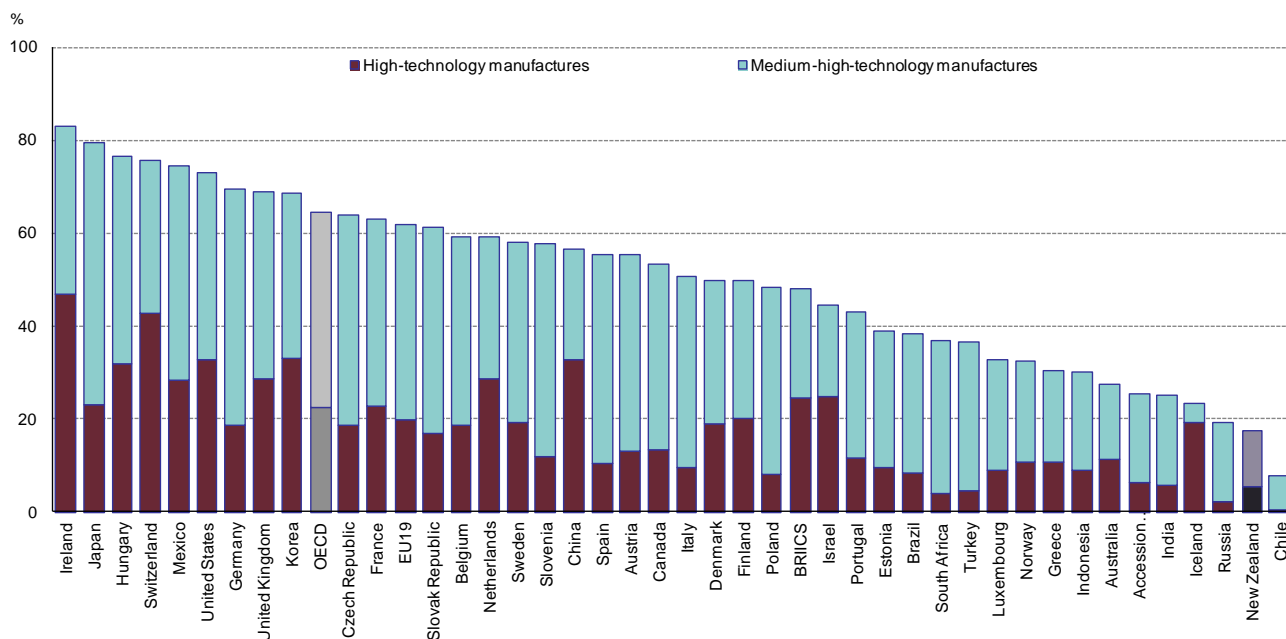
²⁷ Values expressed in \$NZD have been converted from \$USD using 0.8255 exchange rate (current as at 09 March 2012).

- significant existing (or potential) scale of production, such that the benefits of any innovations are spread across a large economic base
- a well-established comparative advantage, for example, where New Zealand has a disproportionately high export share given the size of our economy.²⁸

62 The rationale for looking at these measures is that the country’s future economic performance, certainly in the next 10-15 years, will be heavily shaped by existing industrial specialisations, resources and capabilities.²⁹

63 New Zealand’s share of external trade (relative to GDP) is well below that of similar-sized, high-performing OECD countries. Its share of world exports has also declined somewhat over the past 15 years, as has the OECD’s share of world exports.³⁰ New Zealand also performs poorly on export intensity of medium-high and high tech goods compared with other OECD countries, though the sophistication of New Zealand’s exports overall is consistent with its per capita income.³¹

Figure 13: Medium-high tech and high tech exports by country



Source: OECD (2009), OECD Science, Technology and Industry Scoreboard 2009

²⁸ Davis, N. (2012), Comparative Advantage, Economic Scale and the Determination of Science and Innovation Priorities (DRAFT document).

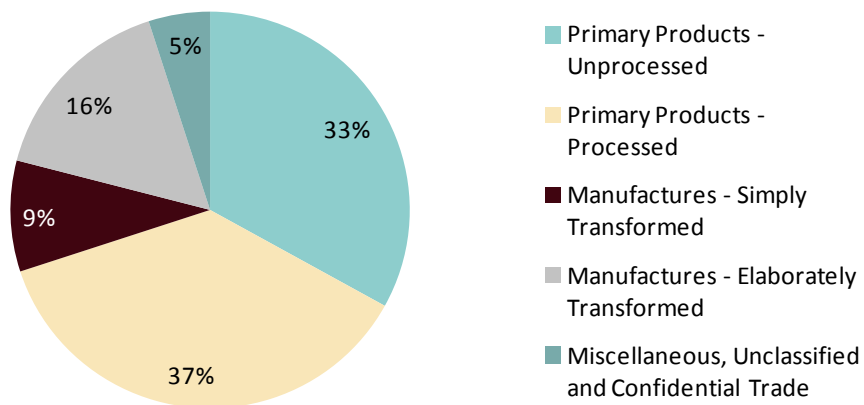
²⁹ Davis, N. (2012), Comparative Advantage, Economic Scale and the Determination of Science and Innovation Priorities (DRAFT document).

³⁰ MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

³¹ MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

64 New Zealand’s merchandise exports are still heavily weighted toward Food & Beverage exports.³² International trade is dominated by primary products (70%), with only a small portion of exports (16%) in elaborately transformed manufactures. Products such as milk, cream, meat, butter, cheese, logs, metals such as gold and aluminium, and medical instruments are high export earners.

Figure 14: New Zealand exports by processing level



Source: MFAT (2012). Analysis of New Zealand merchandise trade – Year to December 2011

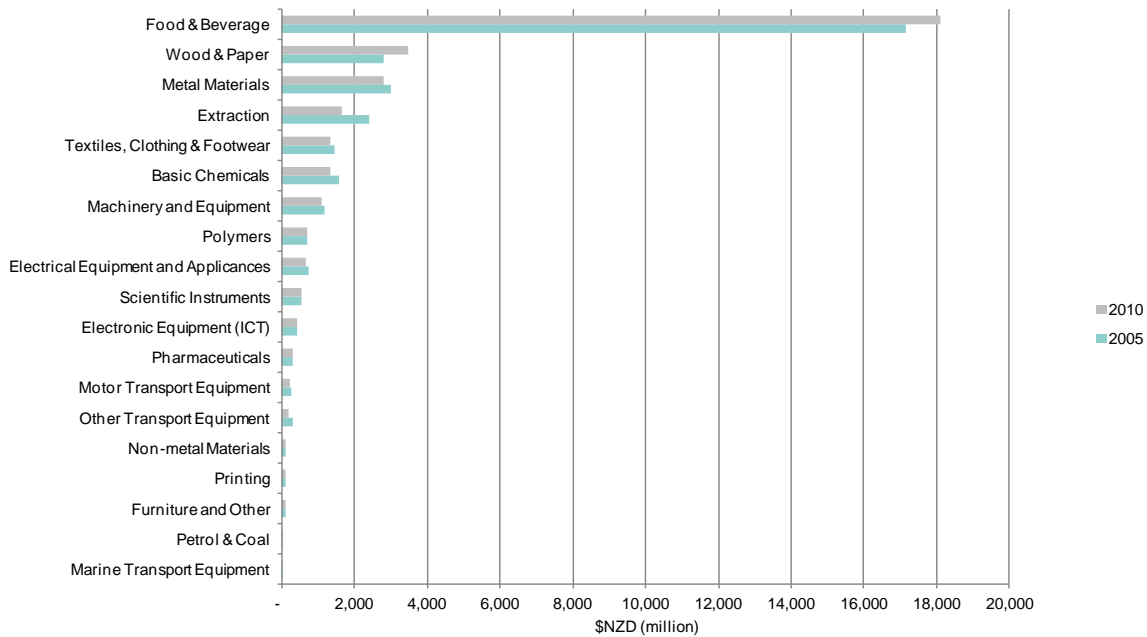
65 50% of New Zealand’s total export value came from the Food & Beverage sub-sector. The top 5 exporting sub-sectors within the HVMS sector (Food & Beverage, Wood & Paper, Metal Materials, Oil & Gas Extraction, and Textiles Clothing & Footwear) produced 76% of the total value of New Zealand exports in 2010.

66 Between 2008 and 2010 the following industries increased their proportionate contribution to total exports: Food & Beverage, Wood & Paper, Scientific Instruments, and Petrol & Coal.

67 For a list of the top 5 export products for each HVMS sub-sector refer to Appendix 4.

³² MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

Figure 15: Value of Manufacturing Exports 2010 & 2008 (nominal \$)



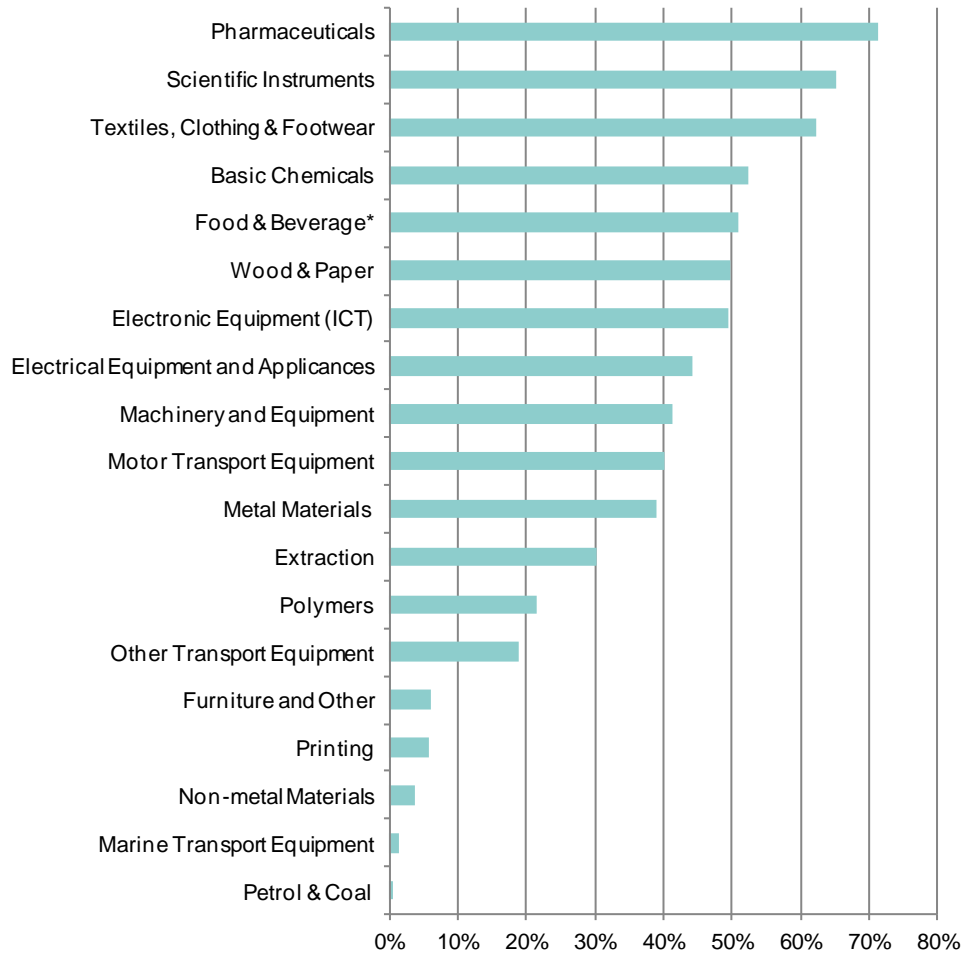
Source: Data supplied by MSI

Export intensity

68 Export intensity data were not available directly from Statistics New Zealand as the dataset is not linked to the Business Frame. We converted export data figures from \$US to \$NZ using an exchange rate of 0.8255 and then calculated the total as a proportion of total output for 2010 for each sub-sector.

69 The most export intensive HVMS sub-sectors were Pharmaceuticals (71%), Scientific Instruments (65%), and Textiles, Clothing & Footwear (62%).

Figure 16: Export intensity by HVMS Manufacturing sub-sector



Source: Data supplied by MSI

* Output data (used to calculate intensity) for Food & Beverage include Tobacco Manufacturing, due to confidentiality restrictions.

MED’s research reveals that, for many KIMS firms, well over 90% of their products are exported, and much of their technology and skills are sourced offshore and adapted to New Zealand conditions.³³

In 2009, goods exports accounted for 19% of KIMS businesses total sales – almost three times higher than non-KIMS businesses (6.5%).³⁴

³³ MED – Industry Policy and KIMS businesses (not publicly available).

³⁴ MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

They were also significantly more likely to generate overseas income (76% compared with 20% of all businesses); were five times as likely to report that international markets accounted for the largest proportion of their sales (38% compared with 8%); and were slightly more likely to report that their main competitors were international businesses (15% compared with 9%).³⁵

Transportation was the most export-intensive sub-sector in MED's list of KIMS businesses. Its ratio of goods exports to total sales was twice that of KIMs businesses as a whole.³⁶

KIMS firms quickly occupy their domestic and sometimes Australasian market niche and struggle to address the capital constraints, extended cash burn and market knowledge barriers to successfully compete in larger offshore markets. To internationalise and expand offshore such firms often need to change their capital structures and business models. This often corresponds to the time when the founding or other entrepreneurs may wish to exit, raising succession planning and business continuity issues.³⁷

KIMS businesses on MED's list were twice as likely to see 'limited access to finance' as a barrier to generating overseas income (33% compared with 15%).³⁸

Revealed Comparative Advantage

- 70 New Zealand firms frequently struggle to commercialise innovations at scale, and struggle to gain significant share in global markets.³⁹
- 71 A revealed comparative advantage (RCA) exists where New Zealand's share of world exports for a particular product is greater than New Zealand's share of total world exports. An RCA index score above 1 indicates a comparative advantage. See Appendix 5 for a full list of products with revealed comparative advantage.
- 72 We identified 123 product classes with revealed comparative advantage within the HVMS sub-sectors.⁴⁰ The majority of revealed comparative advantage product classes represent low tech and unprocessed products. The product classes are predominantly produced in the Food & Beverage Manufacturing (42 product classes), Textiles, Clothing & Footwear (19) and Wood & Paper (18) sub-sectors.
- 73 Among these product classes, nearly half (46%) have an RCA of 3 or more, indicating a substantial comparative advantage.

³⁵ MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

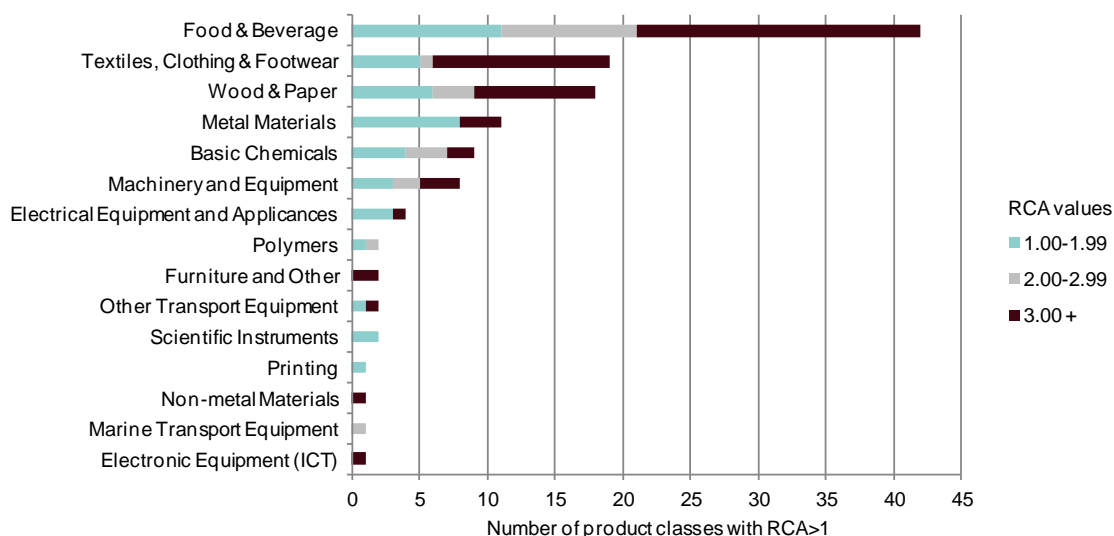
³⁶ MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

³⁷ MED – Industry Policy and KIMS Businesses (not publicly available).

³⁸ MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

³⁹ MSI (2011) Business R&D in New Zealand – presentation for BERD workshop November 18 2011 (not publicly available).

⁴⁰ Revealed Comparative Advantage Data supplied by MSI. Data are based on Standard International Trade Classifications.

Figure 17: Distribution of RCA product classes by HVMS sub-sectors

Source: Data supplied by MSI

Innovation

NOTE TO READER:

The results for this section are based on Statistics New Zealand's 2009 Innovation Survey responses. It has not been possible to match the sectors used in the Innovation Survey with the HVMS sub-sectors due to survey weighting and confidentiality issues.

When aggregating to the total HVMS sector, the key sub-sector differences (where all ANZSIC sub-sectors were included in the Survey results, but the HVMS definition excludes some sub-sectors) are in: Construction, Telecommunication Services, Mining, Electricity Generation & Transmission.

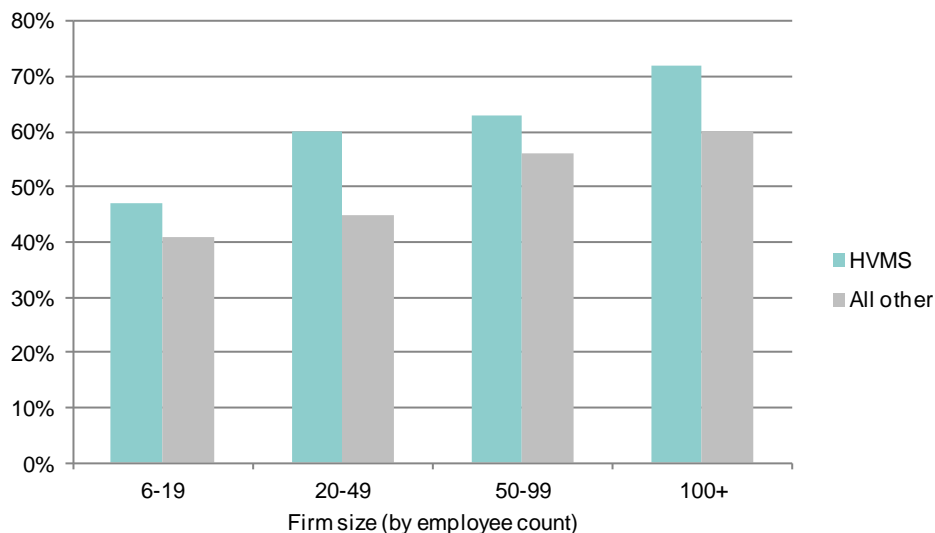
These results provide the best approximation available.

- 74 Innovation exploits knowledge. Knowledge is non-rival and cumulative so can lead to increasing returns to production even where other inputs remain constant. Although the proportion of NZ firms innovating is similar to other OECD countries, our low productivity growth rates suggest we are not reaping the rewards of this activity.⁴¹

⁴¹ MSI (2011) Business R&D in New Zealand – presentation for BERD workshop November 18 2011 (not publicly available).

75 Innovative firms are more likely to record an increase in market share, profitability, and total sales than non-innovative firms.⁴² A higher proportion of HVMS firms are innovating compared to all other firms and the proportion of firms innovating increases with firm size.

Figure 18: Proportion of firms responding that they undertook innovation⁴³ activities - by firm size⁴⁴



Source: Statistics New Zealand Business Operations Survey – Innovation module

76 The proportion of innovating firms is available by HVMS sub-sector for each size of firm, but the graphs are located in Appendix 2 due to their size. The graphs show that the Telecommunications, Other Machinery & Equipment and Other Manufacturing sub-sectors have the highest proportions of innovating firms.

MED assessed KIMS using two different approaches: one based on identified firms of interest, and the other on ANZSIC groupings derived from the OECD’s technology intensity groupings.⁴⁵ In terms of innovative activity the MED analysis shows that:

- KIMS firms are more likely to be engaged in innovative activities (69% v 35% firms of interest approach) (43% v 35% ANZSIC approach)

⁴² MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

⁴³ Innovation is defined broadly in the Innovation Survey. It includes the development or introduction of any new or significantly improved activity for the business. This includes products, processes or methods that the business was first to develop, or adopted from other firms.

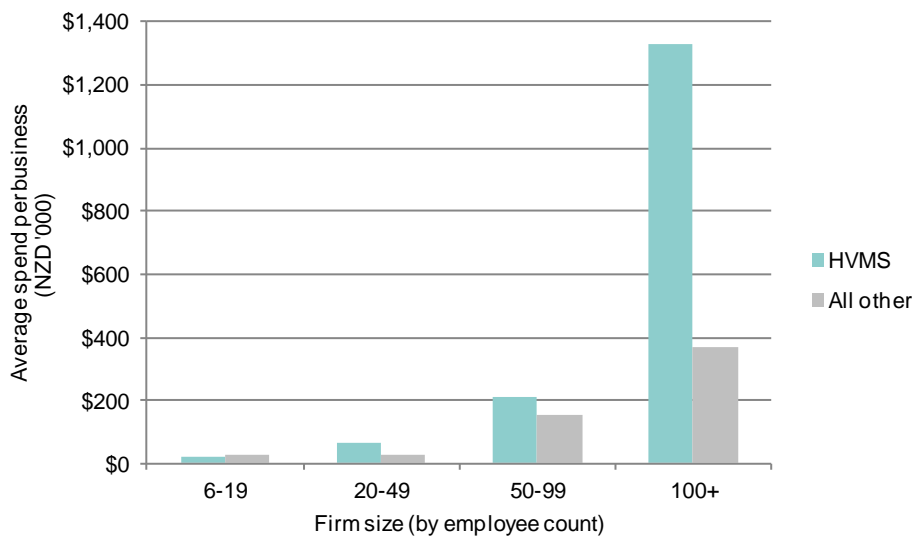
⁴⁴ Firms with less than six employees are excluded from the Business Operations Survey sample and therefore the Innovation Survey.

⁴⁵ MED (2011), The KIMS Sector: A Comprehensive Overview Parts 1 & 2 (not publicly available).

- More likely to develop new/significantly improved goods/services (62% v 19% firms of interest approach) (30% v 19% ANZSIC approach).

- 77 The differences between firm size and innovative activity are much more pronounced when we look at the average (mean) expenditure on innovative activities, particularly for HVMS firms.
- 78 HVMS firms employing 100+ employees had an average (mean) product development expenditure of \$1.33million per annum, almost four times the average expenditure of the same size non-HVMS firms (\$367,000), and far higher than any other firm size grouping.

Figure 19: Average (mean) product development⁴⁶ expenditure by firm size (per annum)



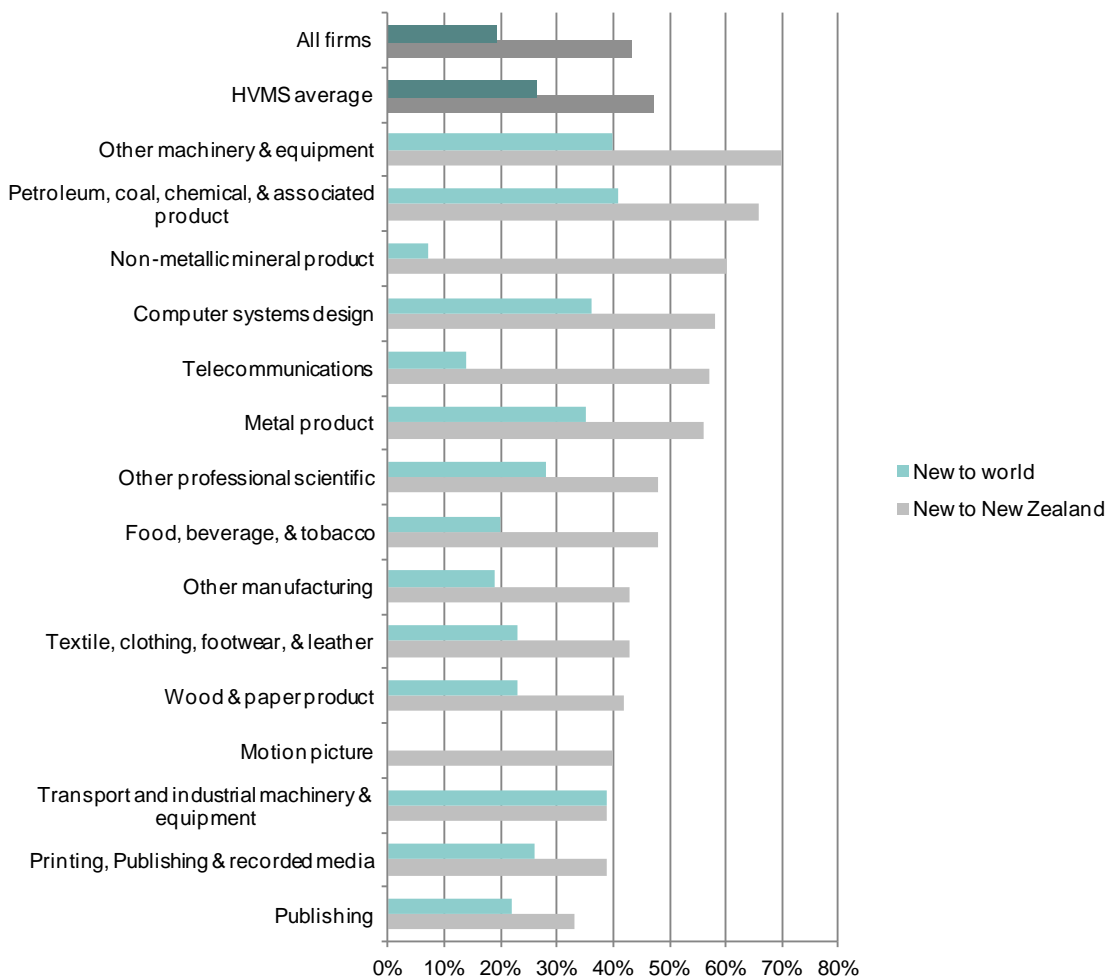
Source: Statistics New Zealand Business Operations Survey – Innovation module

- 79 HVMS firms were more likely to have created ‘New to World’ and ‘New to New Zealand’ products when compared to the average for all firms. Petroleum, Coal, Chemical & Associated Products, and Other Machinery & Equipment Manufacturing businesses were most likely to report ‘New to World’ products, with 40% of product innovators in these sub-sector reporting ‘New to World’ products.
- 80 Transport and Industrial Machinery & Equipment Manufacturers were equally likely to report ‘New to World’ products as ‘New to New Zealand’ products. No product

⁴⁶ These results come from the Innovation Survey. The Survey asked firms to estimate their combined expenditure on product development and other related activities including: R&D, design, marketing and market research and other activities (e.g. prototyping, trials, commercialisation).

innovators in the Motion Picture sub-sector reported developing 'New to World' products, though 40% had produced 'New to New Zealand' products.

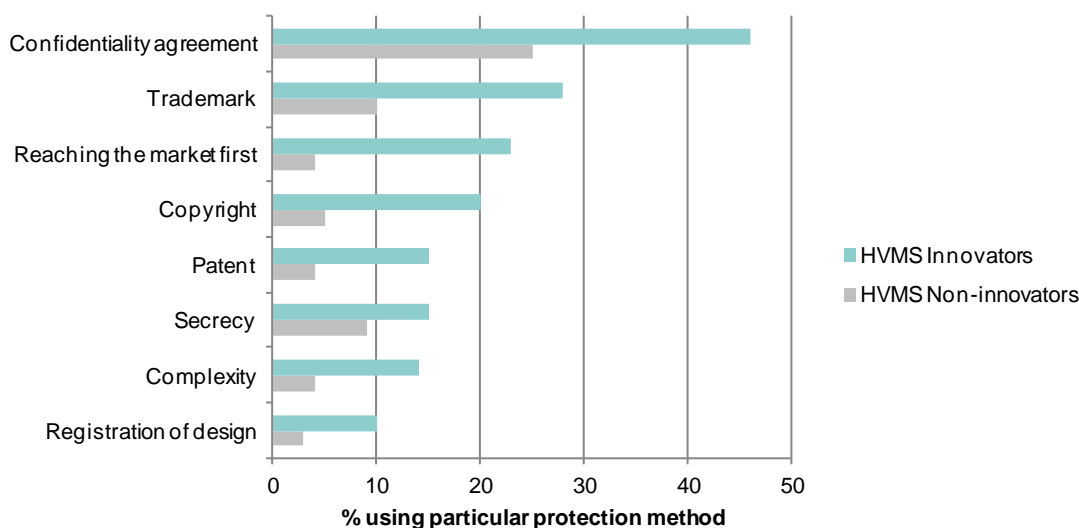
Figure 20: Proportion of firms introducing 'New to World' and 'New to New Zealand' products by HVMS sub-sector



Source: Statistics New Zealand Business Operations Survey – Innovation module

Protection of ideas

81 For innovating HVMS firms, the most regularly used method for protecting ideas is confidentiality agreements (46%).

Figure 21: Proportion of HVMS firms using methods to protect their innovations

Source: Statistics New Zealand Business Operations Survey – Innovation module

- 82 Patent activity is often used as one indicator of innovation output. The Innovation Survey data tell us that patents are not a commonly used tool by New Zealand firms to protect their ideas – 15% of innovating HVMS firms use patents and less than 5% of non-innovating HVMS firms use them.
- 83 It is not surprising then that less than one-quarter (24%) of New Zealand patent applications are attributable to New Zealand residents.⁴⁷ Domestic patent applicants file heavily in technologies such as Industrial Engineering, Agriculture and Food, and Civil Engineering, specifically building materials.⁴⁸
- 84 Domestic applicants perform high levels of international patent filing in five main fields:
- Industrial Engineering.
 - Pharmaceuticals.
 - Agriculture and Food.
 - Domestic Articles and Personal Care products.
 - Materials Science.⁴⁹

⁴⁷ WIPO (2011), World Intellectual Property Indicators - 2011 Edition

⁴⁸ Thomson Reuters (2011), Survey of New Zealand Patent Activity – Prepared for IPONZ (CONFIDENTIAL DRAFT).

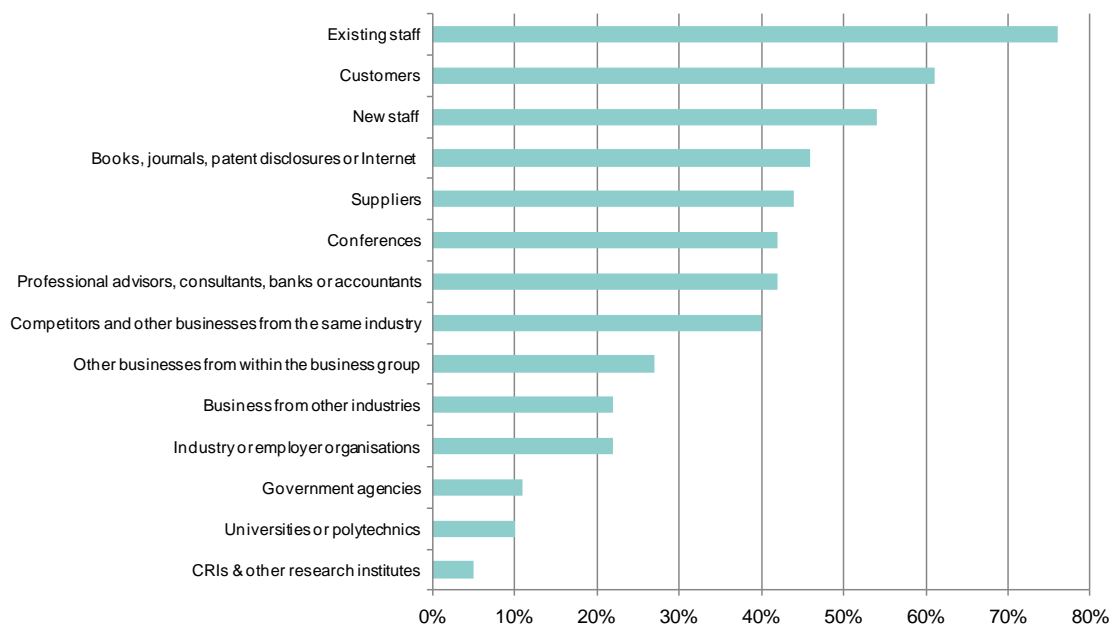
⁴⁹ Thomson Reuters (2011), Survey of New Zealand Patent Activity – Prepared for IPONZ (CONFIDENTIAL DRAFT).

85 The patent categorisation procedure is not limited to a single technical category per patent and overlap between categories provides an opportunity to understand the relationship between different disciplines. In New Zealand, the highest overlap occurs between the Biotechnology, Pharmaceutical and Agriculture and Food fields indicating the closely related nature of intellectual property in these technologies.⁵⁰

Sources of ideas

86 Existing Staff (76%), Customers (61%), and New Staff (54%) were key sources of ideas for innovating HVMS firms. Only a small portion of innovating HVMS firms identified Universities or Polytechnics (10%), or CRIs & Other Research Institutions (5%) as sources. The overall trend for HVMS firms is similar to that for all firms.

Figure 22: Sources of innovative ideas for HVMS firms



Source: Statistics New Zealand Business Operations Survey – Innovation module

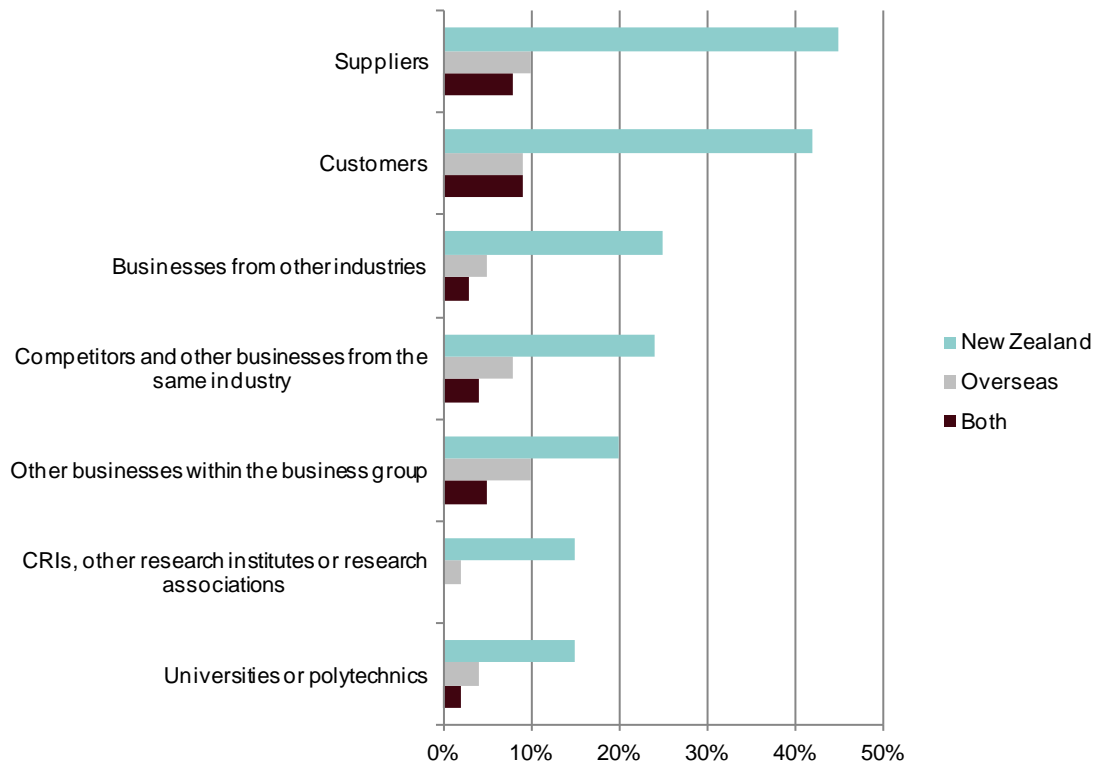
Cooperative arrangements

87 The Innovation Survey asks respondents about the cooperative arrangements they had entered into in the last two financial years. Overall, 23% (1,545 firms) of innovating HVMS firms had been involved in a cooperative agreement in the last two years compared with 21% of firms overall.

⁵⁰ Thomson Reuters (2011), Survey of New Zealand Patent Activity – Prepared for IPONZ (CONFIDENTIAL DRAFT).

88 HVMS firms with cooperative arrangements are most likely to enter into these agreements with New Zealand based partners, with the most likely partners being ones that are also operating in a commercial environment: Suppliers (45%), Customers (42%), and Businesses from Other Industries (25%).

Figure 23: Sources of cooperative arrangements for HVMS firms

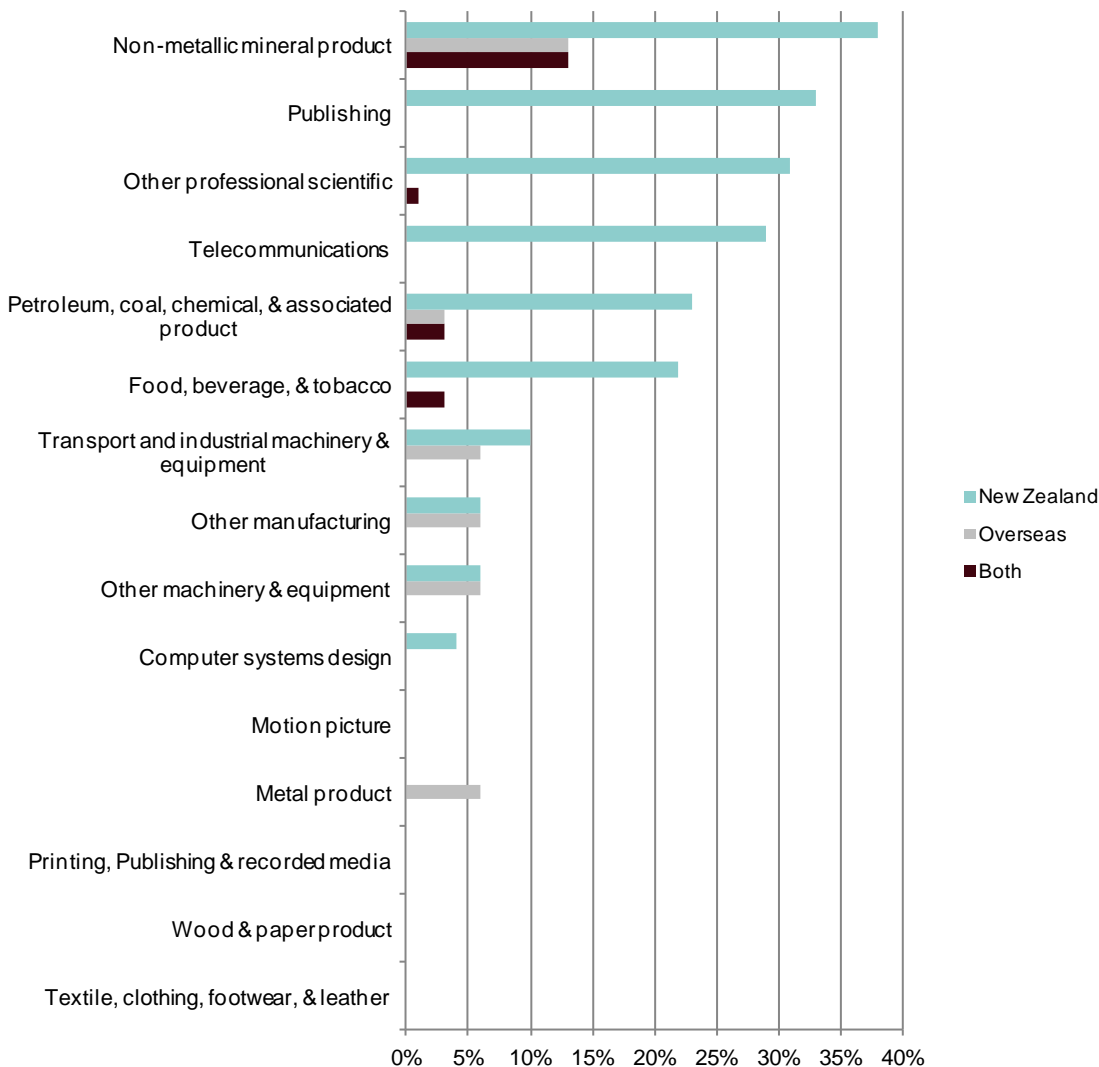


Source: Statistics New Zealand Business Operations Survey – Innovation module

89 Only 4% of all innovating HVMS firms had a cooperative agreement with CRIs, Other Research Institutes or Research Associations over the last two years. This proportion increases to 15% if we only look at HVMS firms that had any form of cooperative agreement in place. Figure 24 below demonstrates that the majority of the arrangements with CRIs, Other Research Institutes or Research Associations are New Zealand based.

90 Figure 24 suggests that some HVMS sub-sectors are much more likely to enter into agreements with CRIs. However, reporting at the HVMS sub-sector level results in small and highly variable sample sizes. Interpreting the graph in this way should therefore be treated with caution.

Figure 24: Percentage of HVMS firms (with cooperative agreements in place) entering into arrangements with CRIs and other Research Institutes or Associations



Source: Statistics New Zealand Business Operations Survey – Innovation module

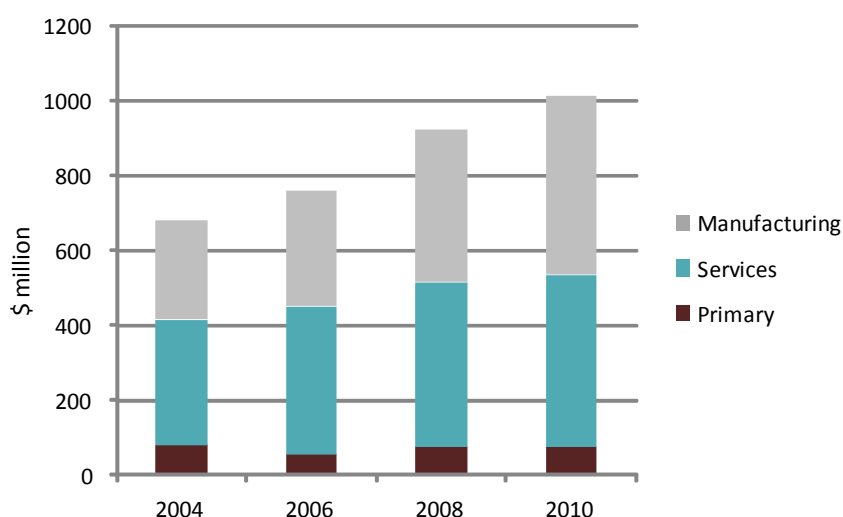
The 2011 New Zealand Economic Indicators report shows that there is a high proportion of Crown Research Institute (CRI) research funded by business, but a low and declining share of university research funded by business.⁵¹

⁵¹ MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011.

Research & Development

- 91 Firms utilise a range of inputs as part of the innovation process, of which R&D is one. Formal R&D has been shown to be correlated with GDP per capita growth and multi-factor productivity. New Zealand has a low level of business expenditure on R&D (BERD) compared with other countries⁵² but BERD has been increasing over time. The low level of BERD is mostly attributed to a lack of large R&D intensive firms.
- 92 At a highly aggregated level, most New Zealand BERD can be attributed to the Manufacturing sector and, over time, the proportion of the Manufacturing sector's contribution to total BERD has increased.⁵³

Figure 25: Changes in BERD expenditure over time by high-level sector



Source: MSI (2011), Business R&D in New Zealand – presentation for BERD workshop 18 November 2011.

- 93 Approximately 6% of New Zealand firms are engaged in R&D. 14% of HVMS firms indicate that they are engaged in R&D compared with 4% of non-HVMS firms.⁵⁴ Although a greater proportion of HVMS firms engage in R&D activity than non-HVMS firms, there is a much greater difference in the proportion of large HVMS and non-HVMS firms undertaking R&D. 40% of HVMS firms with 100+ employees indicated that they were undertaking R&D activities, compared with less than 10% for non-HVMS firms in the same size category.

⁵² MSI (2011), Business R&D in New Zealand – Presentation for BERD workshop November 18 2011 (not publicly available).

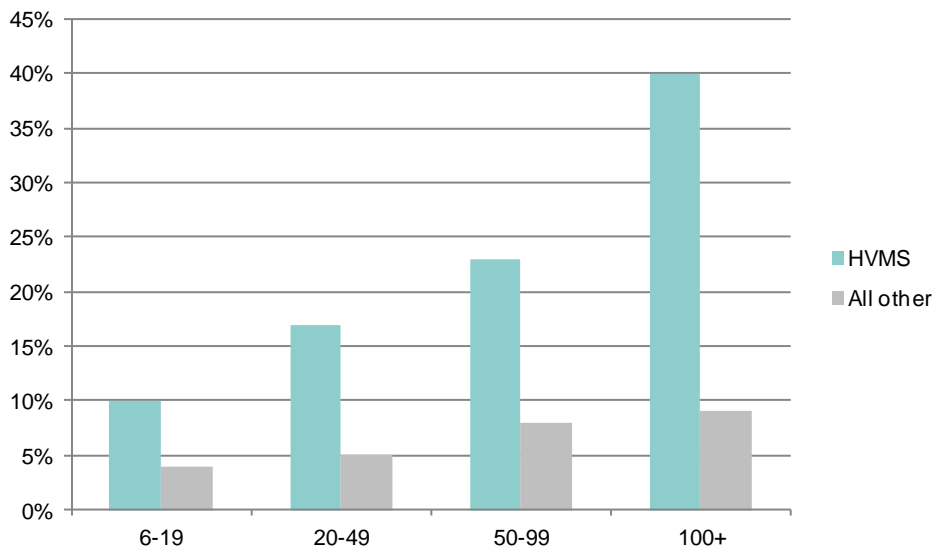
⁵³ MSI (2011), Business R&D in New Zealand – Presentation for BERD workshop November 18 2011 (not publicly available).

⁵⁴ Statistics New Zealand (2010), R&D Survey – special extract.

MED found that 25% of KIMS firms conducted some research and development, compared with only 1% of other firms.⁵⁵

94 Undertaking R&D activities differentiates HVMS from non-HVMS firms to a greater degree than undertaking innovation activities.

Figure 26: Proportion of firms (by firm size) undertaking R&D



Source: Statistics New Zealand R&D survey

95 The low level of BERD in New Zealand can be attributed to the comparatively low BERD by large firms. As a proportion of total industry value added⁵⁶, medium-sized New Zealand firms fund less BERD and large New Zealand firms fund a lot less BERD than the OECD mean. In contrast, New Zealand’s small businesses (less than 50 employees) fund a little more. Figure 27 shows that, in New Zealand, small businesses contribute a high proportion of total BERD (73%) compared to other OECD countries.⁵⁷ Figure 28 shows that New Zealand has low BERD as a proportion of value added compared with other OECD countries.

⁵⁵ MED (2011), The KIMS sector: A comprehensive overview Part 1 (not publicly available).

⁵⁶ Total industry value added is the sum of value added by small, medium, and large firms.

⁵⁷ OECD (2011), Research and Development Database, May 2011 (accessed via OECD iLibrary).

Figure 27: BERD by size class of firm as a proportion of total BERD

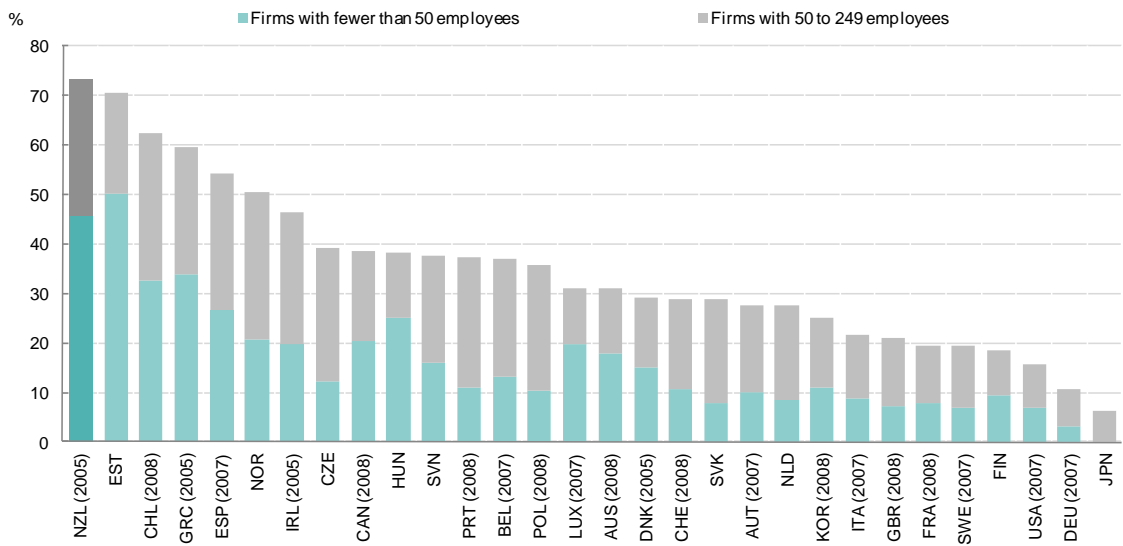
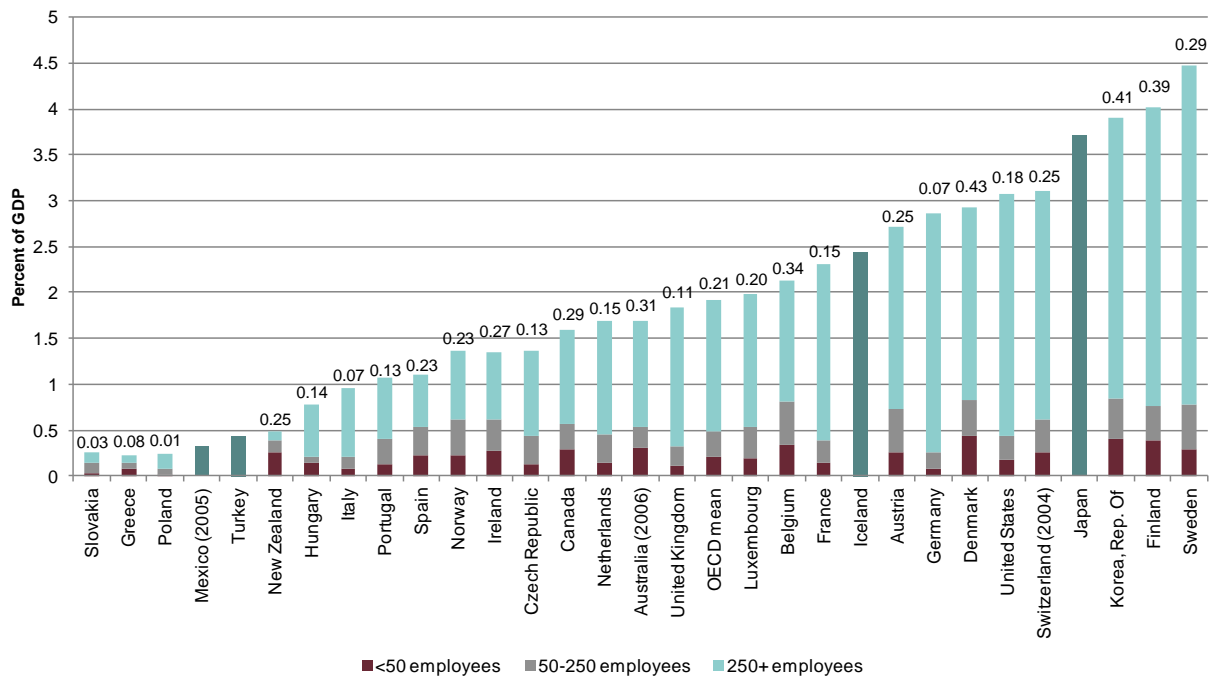


Figure 28: BERD by size class of firm as a proportion of total industry value added (2007)⁵⁸

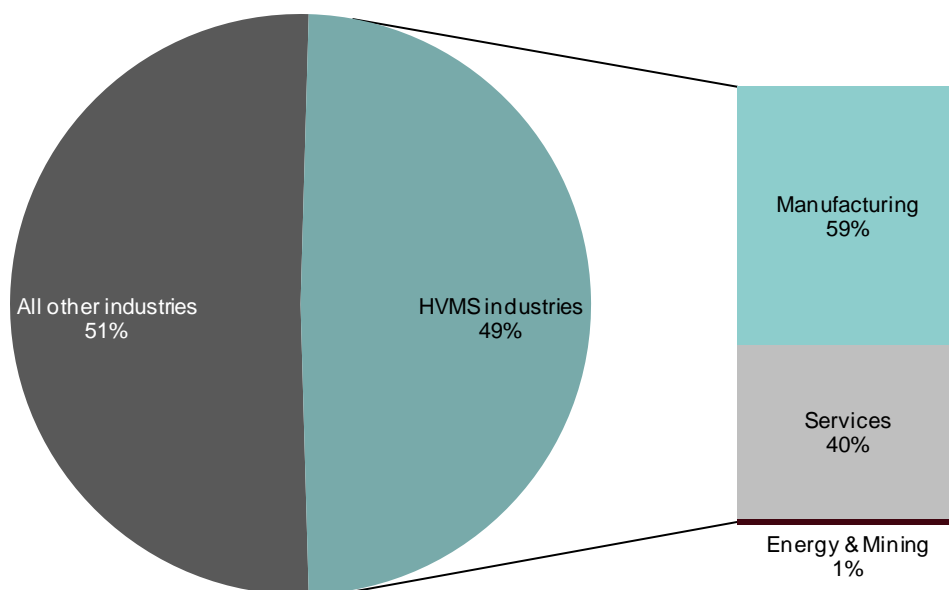


⁵⁸ MED, The Treasury, Statistics New Zealand (2011), Economic Indicators: 2011

96 HVMS firms comprised half of the R&D active business population in 2010 (approximately 3,300 firms). This is down from 2004, when they made up 60% of the R&D active business population.

97 Of the HMVS firms undertaking R&D, 59% were in the Manufacturing sub-sector, 40% were in the Services sub-sector and 1% were in the Energy & Mining sub-sector.

Figure 29: Proportion of firms conducting R&D



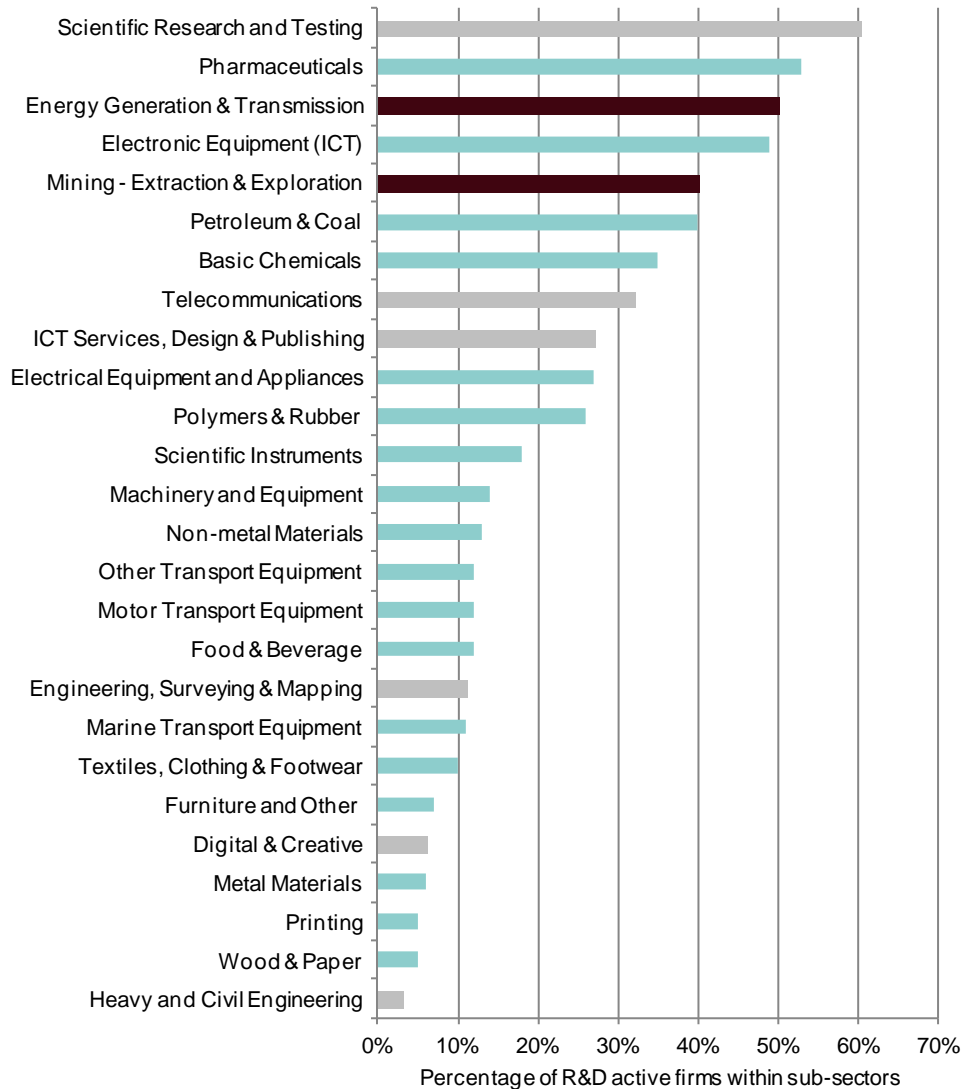
Source: Statistics New Zealand R&D survey

98 When considering the incidence of R&D within industries, the HVMS sub-sectors that had a high proportion of firms engaged in R&D activity were: Scientific Research & Testing, Pharmaceuticals, Energy Generation & Transmission and Electronic Equipment. Each of these sub-sectors had 50% or more of firms engaged in R&D.

99 The HVMS sub-sectors with the greatest total number of firms undertaking R&D were: ICT Services, Design & Publishing; Scientific Research and Testing; and Food & Beverage Manufacturing.

100 The incidence of R&D in HVMS sub-sectors is shown in the following chart.

Figure 30: Incidence of R&D activity in HVMS sub-sectors



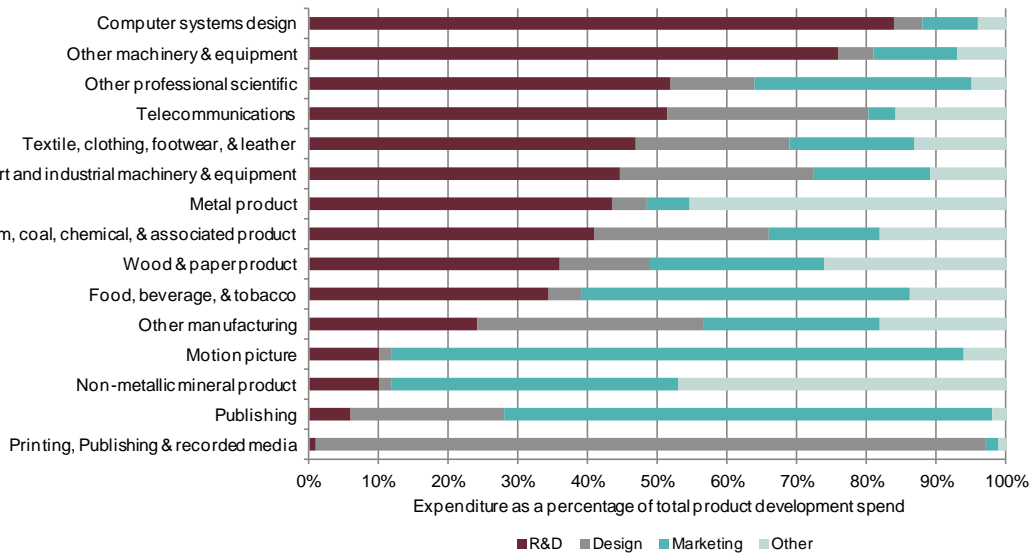
Source: Statistics New Zealand R&D survey

101 The proportion of firms reporting R&D only tells one part of the product/service development story. The relative importance of R&D compared with other inputs varies considerably across industries.⁵⁹ Figure 31 demonstrates how different sectors use a different mix of product development activities – some of which may be outside the scope of an ATI, in particular Marketing. Those sub-sectors with high proportions of

⁵⁹ MSI (2011), Business R&D in New Zealand – Presentation for BERD workshop November 18 2011 (not publicly available).

R&D and Design expenditure in product development are likely to be of interest to an ATI, and those with predominantly Marketing spend, less so.

Figure 31: Relative importance of R&D and other innovation inputs by HVMS sub-sector

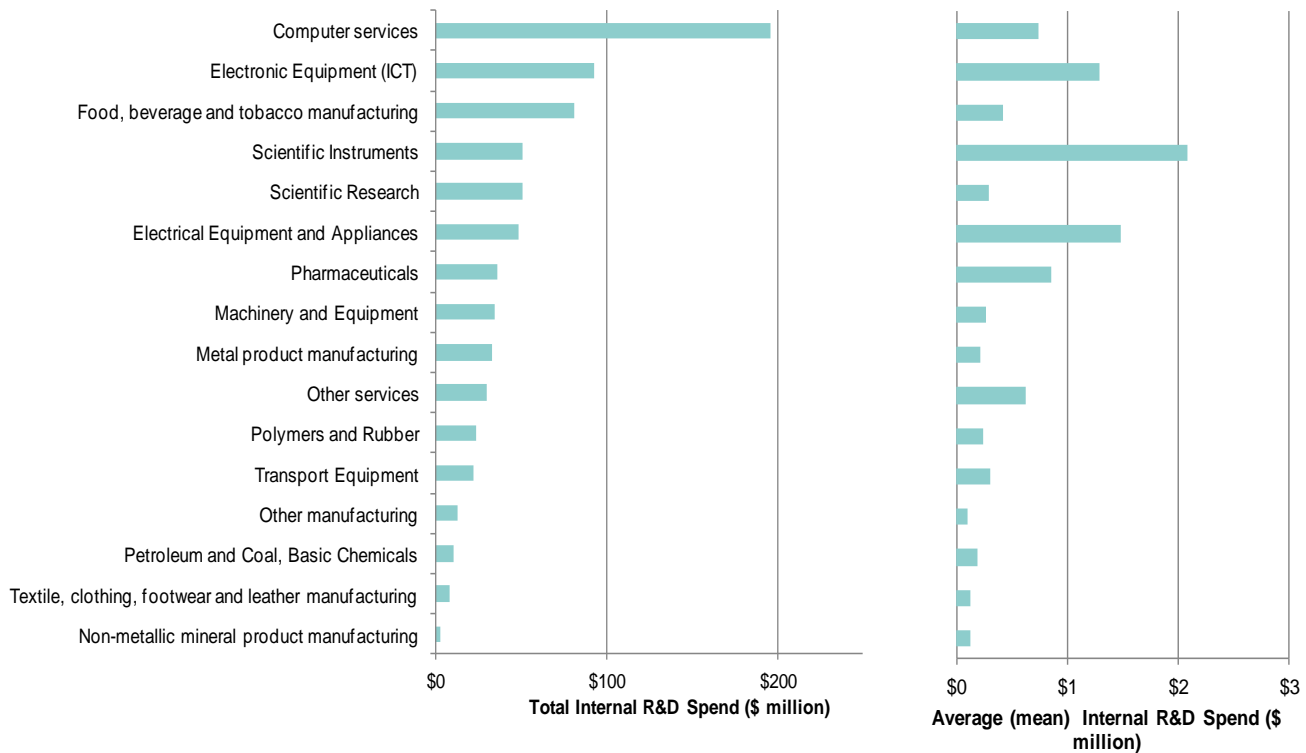


Source: Statistics New Zealand Business Operations Survey – Innovation module

102 The Computer Services sub-sector spends almost double the amount on internal R&D than any other HVMS sub-sector (\$196 million), the equivalent of almost 20% of the total HVMS spend on R&D (just over \$1 billion).

103 However, in terms of average R&D expenditure, Scientific Instrument Manufacturers (\$2.1 million), Electrical Equipment & Appliance manufacturers (\$1.5 million) and Electronic Equipment (ICT) manufacturers (\$1.3 million) are the biggest spenders.

Figure 32: Total Internal R&D expenditure and average (mean) Internal R&D expenditure by HVMS sub-sector⁶⁰



Source: Statistics New Zealand R&D survey

Foreign ownership

- 104 Foreign Direct Investment (FDI) can contribute to economic growth by increasing productivity through the application of superior skills, technology, more efficient use of resources, increasing R&D, and by intensifying competition.
- 105 High quality FDI can generate improvements in innovation, productivity and scale, help local firms become more internationally connected and/or introduce new skills and technology to the wider economy.⁶¹ In addition to these direct effects, FDI can generate wider economic benefits that are not entirely captured by the firms involved in the investment.⁶²

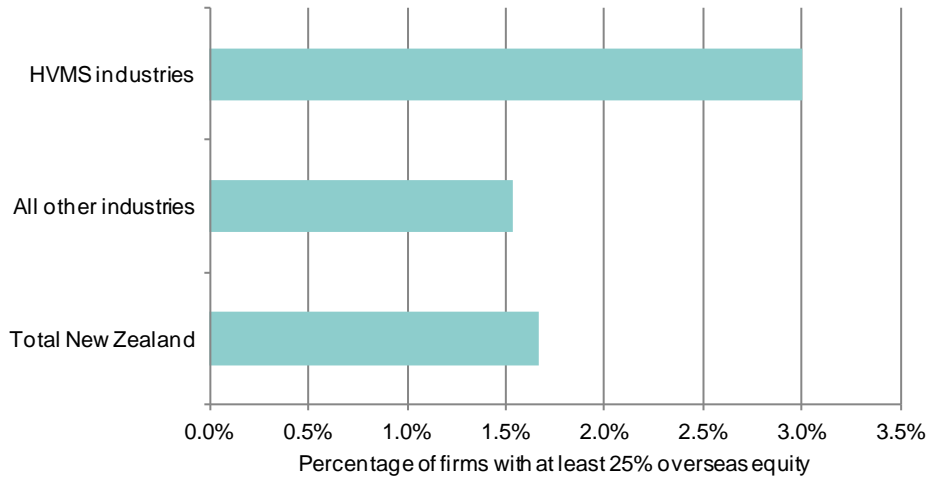
⁶⁰ The sector results from the R&D survey could not be matched exactly to the HVMS sectors, due of weights applied by Statistics New Zealand . These results provide the best approximation available.

⁶¹ MartinJenkins (2011), Attracting Talent and Investment to Wellington, Report to Wellington City Council.

⁶² MartinJenkins (2011), Attracting Talent and Investment to Wellington, Report to Wellington City Council.

106 3% of HVMS firms (1,310 firms) have 25% or more of foreign equity, double the proportion of all other firms (1.5%).

Figure 33: Proportion of firms with overseas ownership equity exceeding 25%

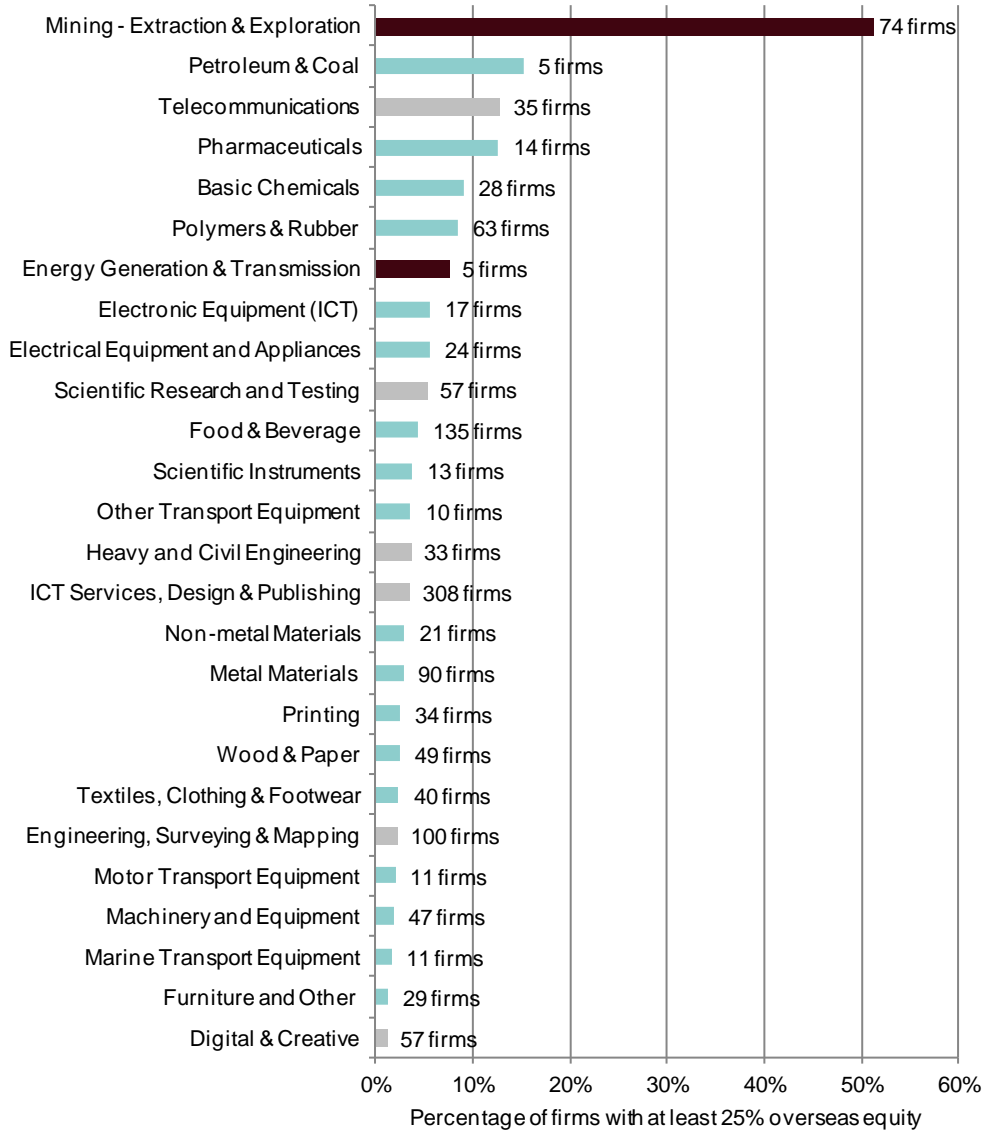


Source: Statistics New Zealand Business Frame

107 On a sub-sector basis, Mining - Extraction & Exploration has the highest proportion of firms that are more than 25% overseas owned (51% of firms). Only three other sub-sectors (Petroleum & Coal, Telecommunications, Pharmaceuticals) had more than 10% of firms with greater than 25% FDI.

108 The largest number of HVMS firms that have more than 25% of overseas ownership are in the ICT Services, Design & Publishing HVMS sub-sector. This sub-sector on its own accounts for 308 (24%) of the 1,310 HVMS firms meeting the overseas ownership threshold used in this analysis.

Figure 34: Proportion of firms with overseas ownership of greater than 25% by HVMS sub-sector (with number of firms)



Source: Statistics New Zealand Business Frame

MED's analysis of KIMS firms also shows that they are more likely to receive FDI than non-KIMS firms.

Firms with FDI account for 35% of high tech manufacturing sales, 44% of medium-high tech manufacturing sales and 40% of high value services sales. This compares with 29% of sales for non-KIMS firms.⁶³

The pressure to sell out or move offshore has been exacerbated in recent years because of factors such as globalisation, and the emergence of KIMS businesses that do not depend on local inputs or markets and therefore have little more than social and lifestyle factors anchoring them in New Zealand.⁶⁴

⁶³ MED (2011), The KIMS sector: A comprehensive overview Part 2 (not publicly available).

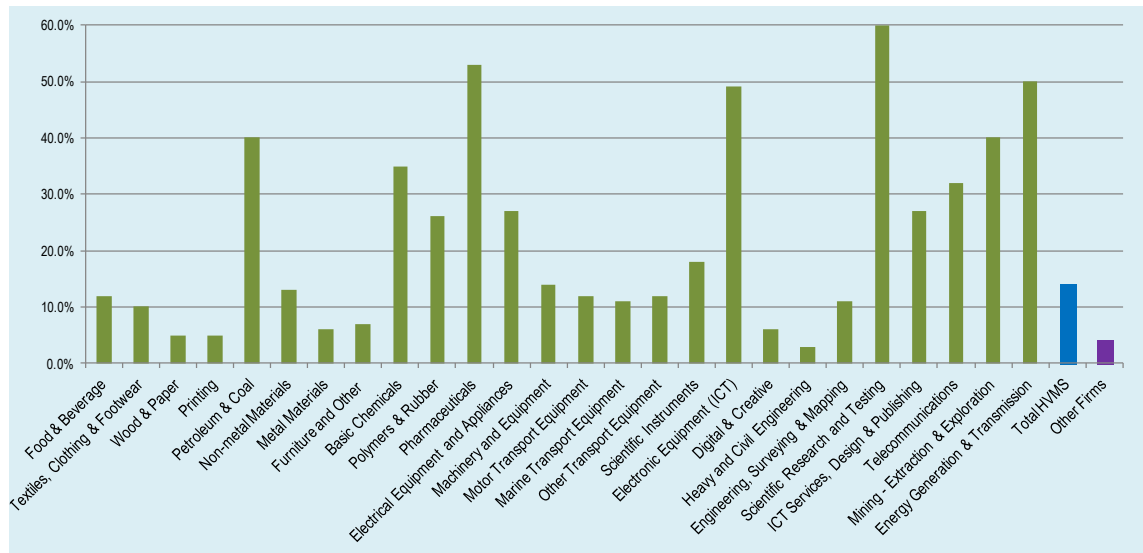
⁶⁴ MED – Industry Policy and KIMS Businesses (not publicly available).

Sub-sectors analysis

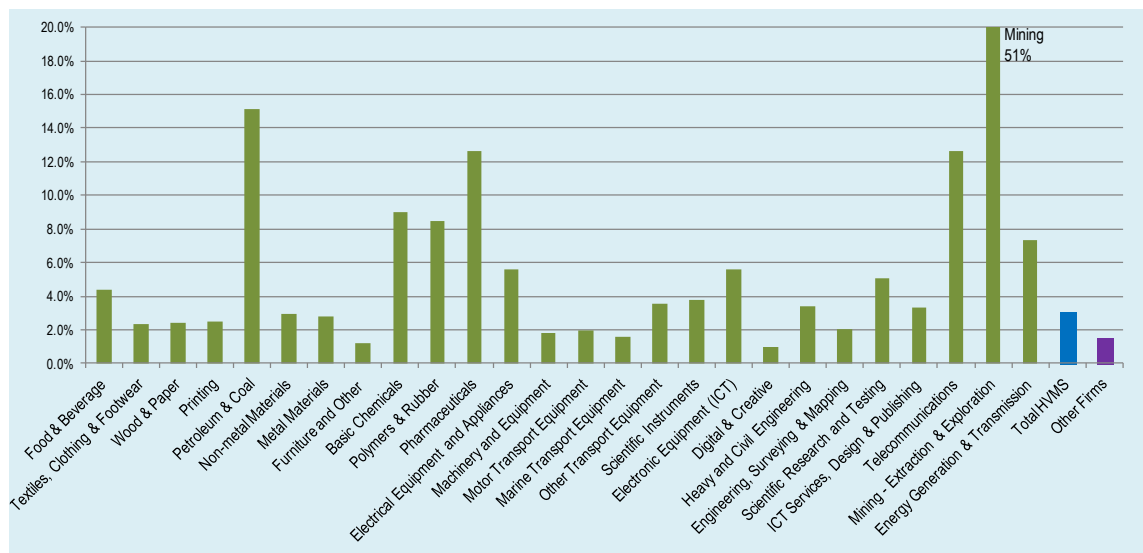
The following section provides detailed information relating to each of the HVMS sub-sectors.

The following charts show the sub-sector titles relevant to each chart on the following pages:

Percent of firms that are R&D Active





Percent of firms with foreign ownership over 25%



Notes:

- Where data in the following section was not available from Statistics New Zealand (generally due to confidentiality) or not able to be provided in the HVMS sub-sectors, the tables in the affected sub-sectors show “n/a”.
- In tables for each subsector, a visual indicator is provided that indicates the score for that subsector compared with the HVMS sector as a whole (for specific characteristics):

	Subsector score is lower than that for HVMS as a whole
	Subsector score is higher than that for HVMS as a whole

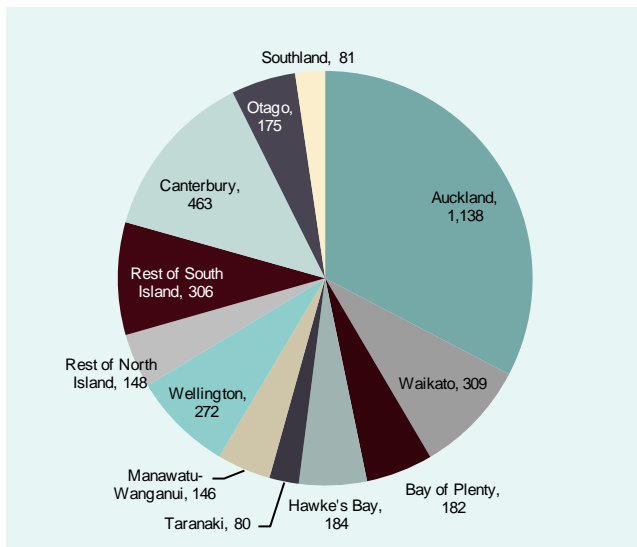
Food and beverage manufacturing

Sub-sector definition – ANZSIC codes

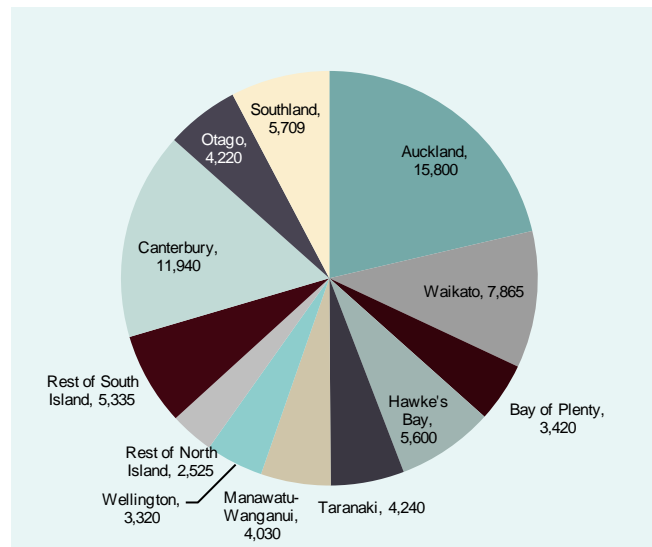
- C11 **Food product manufacturing:** including meat, seafood, dairy, fruit and vegetable, oil and fat, grain mill and cereal, bakery, sugar and confectionary and other food product manufacturing.
- C121 **Beverage manufacturing:** manufacturing aerated or carbonated soft drinks, mineral or purified waters, fruit drinks (less than 100 percent pure juice), concentrated cordials, syrups or non-alcoholic brewed beer or cider.

Number and location of businesses

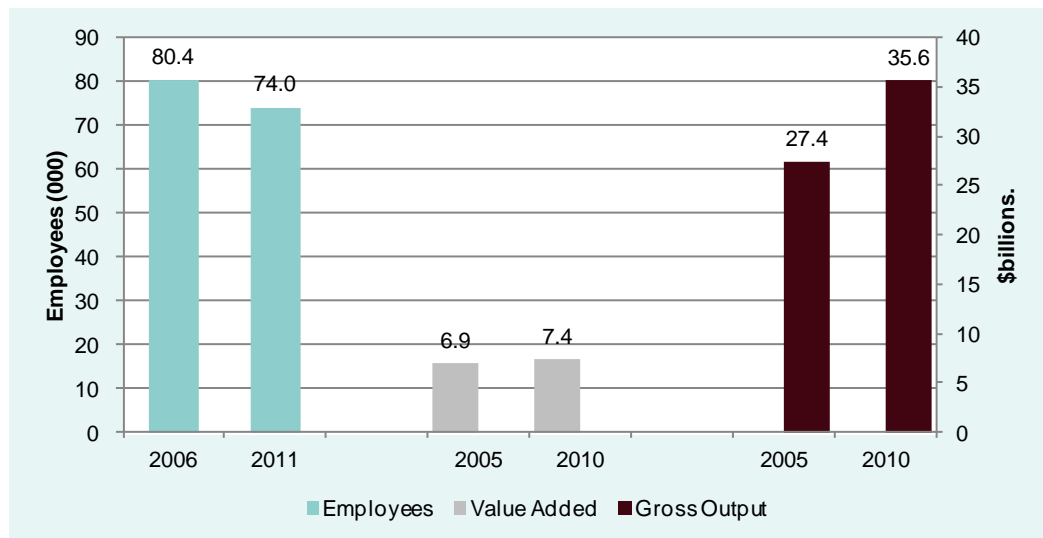
Geographic Units – 3,484



Employees – 74,004

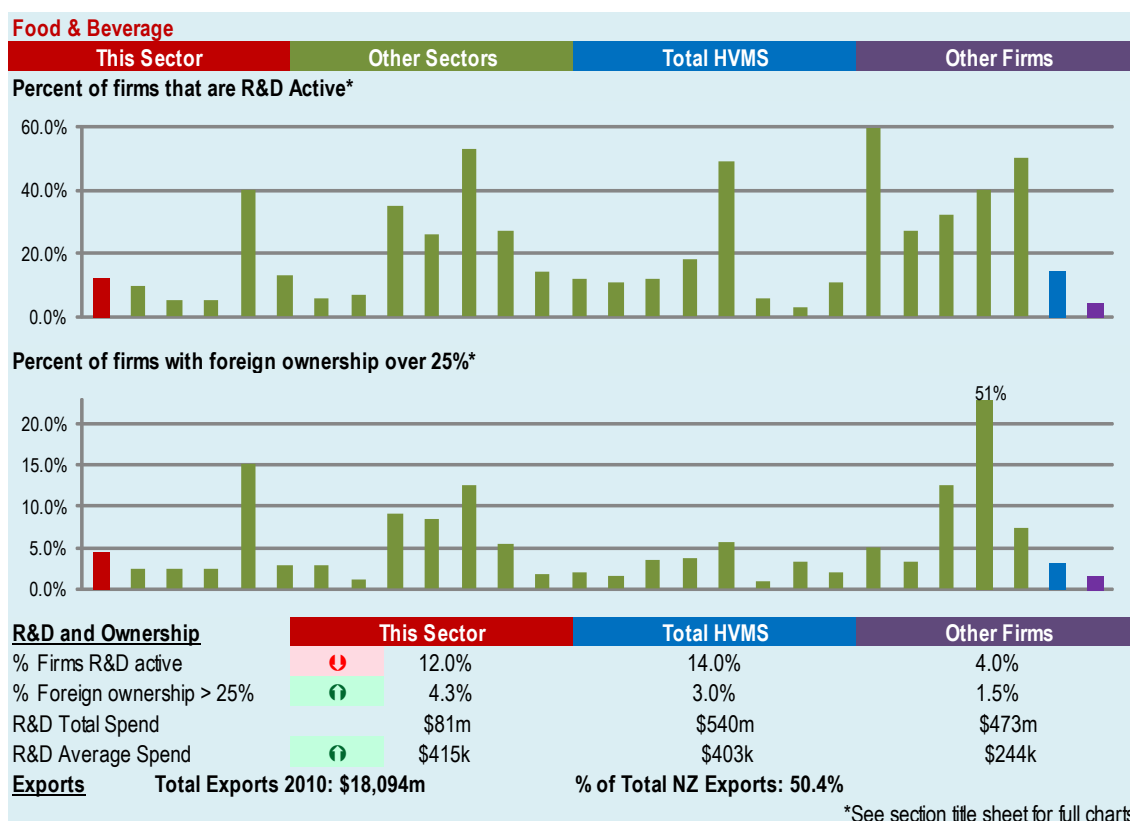


Sector growth – employees, value added and gross output⁶⁵



⁶⁵ Value added and gross output include Tobacco Product Manufacturing, for confidentiality reasons.

R&D, ownership and exports



The top five export product classes by value are Milk & cream, preserved, concentrated or sweetened; Meat of sheep & goats, fresh, chilled or frozen; Butter; Meat of bovine animals, fresh, chilled or frozen; Cheese & curd. These make up 67% of Food & Beverage exports by value.

Comments

The food and beverage sub-sector is the largest employer across all HVMS sub-sectors (25% of total) and the largest employer in Auckland (15% of Auckland).

International market trends⁶⁶: Greater than average export growth; increasing regulatory and consumer scrutiny; demand for lifestyle brands, ethical packaging; retailer consolidation and private supermarket labels; consumer preferences stable but still price sensitive.

Challenges and opportunities⁶⁷

Challenges	Opportunities
<ul style="list-style-type: none"> Most New Zealand F&B companies not in a position to capitalise on research and successfully commercialise New Zealand R&D in global markets. Reliance on government to government agreements around food safety and labelling Risk that the failure of any one consignment or business to deliver compliant products will negatively impact on the access of others to those same markets 	<ul style="list-style-type: none"> Build on strengths in processed foods, focus on adding value in New Zealand rather than overseas, including working with education and research facilities Food Innovation Network – coordination of business development, testing new products

⁶⁶ Euromonitor International (2010)

⁶⁷ <http://www.med.govt.nz/sectors-industries/food-beverage/pdf-docs-library/information-project/innovation-overview-2011.pdf>; <http://www.med.govt.nz/sectors-industries/food-beverage/pdf-docs-library/coriolis-report-pdf>; http://www.foodsafety.govt.nz/elibrary/industry/Statement_Intent_2009-Describes_Nzfsa.pdf

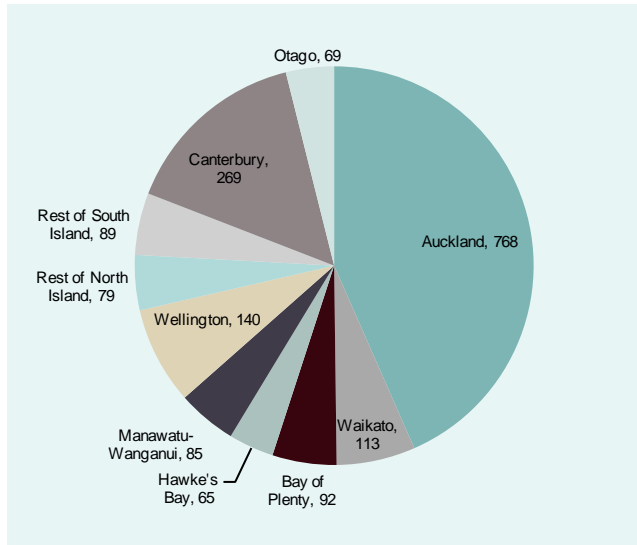
Textiles, clothing and footwear

Sub-sector definition – ANZSIC code

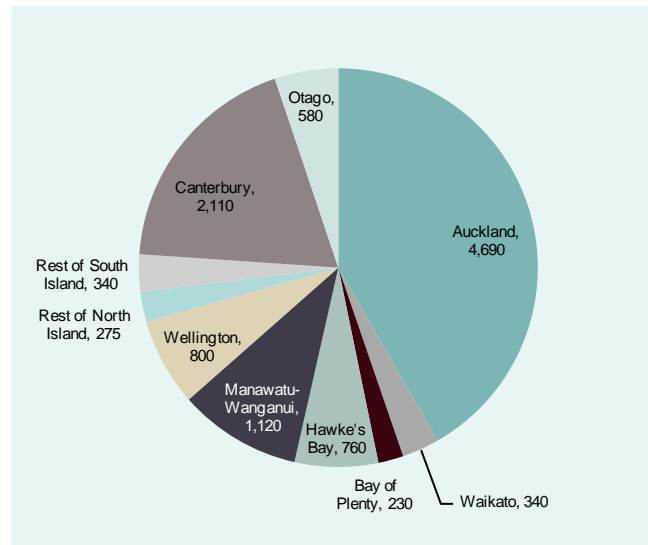
C13 Textile, Leather, Clothing and Footwear Manufacturing: including manufacturing of: Textile Fibre, Yarn and Woven Fabric; Leather Tanning and Fur Dressing; Textile Products; Knitted Products; and Clothing and Footwear.

Number and location of businesses

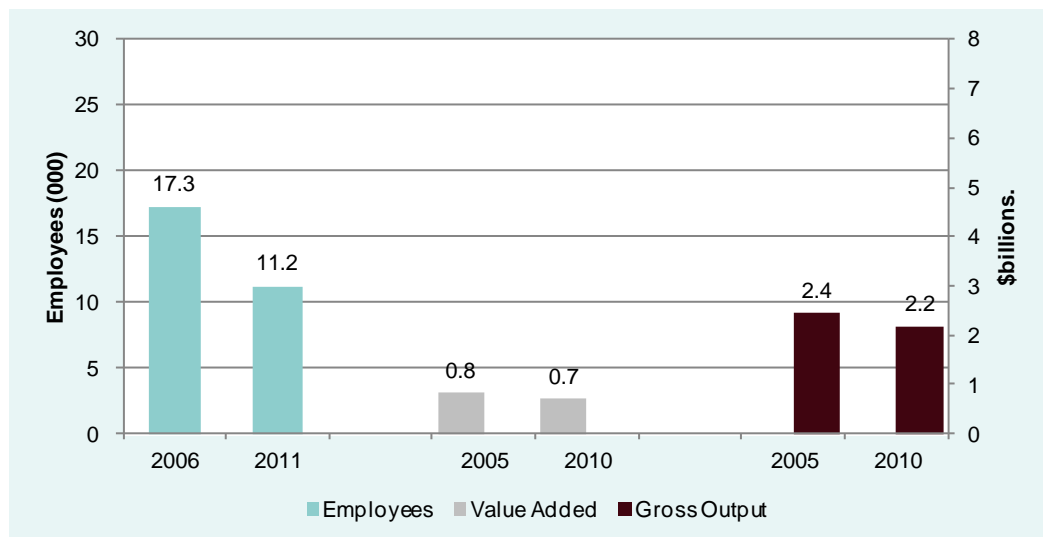
Geographic Units – 1,769



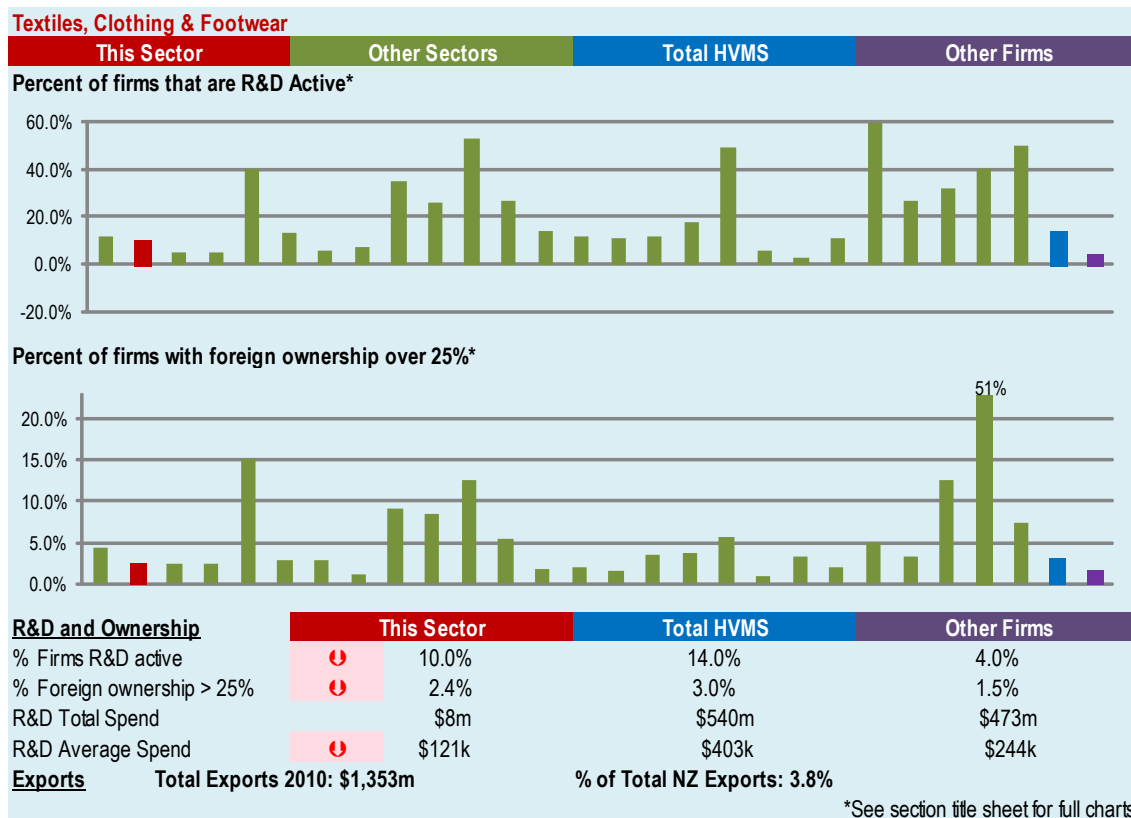
Employees – 11,245



Sector growth – employees, value added and gross output



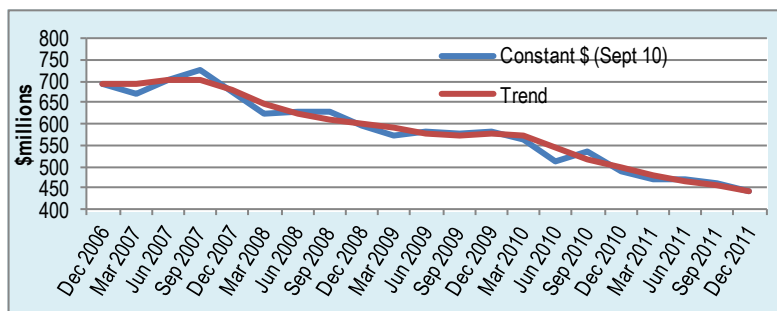
R&D, ownership and exports



The top five export product classes by value are Sheep or lambs-wool, degreased, in the mass; Leather of other bovine cattle and equine leather; Yarn of wool or animal hair (including wool tops); Sheep & lamb skins without the wool, raw(fresh etc); Carpets, carpeting, rugs, mats & matting, of wool etc. These make up 54% of Textiles, Clothing & Footwear exports by value.

Sub-sector history

Textile, leather, clothing, and footwear manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments⁶⁸.



⁶⁸ Statistics New Zealand. Economic survey of manufacturing, December 2011.

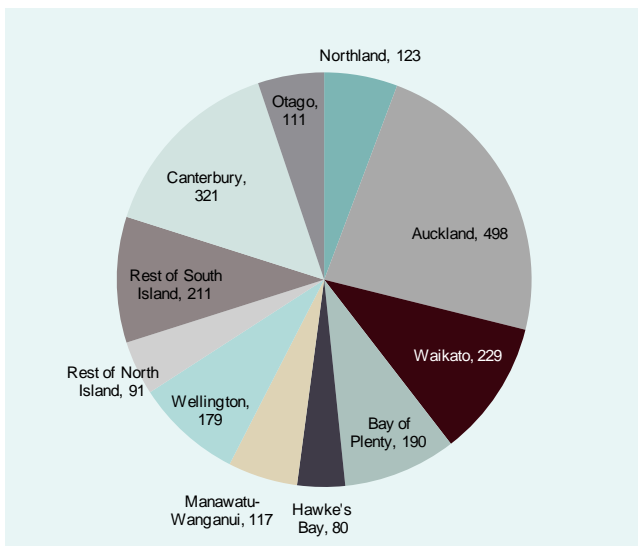
Wood and paper

Sub-sector definition – ANZSIC codes

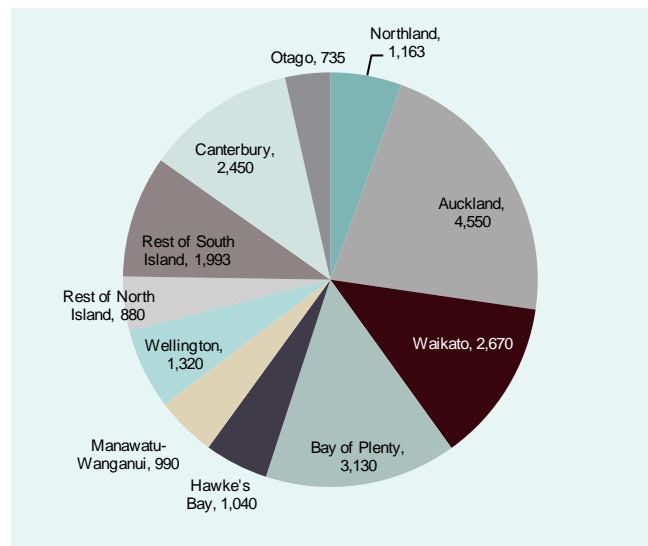
C141	Log Sawmilling and Timber Dressing: manufacturing rough sawn timber, and boards; manufacturing softwood or hardwood wood chips; resawing or dressing timber, timber boards and mouldings. Dressing timber includes seasoning (kiln or air drying) or chemical preservation.
C149	Other Wood Product Manufacturing: manufacturing: wooden prefabricated buildings; wooden structural fittings and components such as roof trusses, doors, wood-framed doors, wall and window frames, shop fronts and joinery (including kitchen fittings) for buildings; veneers and plywood; wood boards and sheets from reconstituted wood fibres such as wood chips, sawdust, wood shavings, slabwood or off-cuts. Also included are units that manufacture laminations of timber and non-timber materials (including decorative plastic laminates on boards or other substrates); wicker ware, cork, bamboo or cane products (excluding furniture).
C15	Pulp, Paper and Converted Paper Product Manufacturing: including manufacturing of: Pulp, Paper and Paperboard; Corrugated Paperboard and Paperboard Containers; Paper Bags; Paper Stationery; Sanitary Paper Products; and Other Converted Paper Product Manufacturing.

Number and location of businesses

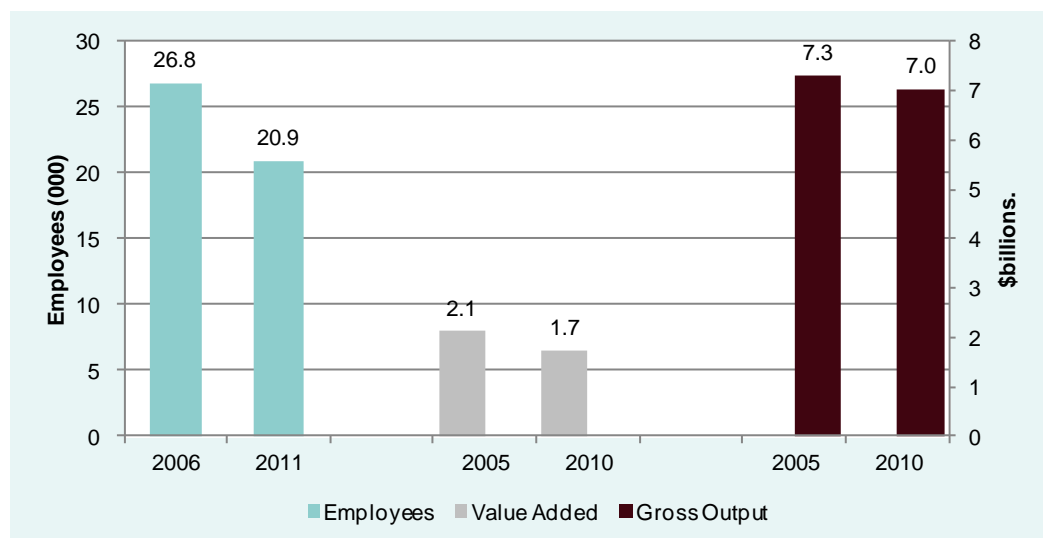
Geographic Units – 2,150



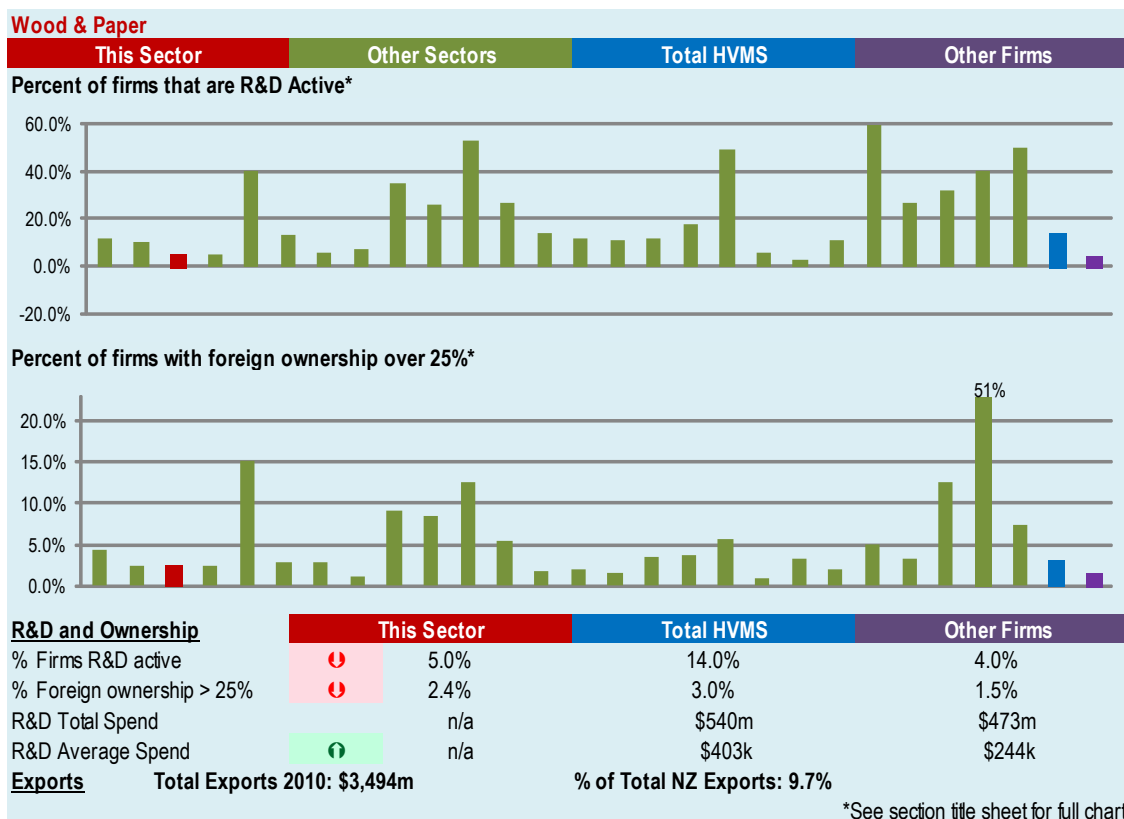
Employees – 20,921



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Saw logs and veneer logs, of coniferous species; Wood of coniferous species, sawn, planed, tongued etc.; Chemical wood pulp, soda or sulphate; Building board of wood pulp or of vegetable fibre; Kraft paper and paperboard, in rolls or sheets. These make up 76% of Wood & Paper exports by value.

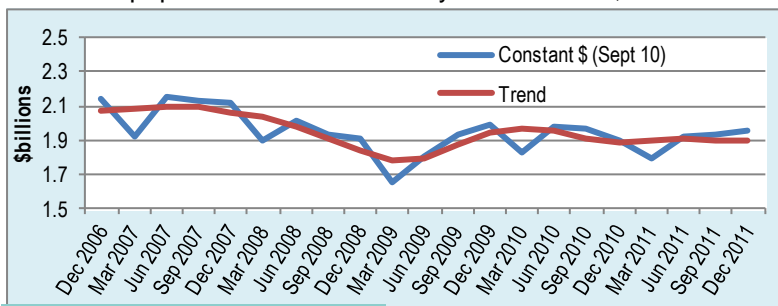
Comments⁶⁹

Worldwide, nearly 3.5 billion tonnes of wood are consumed annually, and average wood demand increases by approximately 100 million tonnes a year. The OECD estimates that the global trade in timber is worth more than NZ\$300 billion a year.

Much of the global demand for timber and wood products is met with wood that is harvested unsustainably. New Zealand is one of few countries in the world with the ability to increase and sustain its total wood production.

Sub-sector history

Wood and paper – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments⁷⁰.



⁶⁹ NZTE Growth Industry analysis. www.nzte.govt.nz.

⁷⁰ Statistics New Zealand. Economic survey of manufacturing, December 2011.

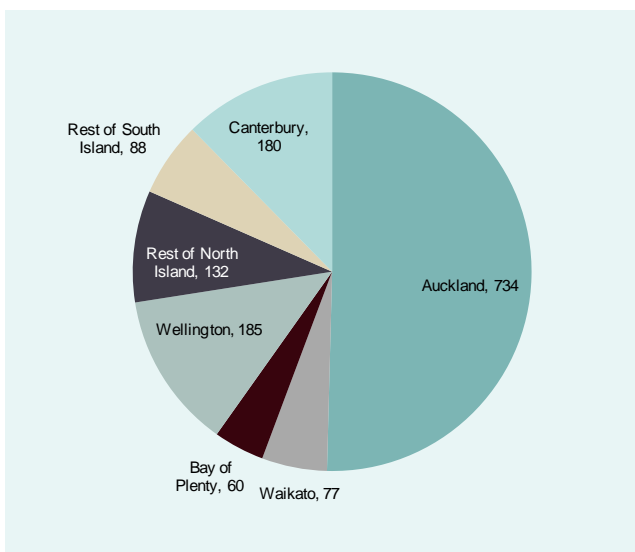
Printing

Sub-sector definition – ANZSIC codes

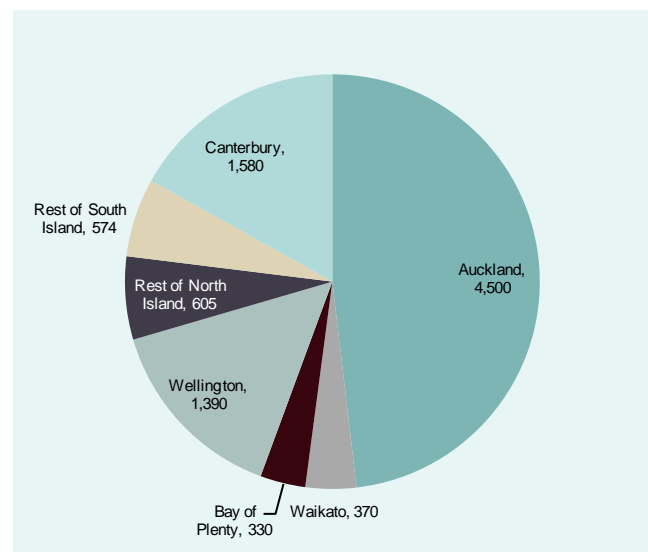
C16 Printing (including the Reproduction of Recorded Media): printing and/or providing reprographic services. Printing methods may include off-set lithographic, reprographic, digital, relief and screen printing. Units may print onto a variety of materials, including paper, plastic and metal. Also included are units mainly engaged in screen printing on wearing apparel. Providing printing support services such as pre-press (eg typesetting, colour separation or plate-making), post-press or finishing (eg laminating, embossing or book binding) services. Reproduction of pre-recorded audio, video, software and other data on electronic, optical and magnetic media.

Number and location of businesses

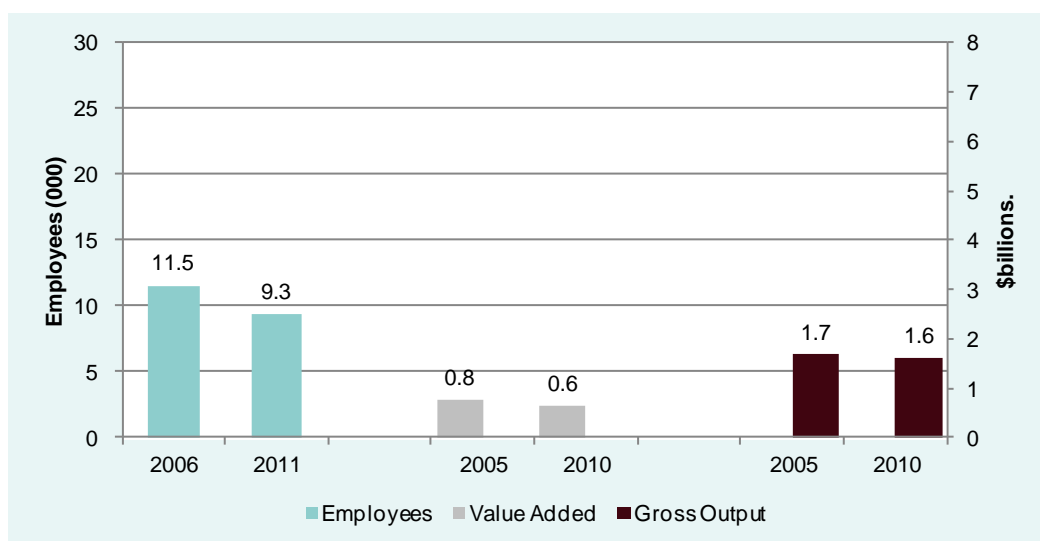
Geographic Units – 1,456



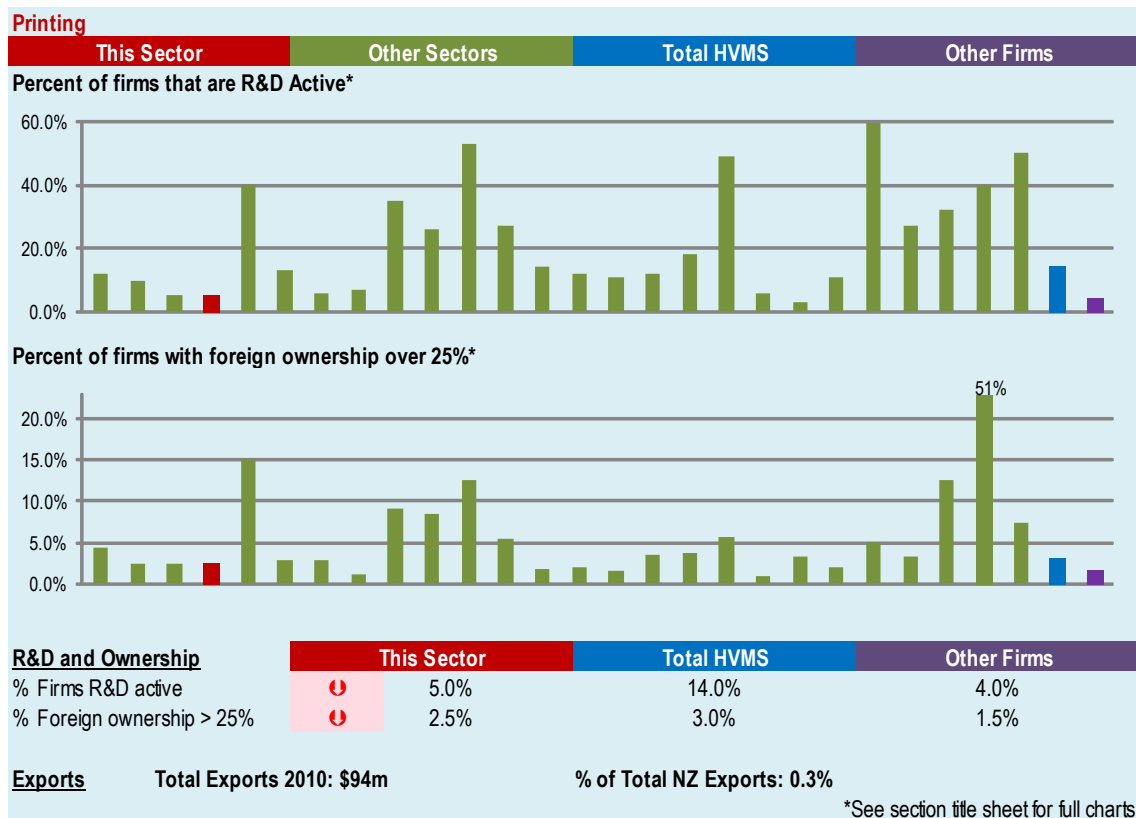
Employees – 9,349



Sector growth – employees, value added and gross output



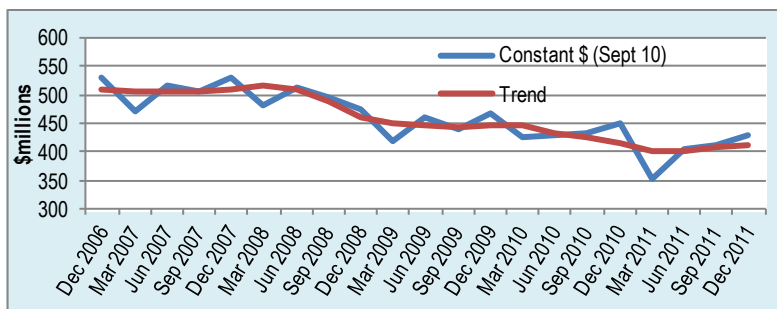
R&D, ownership and exports



The five export product classes making up the Printing subsector are Printed matter, n.e.s; Books, pamphlets, maps and globes, printed; Registers, exercise books, note books, etc.; Newspapers journals, periodicals; Picture postcards, greeting cards.

Sub-sector history

Printing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments⁷¹.



⁷¹ Statistics New Zealand. Economic survey of manufacturing, December 2011.

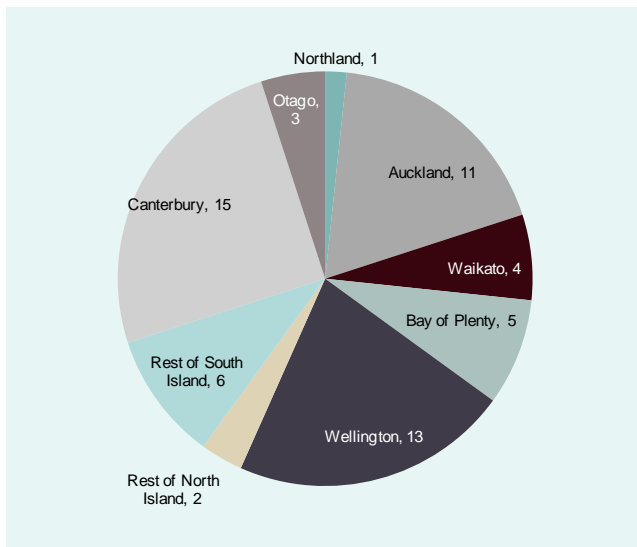
Petroleum and coal

Sub-sector definition – ANZSIC codes

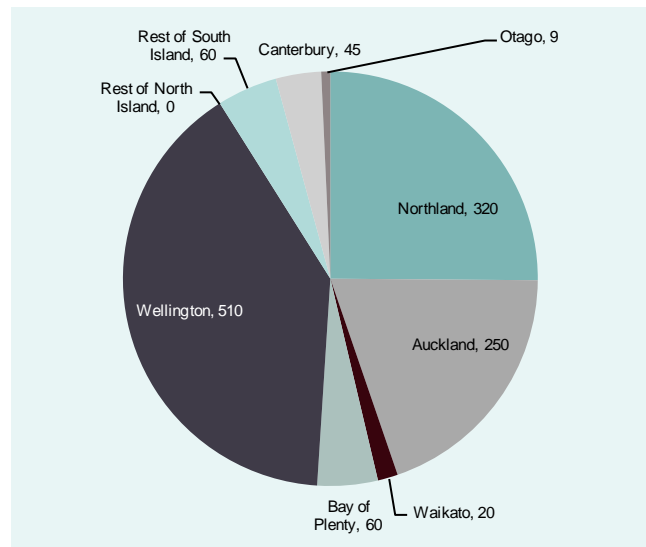
C17 Petroleum and Coal Product Manufacturing: Refining heavy and light component crude oil, manufacturing and/or blending materials into petroleum fuels, and manufacturing fuels from the liquefaction of petroleum gases.
 Further refining heavy and light oil components into petroleum and coal products not elsewhere classified, using oil and grease base stocks, as well as synthetic organic compound base stocks. This class also includes units mainly engaged in distilling coal tars and/or manufacturing cyclic organic hydrocarbon intermediate compounds from refined petroleum or natural gas.

Number and location of businesses

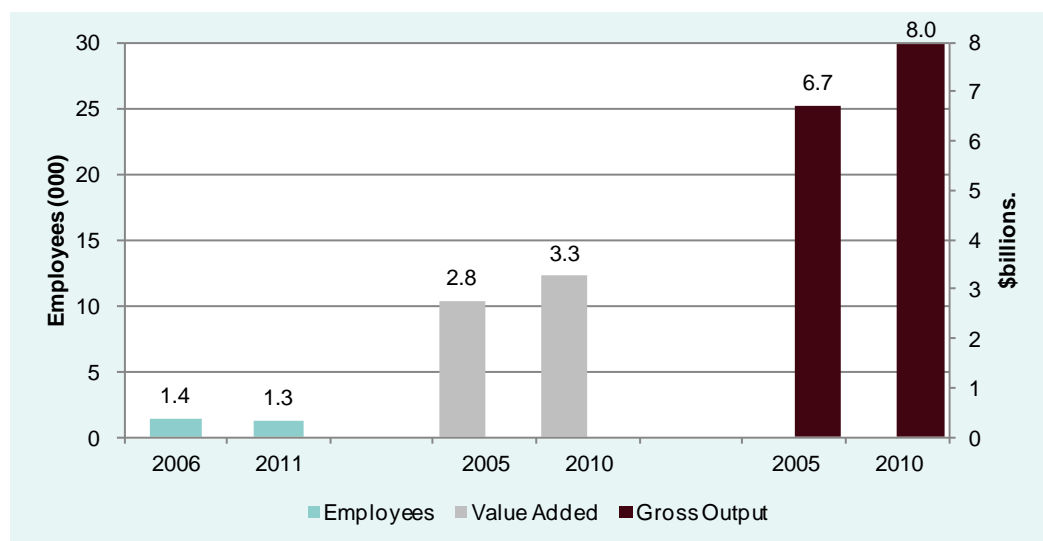
Geographic Units – 60



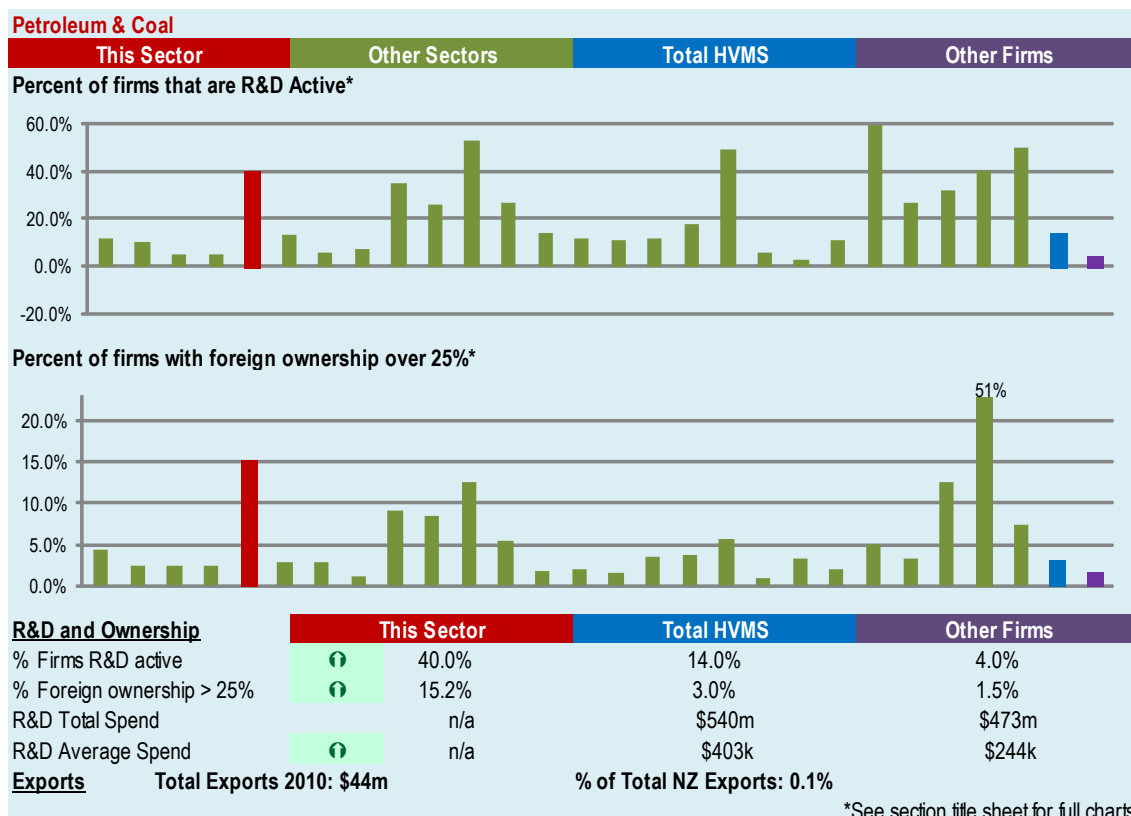
Employees – 1,274



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Petroleum bitumen, petrol. coke & bituminous mixtures nes; Petroleum gases and other gaseous hydrocarbons; Construction materials of asbestos-cement & fibre-cement; Lubricating petrol. oils & other heavy petrol .oils; Mineral tars and products of their distillation. These make up 100% of Petroleum & Coal exports by value.

Comments

This sub-sector includes Refining NZ's plant at Marsden Point, Whangarei. This plant supplies:

- all of the country's jet fuel
- nearly 80% of diesel
- around half of all petrol
- between 75 and 85% of bitumen for roading
- all fuel oil for ships
- sulphur for farm fertiliser.⁷²

The volume of sales for the petroleum and coal product manufacturing industry rose 10.4% (\$164 million) in the December 2011 quarter, following falls in the three previous quarters. The sales value also rose, up 8.8% (\$167 million). The trend indicates that the sales volume for the petroleum and coal product manufacturing industry is increasing.

The volume of finished goods stocks decreased 16.8% in the December 2011 quarter compared with the December 2010 quarter. Stocks have generally been falling since a high point in June 2009⁷³.

⁷² Refining NZ website: accessed March 2012.

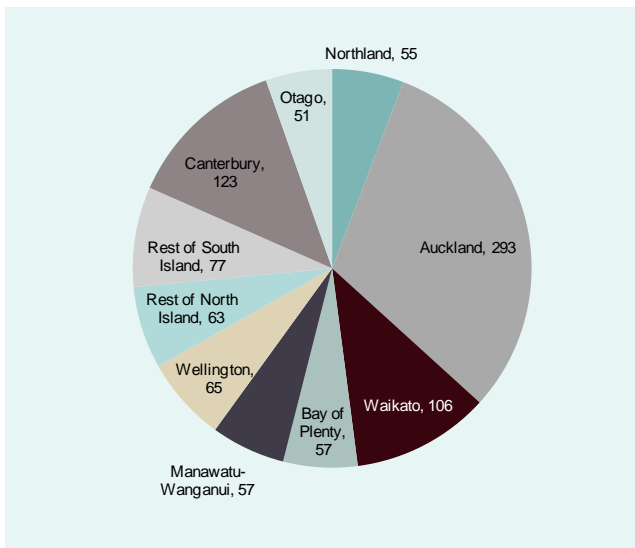
Non-metal materials

Sub-sector definition – ANZSIC codes

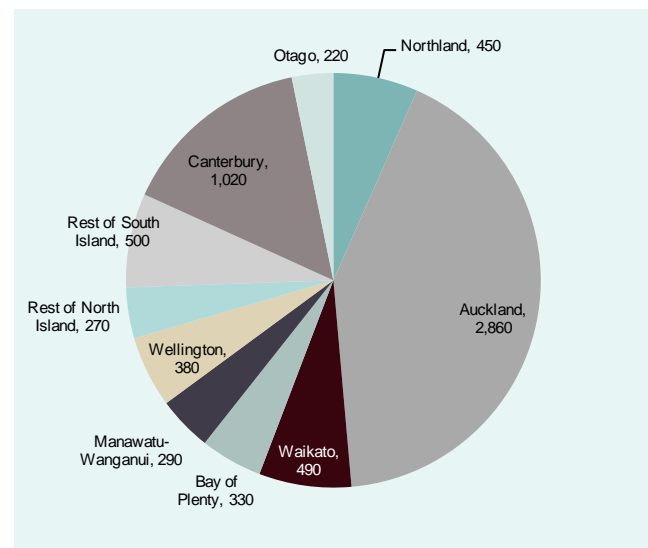
C20 Non-Metallic Mineral Product Manufacturing: including manufacturing of: Glass and Glass Products; Clay Bricks; Other Ceramic Products; Cement and Lime; Plaster Products; Ready-Mixed Concrete; Concrete Products; and Other Non-Metallic Mineral Product Manufacturing.

Number and location of businesses

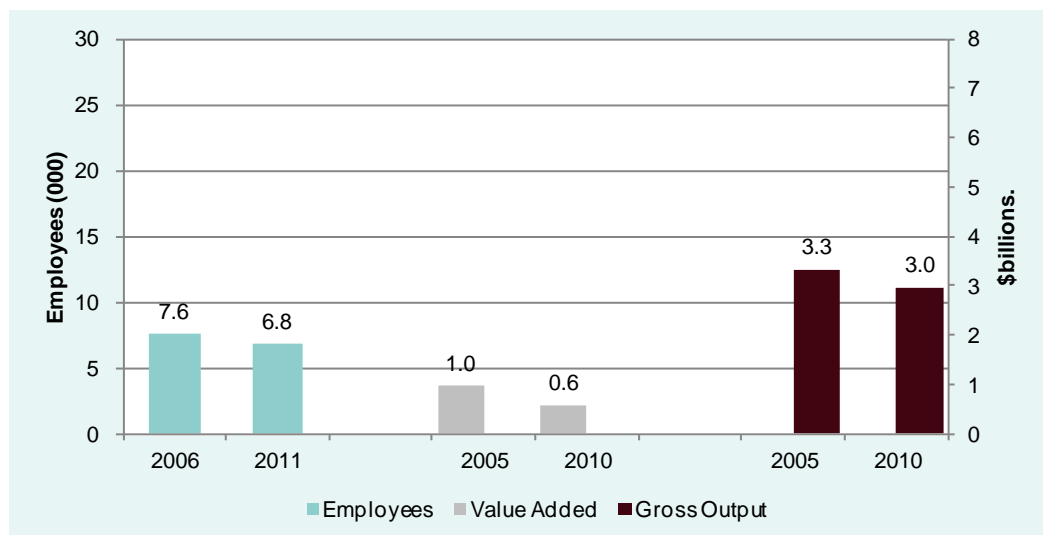
Geographic Units – 947



Employees – 6,810

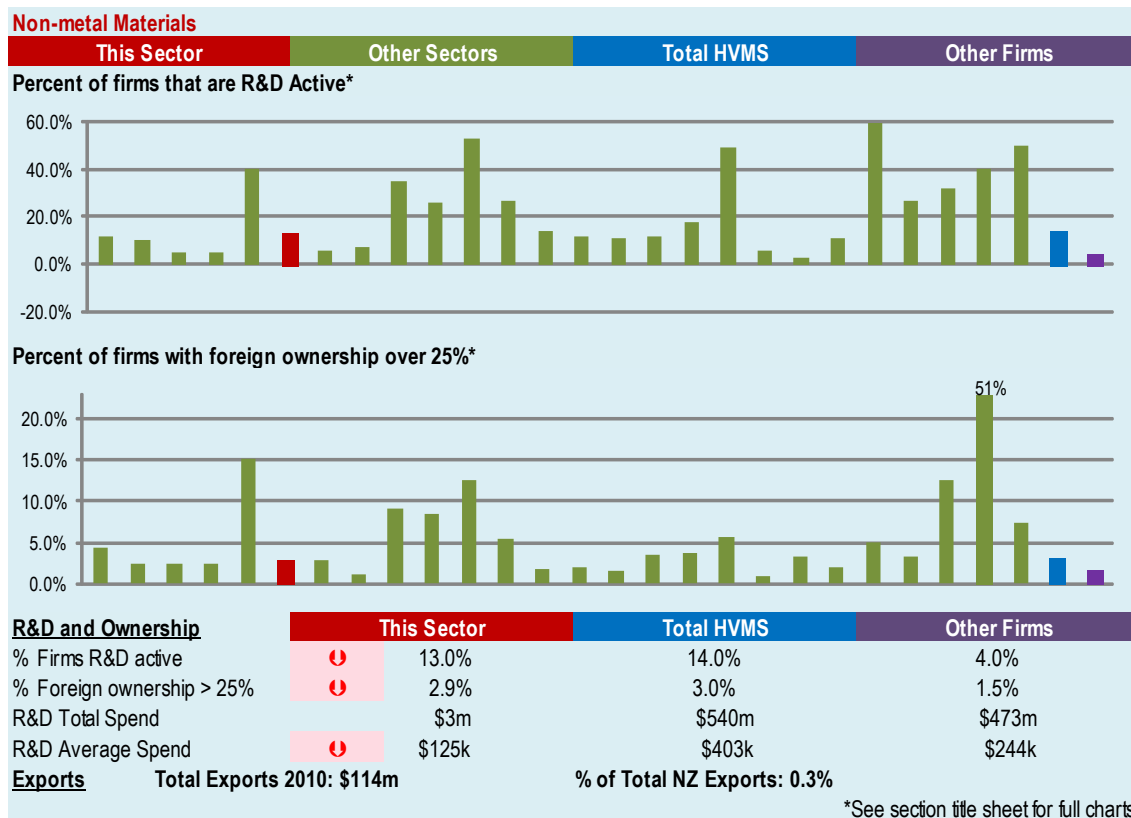


Sector growth – employees, value added and gross output



⁷³ Statistics New Zealand: Economic Survey of manufacturing December 2011.

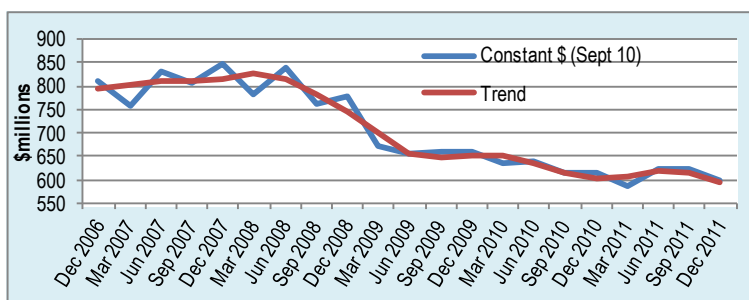
R&D, ownership and exports



The top five export product classes by value are Lighting fixtures and fittings and parts; Manufactures of mineral materials, n.e.s.; Portland cement, aluminous cement, slag cement etc.; Quicklime, slaked lime and hydraulic lime; Electric insulating equipment. These make up 73% of Non-metal Materials exports by value.

Sub-sector history – sales in constant dollars

Non-metal materials manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments.⁷⁴



⁷⁴ Statistics New Zealand. Economic survey of manufacturing, December 2011.

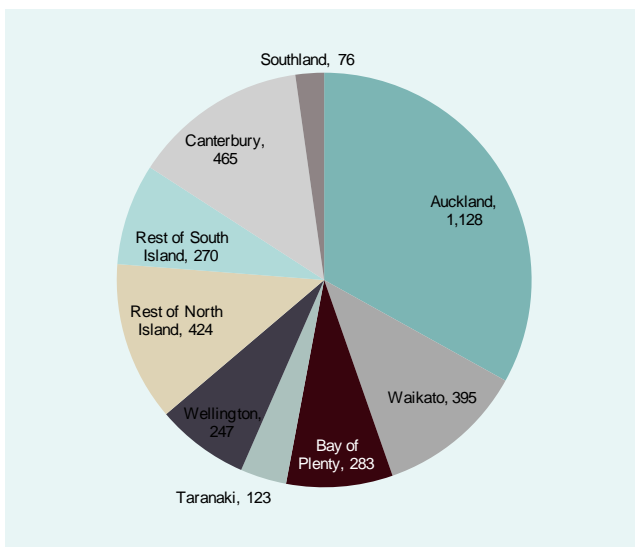
Metal Materials

Sub-sector definition – ANZSIC codes

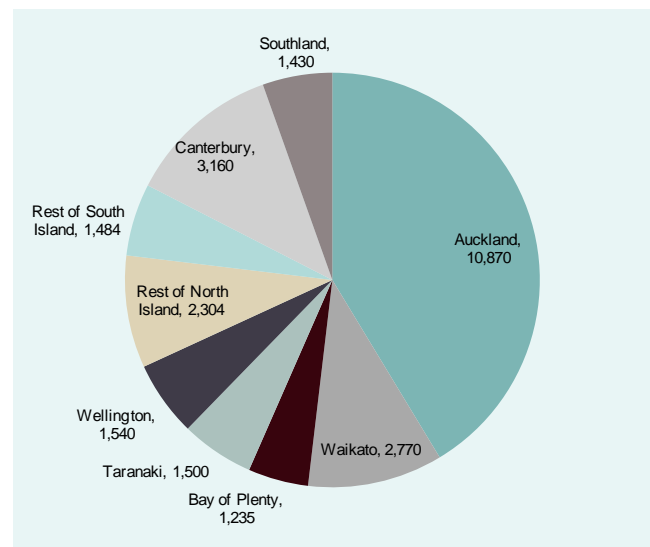
- C21 **Primary Metal and Metal Product Manufacturing:** including: Iron Smelting and Steel manufacturing; Iron and Steel Casting; Steel Pipe and Tube Manufacturing; Alumina Production; Aluminium Smelting; Copper, Silver, Lead and Zinc Smelting and Refining; Non-Ferrous Metal Casting; Aluminium Rolling, Drawing, Extruding; Other Basic Non-Ferrous Metal and Metal Product Manufacturing.
- C22 **Fabricated Metal Product Manufacturing:** Iron and Steel Forging; Structural Steel Fabricating; Prefabricated Metal Building Manufacturing; Architectural Aluminium Product Manufacturing; Metal Roof and Guttering Manufacturing; Other Structural Metal Product Manufacturing; Boiler, Tank and Other Heavy Gauge Metal Container Manufacturing; Other Metal Container Manufacturing; Sheet Metal Product Manufacturing (except Metal Structural and Container Products); Spring and Wire Product Manufacturing; Nut, Bolt, Screw and Rivet Manufacturing; Metal Coating and Finishing; Other Fabricated Metal Product Manufacturing.

Number and location of businesses

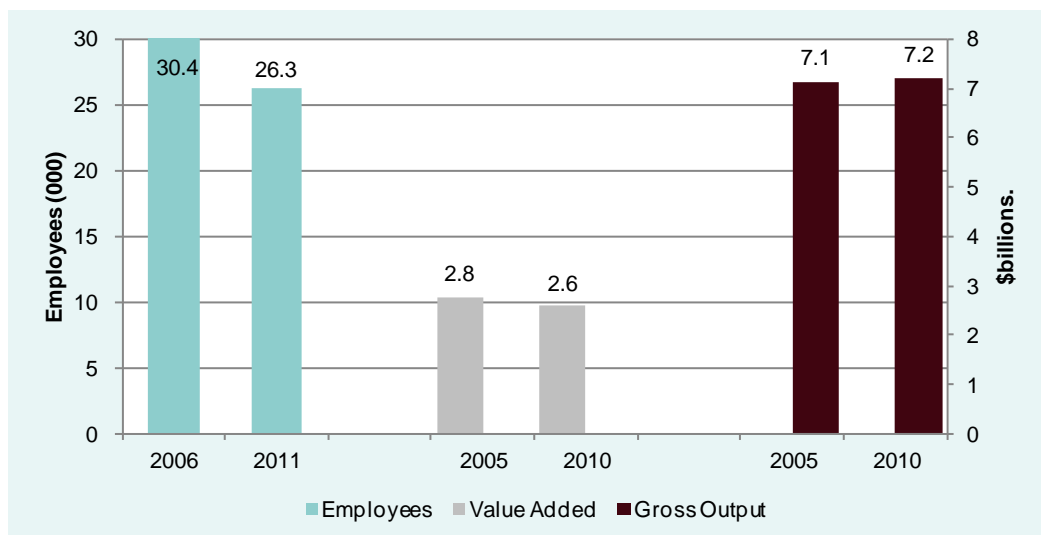
Geographic Units – 3,411



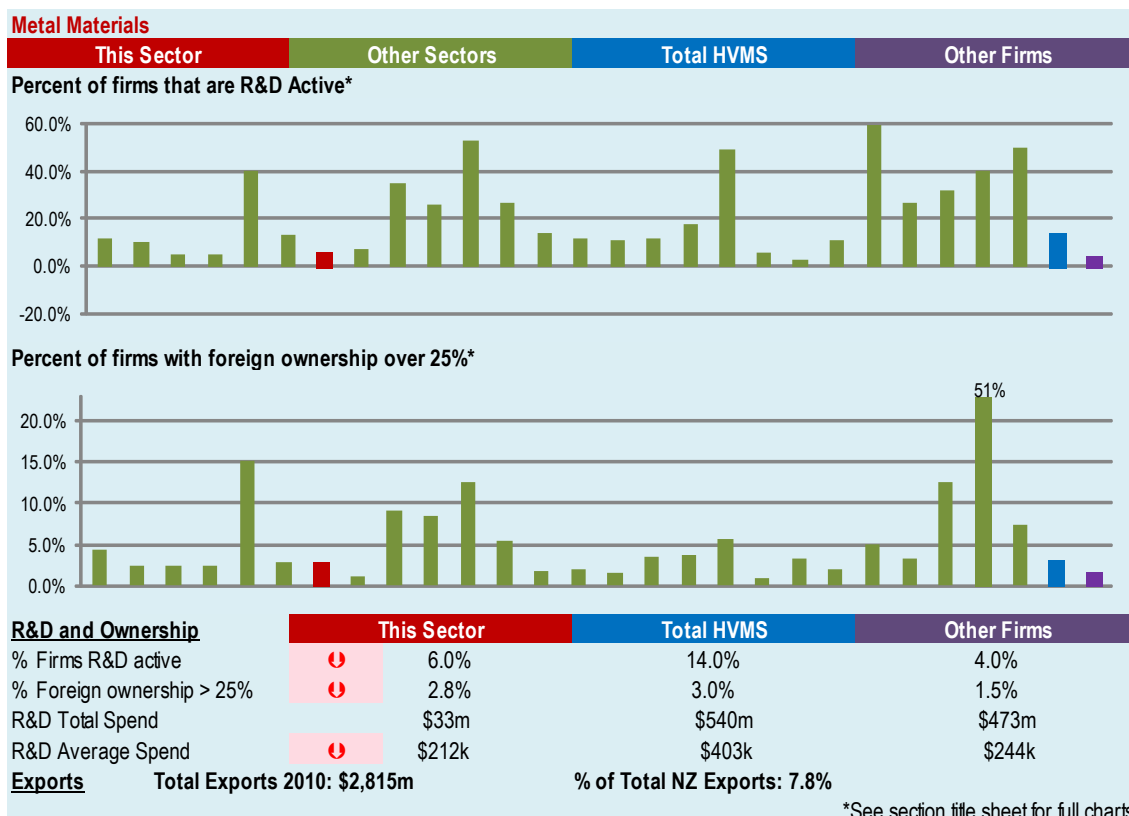
Employees – 26,293



Sector growth – employees, value added and gross output



R&D, ownership and exports



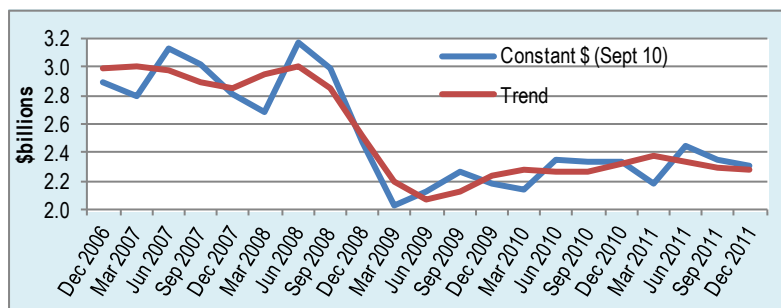
The top five export product classes by value are Aluminium and aluminium alloys ,unwrought; Gold, non-monetary; Silver, unwrought, unworked or semi-manufactured; Waste and scrap metal of iron or steel; Other non-ferrous base metal waste and scrap, n.e.s. These make up 64% of Metal Materials exports by value.

Comments

See comments in previous section (non-metal materials).

Sub-sector history⁷⁵

Metal products manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments.



⁷⁵ Statistics New Zealand. Economic survey of manufacturing, December 2011.

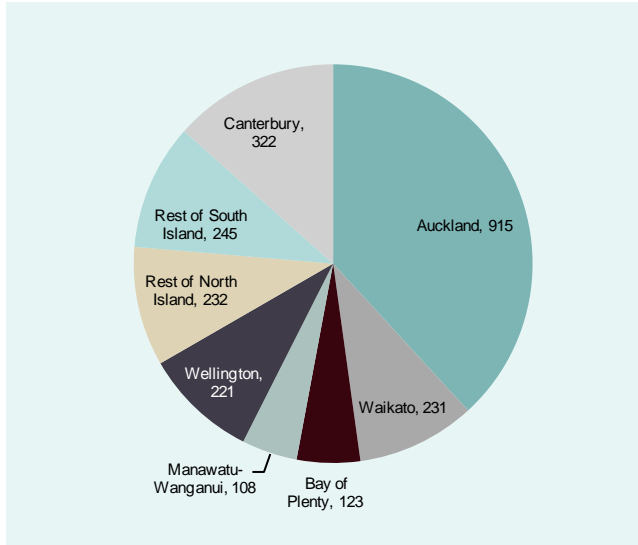
Furniture and other manufacturing

Sub-sector definition – ANZSIC codes

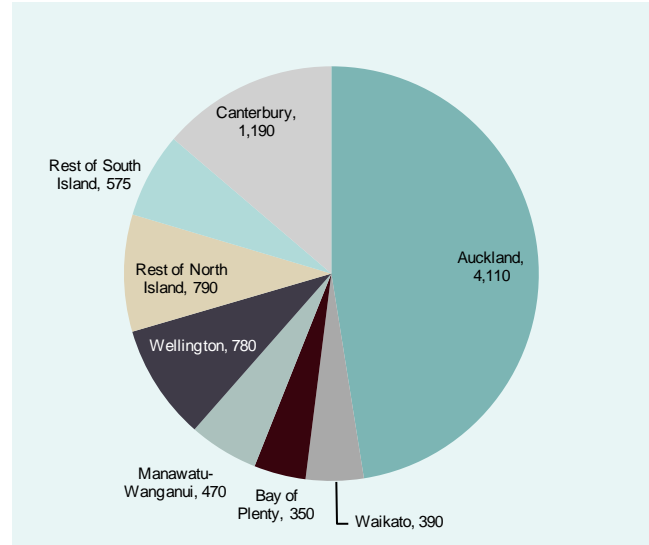
C25 Furniture and Other Manufacturing: including manufacturing of: Wooden Furniture and Upholstered Seats; Metal Furniture; Mattresses; Other Furniture; Jewellery and Silverware; Toy, Sporting and Recreational Products; and other including musical instruments, umbrellas, brooms, brushes and writing and marking equipment.

Number and location of businesses

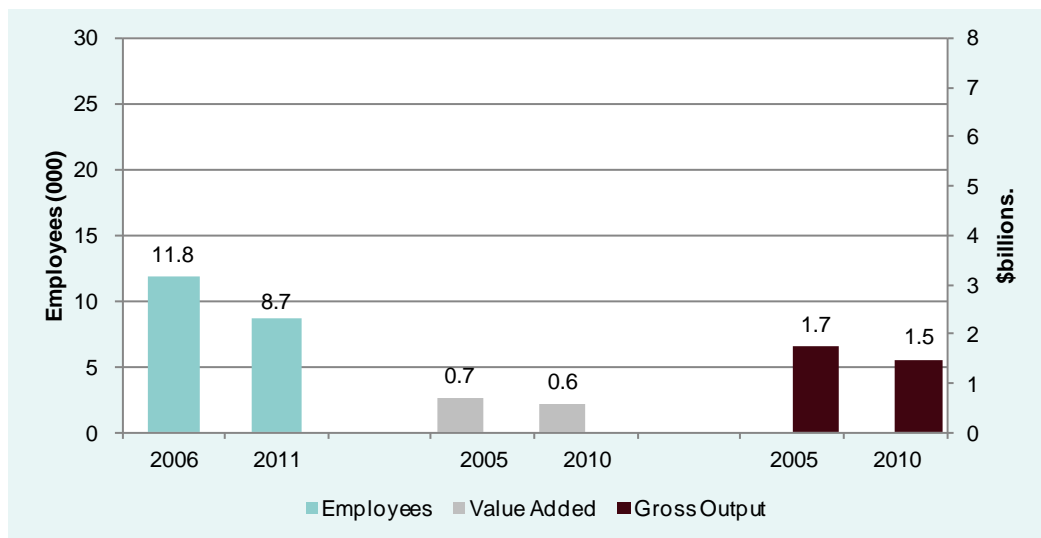
Geographic Units – 2,397



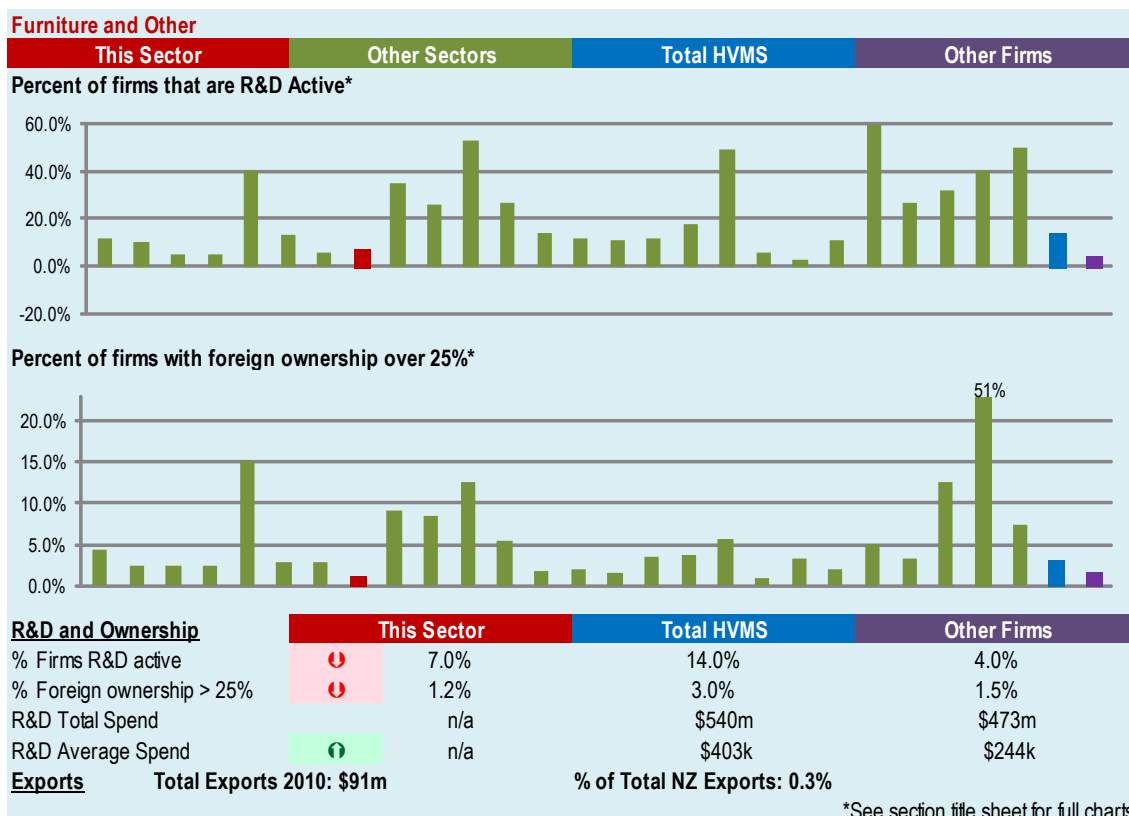
Employees – 8,655



Sector growth – employees, value added and gross output



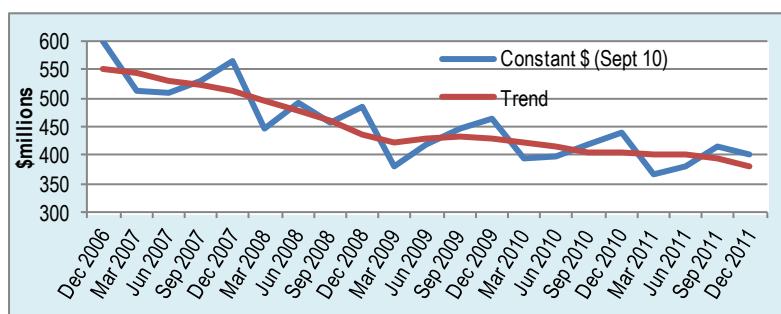
R&D, ownership and exports



The top five export product classes by value are Other furniture and parts; Chairs and other seats and parts; Coin(other than gold) not being legal tender; Pens, pencils and fountain pens; Aircraft, n.e.s. balloons, gliders etc and equipment. These make up 97% of Furniture & Other exports by value.

Comments

Furniture and other manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments⁷⁶.



⁷⁶ Statistics New Zealand. Economic survey of manufacturing, December 2011.

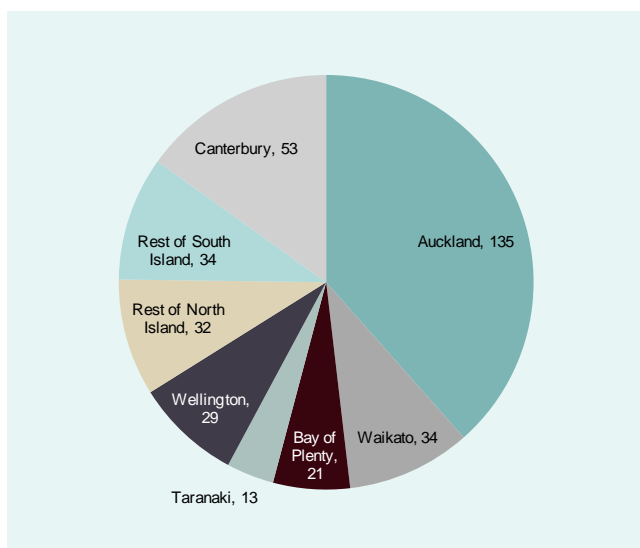
Basic chemical manufacturing

Sub-sector definition – ANZSIC codes

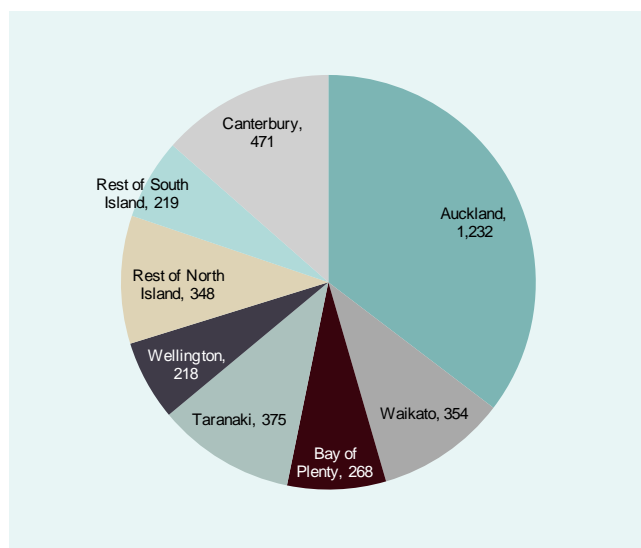
C181100	Industrial Gases Manufacturing
C181200	Basic Organic Chemical Manufacturing
C181300	Basic Inorganic Chemical Manufacturing
C183100	Fertiliser Manufacturing
C183200	Pesticide Manufacturing
C185100	Cleaning Compound Manufacturing
C185200	Cosmetic and Toiletry Preparation Manufacturing
C189100	Photographic Chemical Manufacturing
C189200	Explosives Manufacturing
C189900	Other Basic Chemical Product Manufacturing

Number and location of businesses

Geographic Units – 351



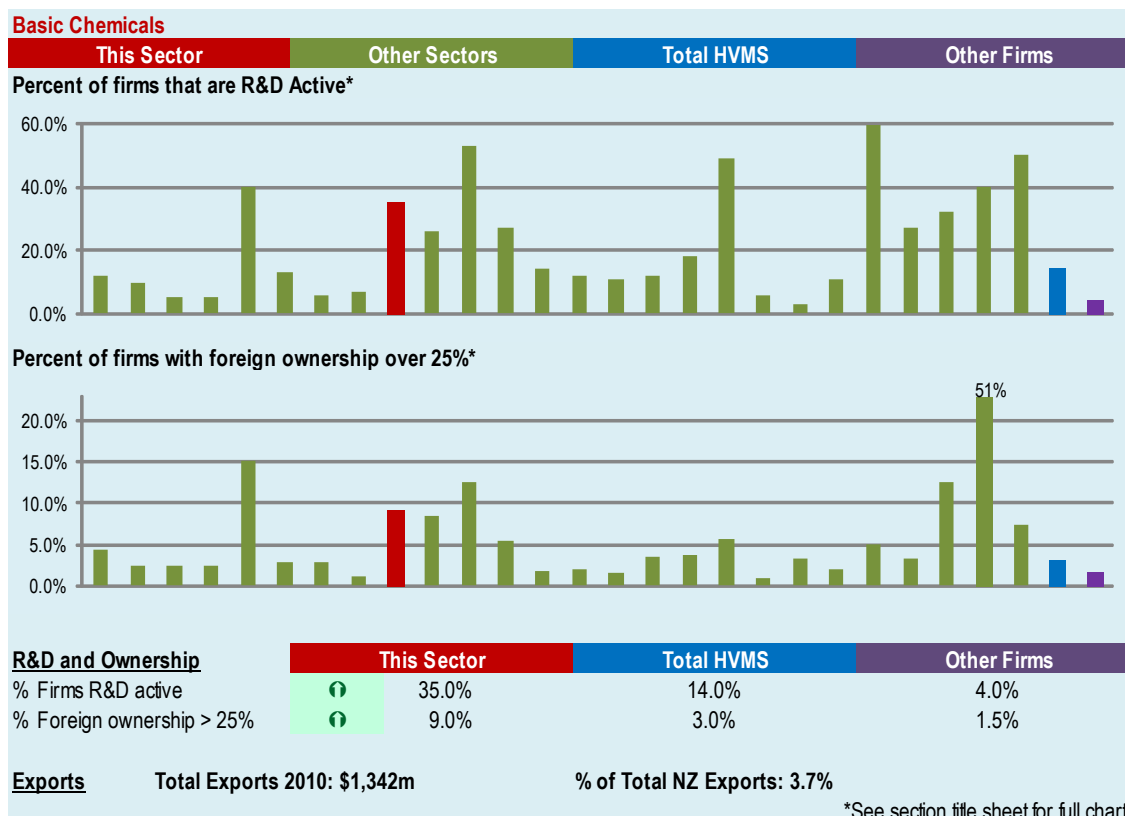
Employees – 3,485



Sector growth – employees, value added and gross output



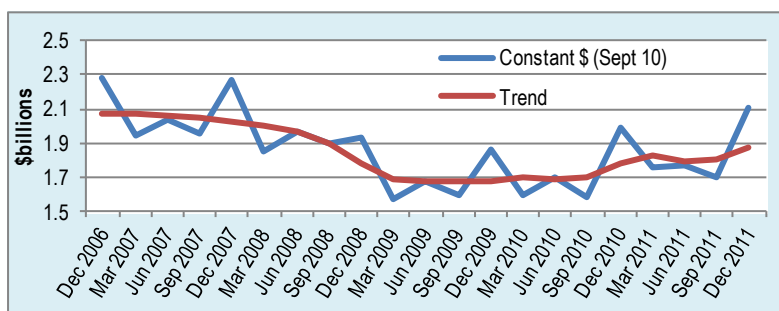
R&D, ownership and exports



The top five export product classes by value are Albuminoidal substances, glues; Organic surface-active agents, n.e.s.; Perfumery, cosmetics and toilet preparations; Polyethylene; Weed killers (herbicides)packed for sale etc. These make up 77% of Basic Chemicals exports by value.

Sub-sector history – only combined data available – Basic Chemicals and Polymers and Rubber

Basic Chemicals and Polymers and Rubber manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments⁷⁷.



⁷⁷ Statistics New Zealand. Economic survey of manufacturing, December 2011.

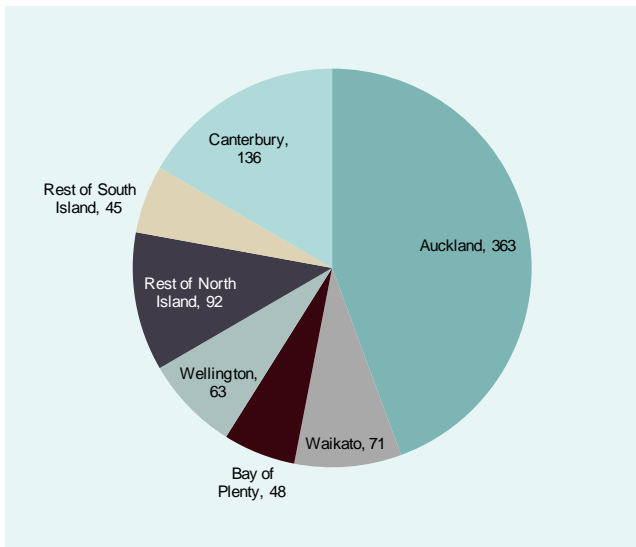
Polymers and rubber manufacturing

Sub-sector definition – ANZSIC codes

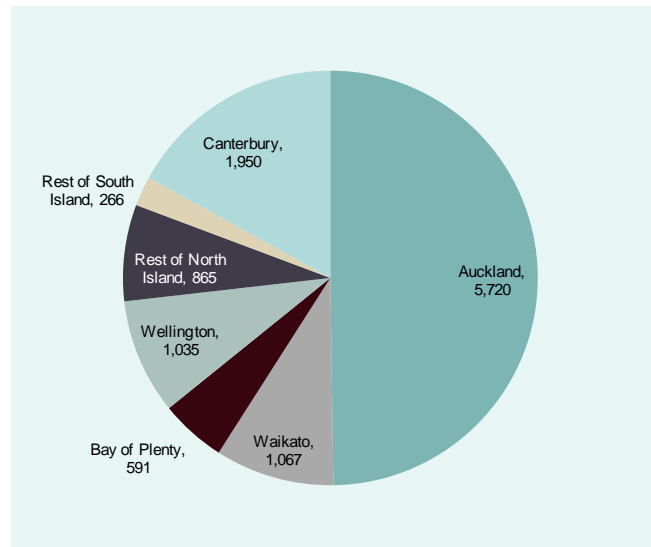
C182100	Synthetic Resin and Synthetic Rubber Manufacturing
C182900	Other Basic Polymer Manufacturing
C191100	Polymer Film and Sheet Packaging Material Manufacturing
C191200	Rigid and Semi Rigid Polymer Product Manufacturing
C191300	Polymer Foam Product Manufacturing
C191400	Tyre Manufacturing
C191500	Adhesive Manufacturing
C191600	Paint and Coatings Manufacturing
C191900	Other Polymer Product Manufacturing
C192000	Natural Rubber Product Manufacturing

Number and location of businesses

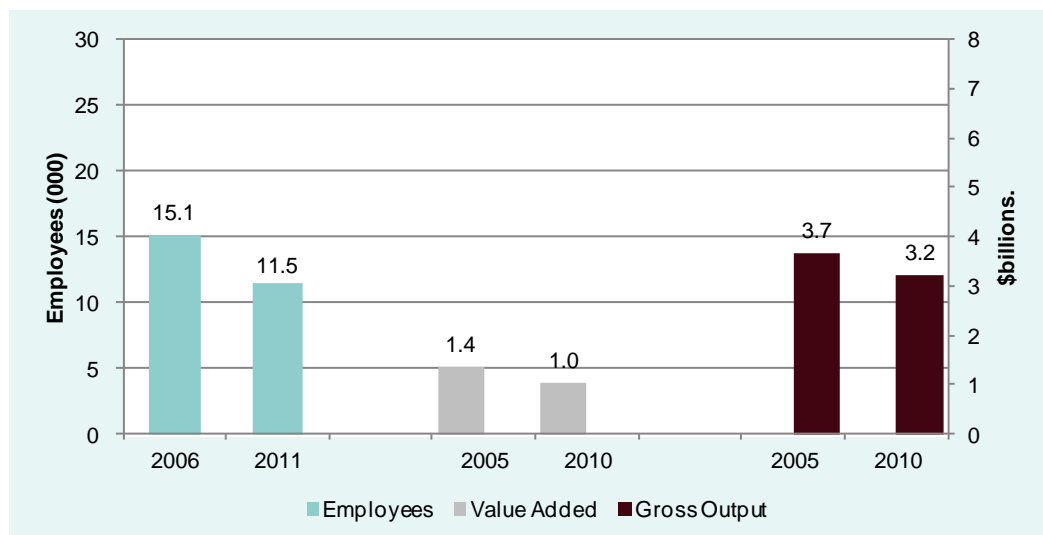
Geographic Units – 818



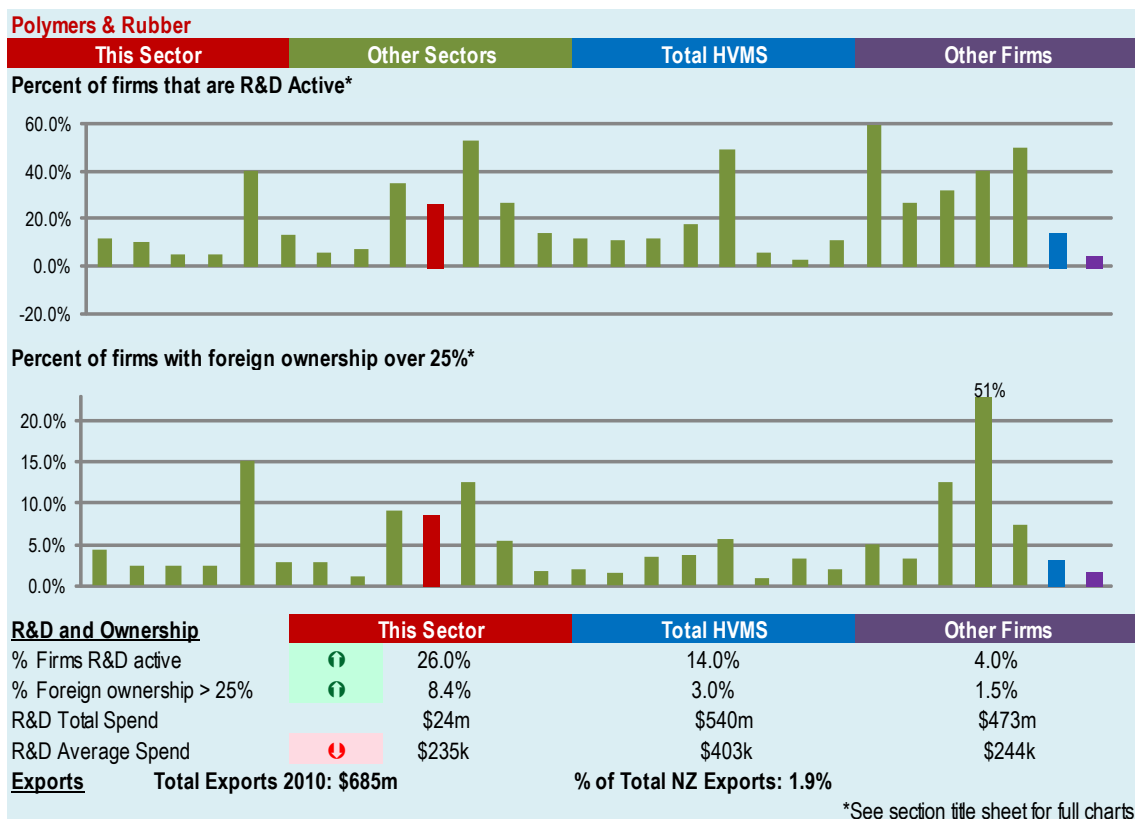
Employees – 11,494



Sector growth – employees, value added and gross output



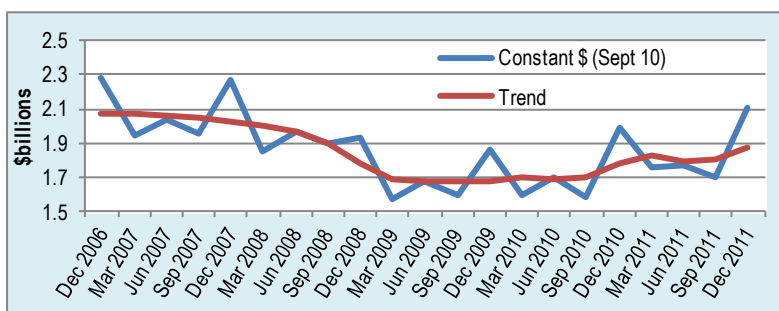
R&D, ownership and exports



The top five export product classes by value are Ships, boats and other vessels; Art. for the conveyance or packing of goods; Miscellaneous art. of materials of div.58; Parts of heading 792 (aircraft etc.), excl. tyres, engines; Other parts & accessories of motor vehicles. These make up 93% of Polymers & Rubber exports by value.

Sub-sector history – only combined data available – Basic Chemicals and Polymers and Rubber

Basic Chemicals and Polymers and Rubber manufacturing – Sales value history 2006 to 2011, constant dollar, no seasonal adjustments.⁷⁸



⁷⁸ Statistics New Zealand. Economic survey of manufacturing, December 2011.

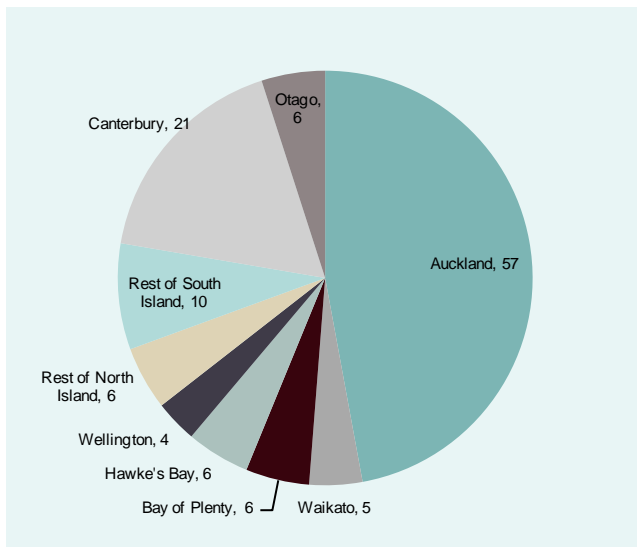
Pharmaceuticals manufacturing

Sub-sector definition – ANZSIC codes

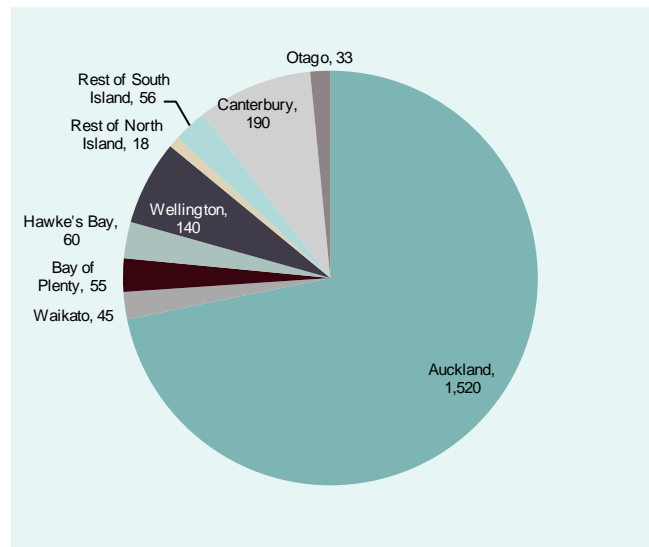
C184100	Human Pharmaceutical and Medicinal Product Manufacturing: manufacturing pharmaceutical and medicinal products for human use from both natural (plants) and synthetic sources (chemicals). This class also consists of units mainly engaged in manufacturing diagnostic substances for antibodies, antigens and chemical/diagnostic testing agents. (Includes biotechnological manufacture of pharmaceutical and medicinal products. Biotech research is in Scientific Research and Testing).
C184200	Veterinary Pharmaceutical and Medicinal Product Manufacturing: manufacturing drugs, medicines, medicinal chemicals, vaccines, serums and other pharmaceutical products for veterinary use.

Number and location of businesses

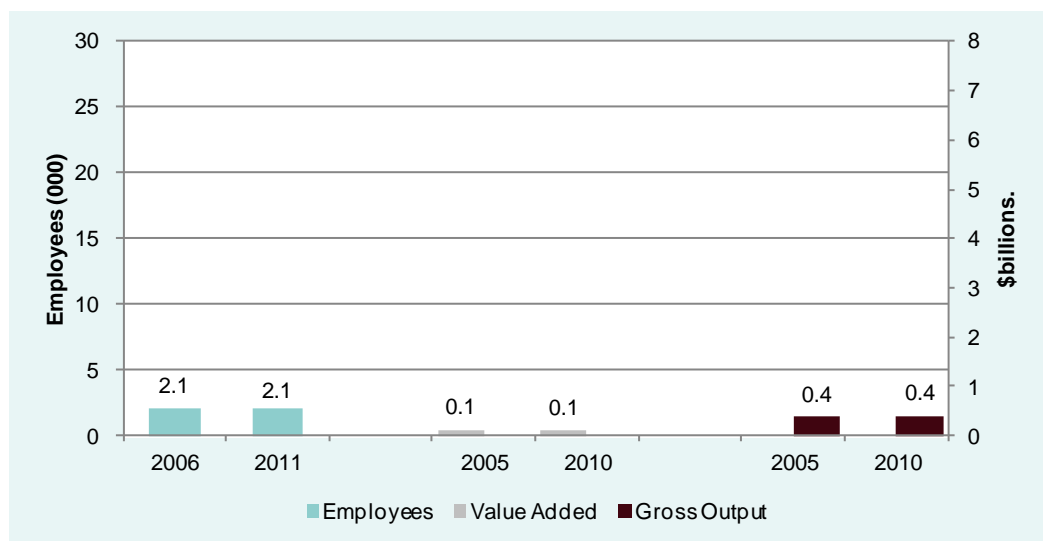
Geographic Units – 121



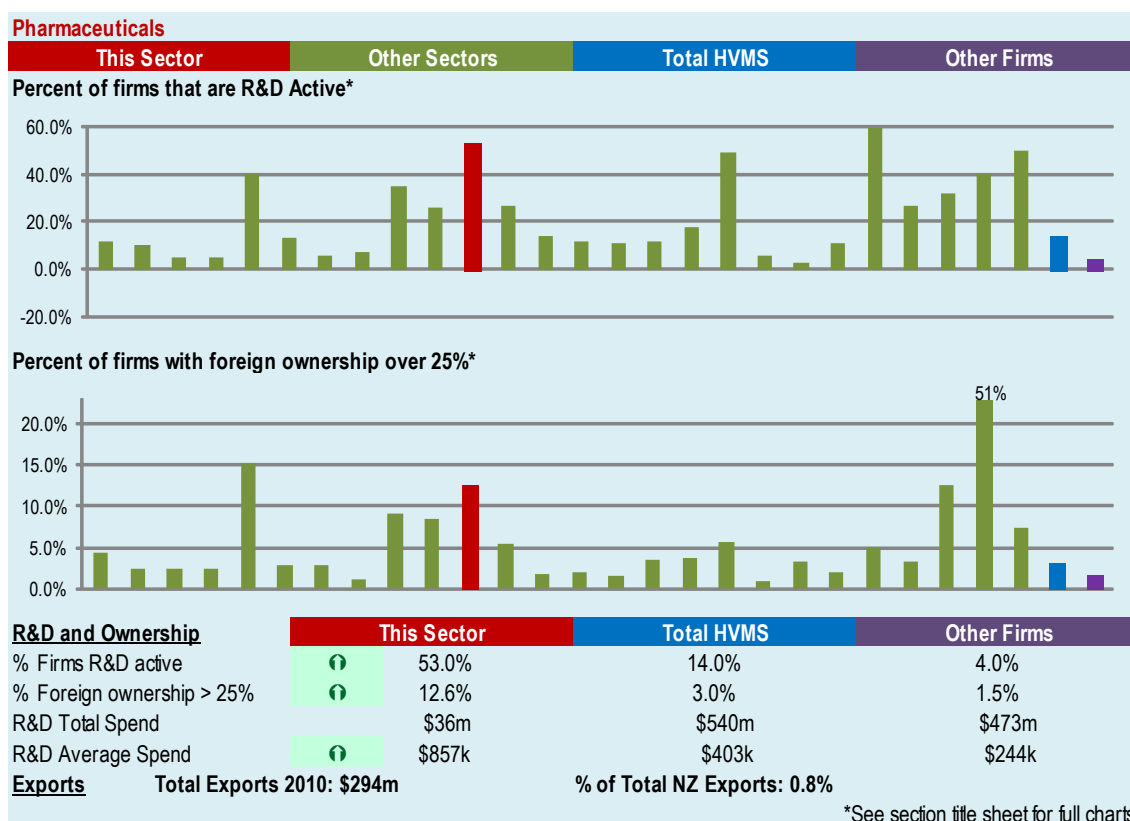
Employees – 2,117



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Medicaments (including veterinary medicaments); Glycosides, glands or other organs & their extracts; Chemical products and preparations, n.e.s.; Hormones, natural or reproduced by synthesis; Provitamins & vitamins, natural or reproduced by synthesis. These make up 94% of Pharmaceuticals exports by value.

Comments

International market trends⁷⁹: Pressure on companies to prove products are truly differentiated; capital constraints; safety concerns; ability to cater to the needs of emerging markets, including China; several drugs set for patent expiry, spurring R&D and marketing; rise in preventative health and wellness, e.g. vaccines, natural remedies.

Challenges and opportunities⁸⁰

Challenges	Opportunities
<ul style="list-style-type: none"> International pharmaceutical companies in Auckland are predominantly sales offices with reporting lines to Australia, and are therefore not involved in R&D. A number of emerging markets are heavily investing in biotechnology infrastructure (China, India, Asia Pacific, Latin America, Middle East and Africa). 	<ul style="list-style-type: none"> Potential for stronger linkages between well regarded research/education organisations and international peers – in particular, University of Auckland; Institute for Innovation in Biotechnology and Masters in Bioscience Enterprise.

⁷⁹ Ernst and Young (2011). *Beyond borders: Global Biotechnology report 2011*. London: Ernst and Young

⁸⁰ Ernst and Young (2011). *Beyond borders: Global Biotechnology report 2011*. London: Ernst and Young

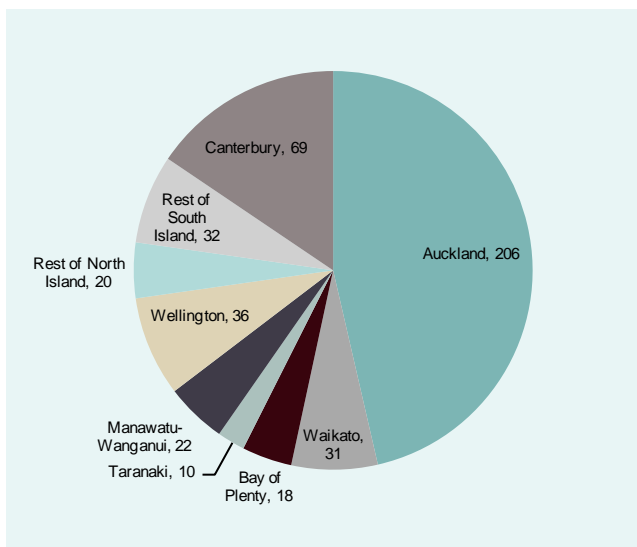
Electrical equipment and appliance manufacturing

Sub-sector definition – ANZSIC codes

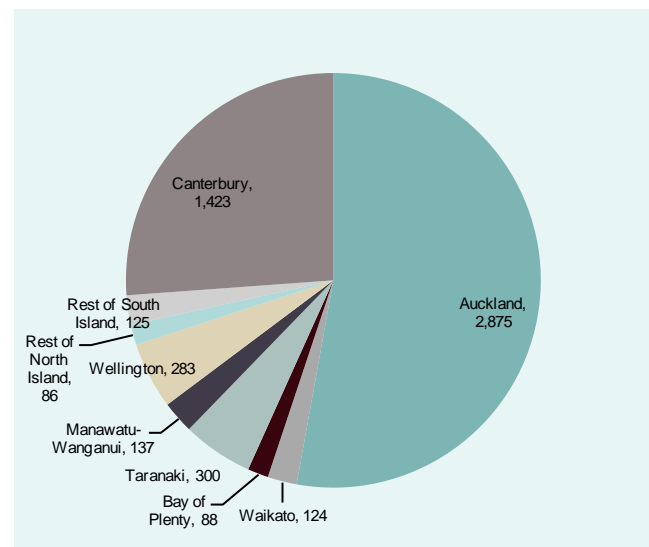
C243100	Electric Cable and Wire Manufacturing
C243200	Electric Lighting Equipment Manufacturing
C243900	Other Electrical Equipment Manufacturing
C244100	Whiteware Appliance Manufacturing
C244900	Other Domestic Appliance Manufacturing
C245100	Pumps and Compressors Manufacturing
C245200	Fixed Space Heating, Cooling and Ventilation Equipment Manufacturing

Number and location of businesses

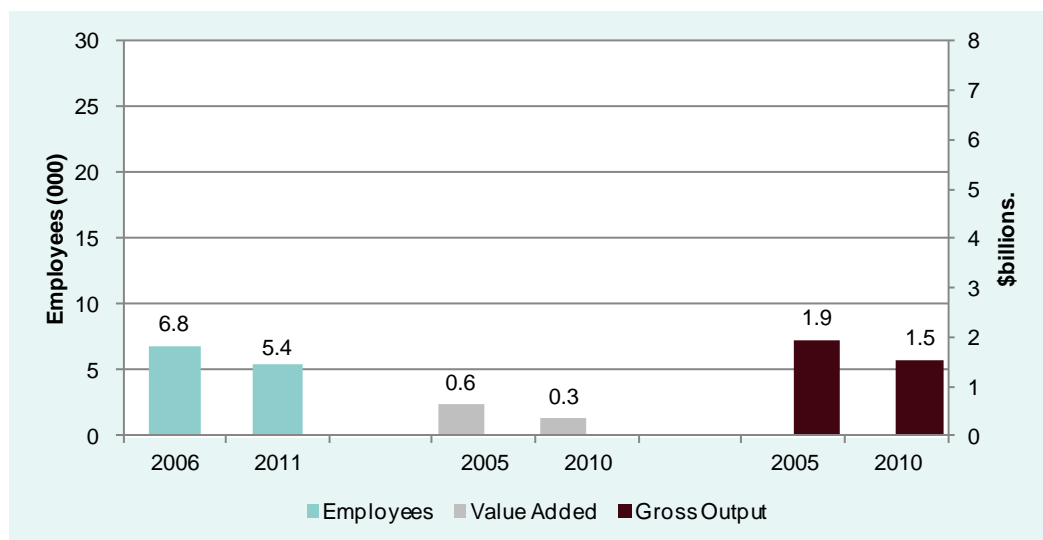
Geographic Units – 444



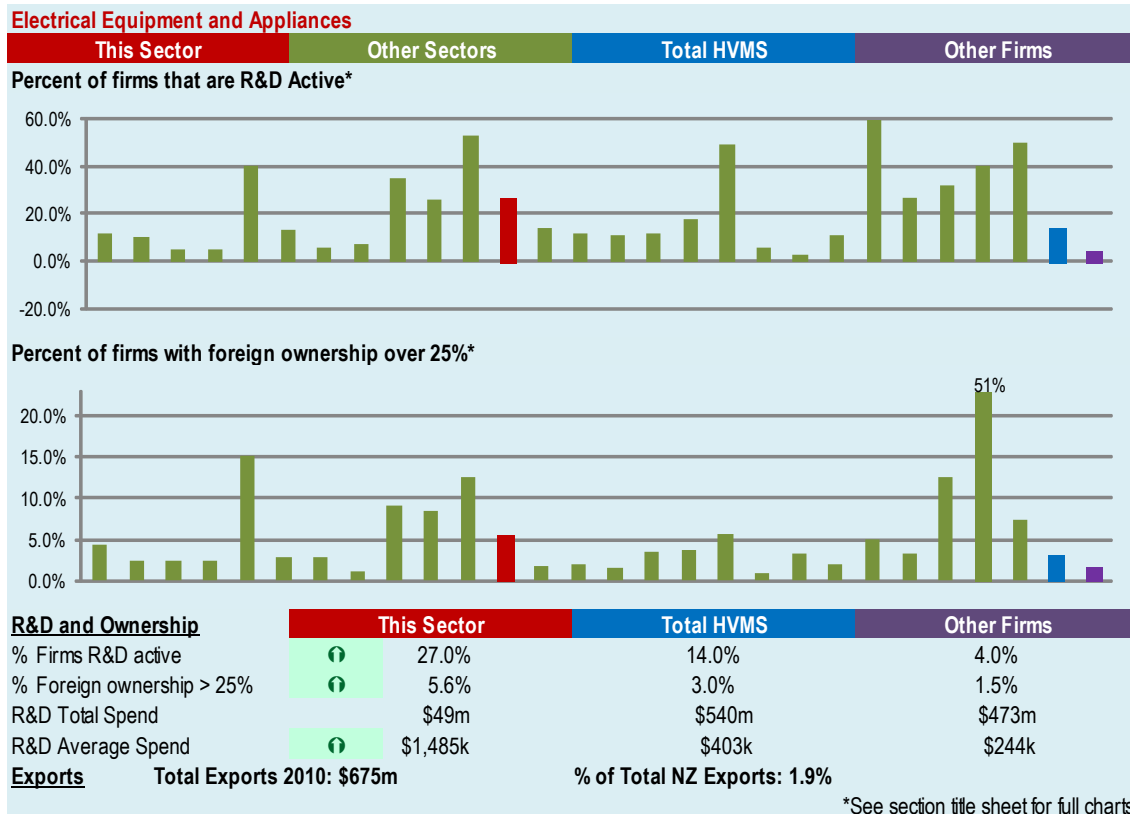
Employees – 5,441



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Electrical appliances such as switches, relays, fuses, pwgs etc.; Insulated, elect. wire, cable, bars, strip and the like; Household refrigerators and food freezers; Refrigerators & refrigeration equipment, ex. household, parts. These make up 67% of Electrical Equipment & Appliances exports by value.

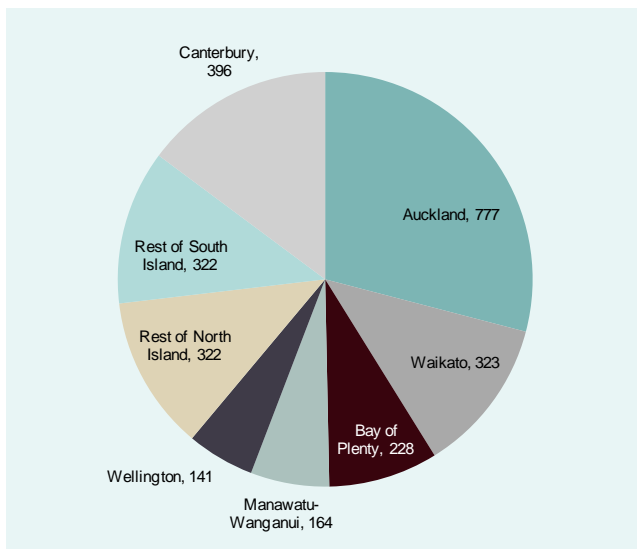
Machinery and equipment manufacturing

Sub-sector definition – ANZSIC codes

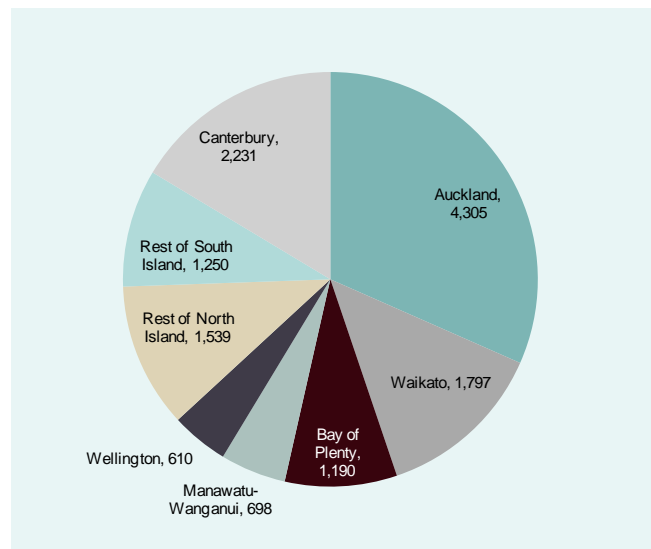
C246100	Agricultural Machinery and Equipment Manufacturing
C246200	Mining and Construction Machinery Manufacturing
C246300	Machine Tool and Parts Manufacturing
C246900	Other Specialised Machinery and Equipment Manufacturing
C249100	Lifting and Material Handling Equipment Manufacturing
C249900	Other Machinery and Equipment Manufacturing

Number and location of businesses

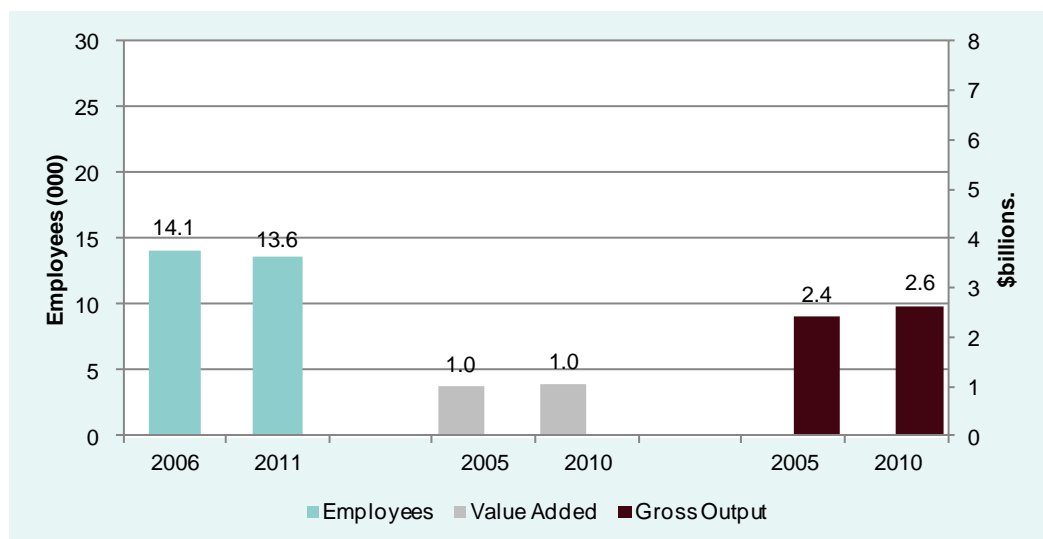
Geographic Units – 2,673



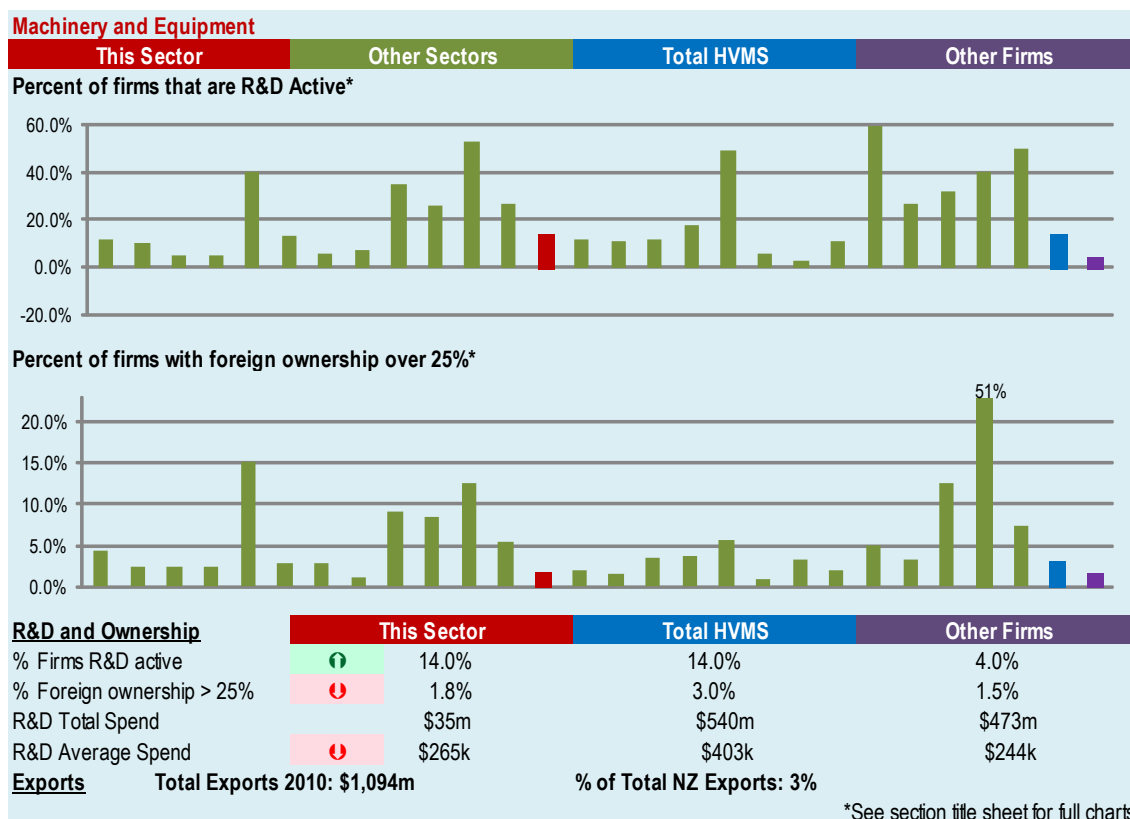
Employees – 13,620



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Machinery & appliances for specialized particular industries; Other non-electrical mach.amp parts; Engines & motors, n.e.s. such as water turbines etc.; Parts and accessories suitable for office/data-processing machinery; Harvesting & threshing machinery and parts. These make up 37% of Machinery & Equipment exports by value.

Comments

International market trends:⁸¹ All industrialised countries face increasing competition from lower cost, but increasingly sophisticated, producers; global value chains are emerging where the various stages of developing a product or service are occurring in different areas of the world, depending on where it makes best business sense.

⁸¹ <http://www.nzte.govt.nz/access-international-networks/Explore-opportunities-in-growth-industries/growth-industries/Pages/Specialised-manufacturing.aspx>

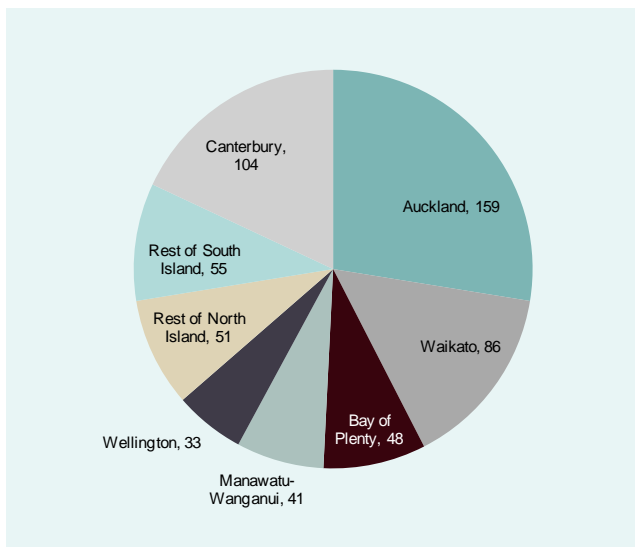
Motor transport equipment manufacturing

Sub-sector definition – ANZSIC codes

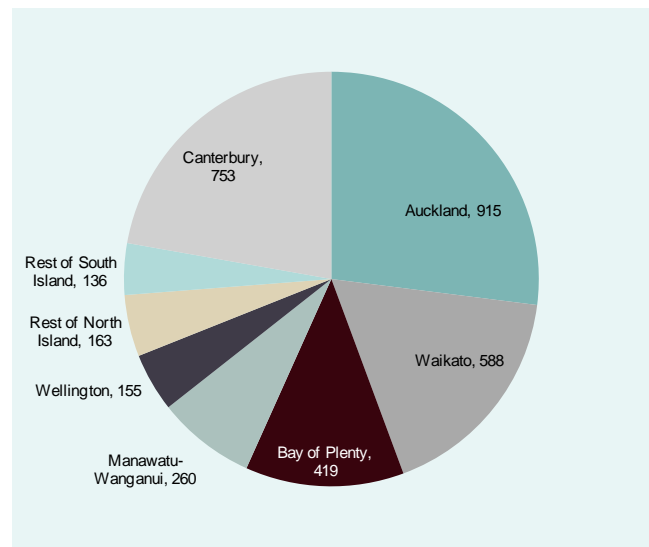
C231100	Motor Vehicle Manufacturing: manufacturing motor vehicles or motor vehicle engines
C231200	Motor Vehicle Body and Trailer Manufacturing: manufacturing motor vehicle bodies (including buses and trucks), caravans and trailers, and in vehicle modifications involving permanent changes to bodywork using an existing engine and chassis.
C231300	Automotive Electrical Components Manufacturing: manufacturing automotive electrical components, automotive air conditioners or instruments.
C231900	Other Motor Vehicle Parts Manufacturing: manufacturing motor vehicle parts not elsewhere classified. This class also includes factory engine reconditioning on a changeover basis.

Number and location of businesses

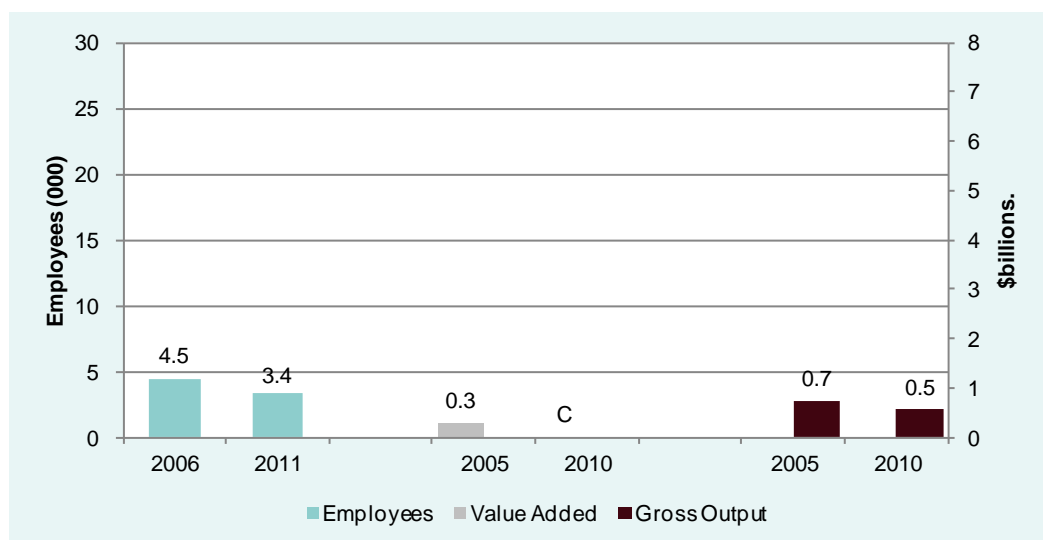
Geographic Units – 577



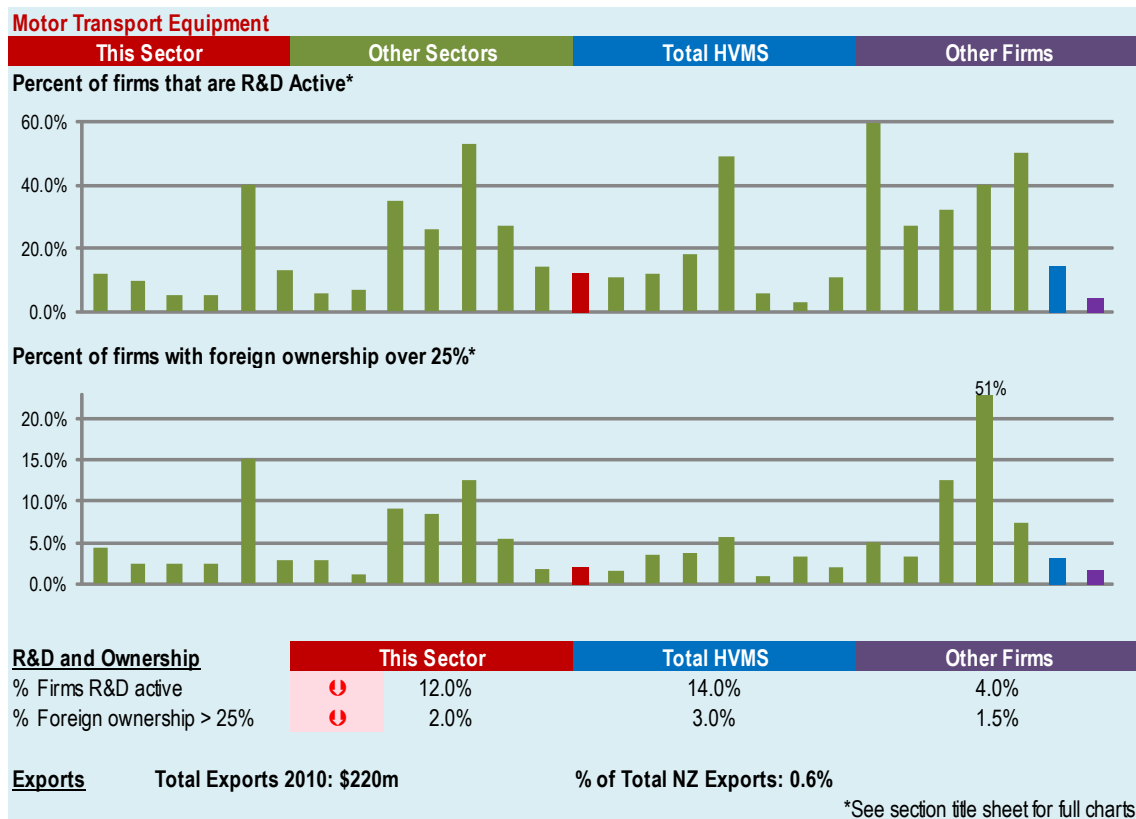
Employees – 3,389



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Trailers & specially designed containers; Passenger motor cars, for transport of pass.& goods; Electr. equipment for internal combustion engines, parts; Parts of internal combustion piston engines of 713.2-/713.8-; Parts of the pumps & liq .elevators of 742-. These make up 75% of Motor Transport Equipment exports by value.

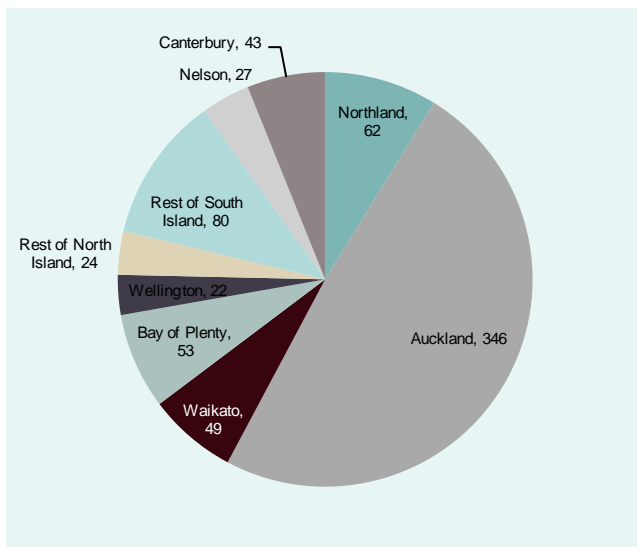
Marine transport equipment manufacturing

Sub-sector definition – ANZSIC codes

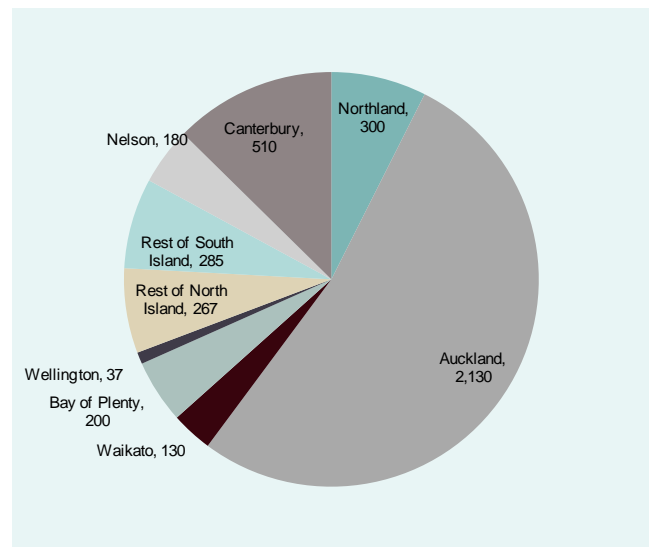
- C239100 **Shipbuilding and Repair Services:** manufacturing or repairing vessels of 50 tonnes and over displacement, submarines or major components for ships and submarines not elsewhere classified.
- C239200 **Boatbuilding and Repair Services:** manufacturing or repairing vessels of under 50 tonnes displacement.

Number and location of businesses

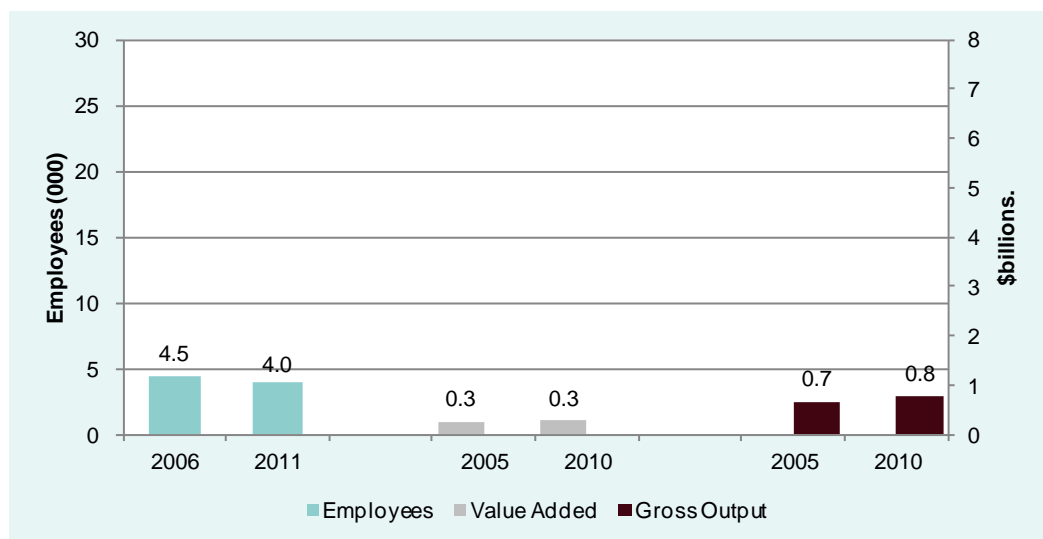
Geographic Units – 706



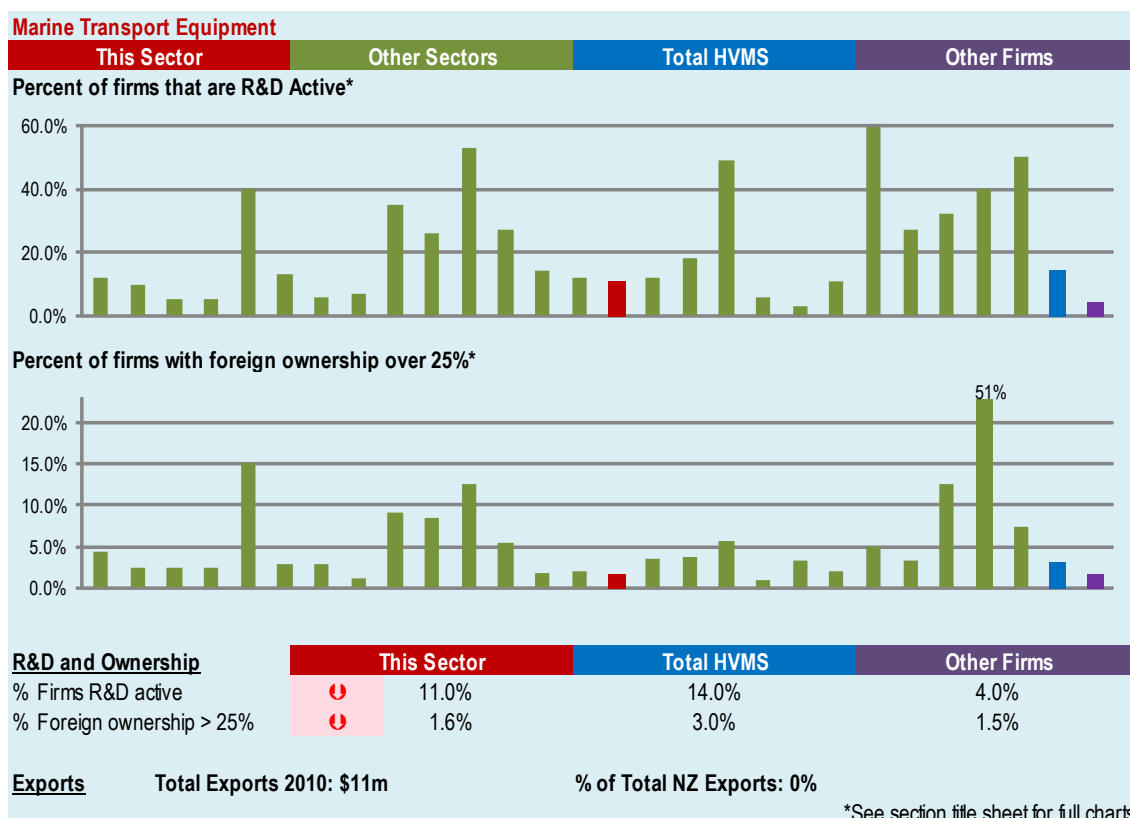
Employees – 4,039



Sector growth – employees, value added and gross output



R&D, ownership and exports



The two export products making up the Marine Transport Equipment are Tugs, special purpose vessels, floating structures; and Warships of all kinds.

Comments

The Marine industry is forecast to grow substantially to reach total annual revenues of \$2.8 billion by 2020. In the Auckland region alone, employee numbers are expected to grow from 5,600 to 9,500 over that period⁸². Conversely, the global financial crisis hit the sector hard in New Zealand and internationally.

In 2008 New Zealand exported 98% of its super yachts and 76% of its racing yachts. New Zealand is the 10th largest producer of super yachts, with a market share of less than 2%.

Australia is emerging as a major competitor, with traditional competition continuing from Europe, the US and the emerging economies in Asia.

Challenges and opportunities⁸³

Challenges	Opportunities
<ul style="list-style-type: none"> • Informal approach to innovation • Delays in developing infrastructure • Skills shortage – including engineering • Limited space (berthage & refitting) • Industry fragmentation; limited commercial skills. 	<ul style="list-style-type: none"> • Strong international competitive advantage. • Integration of extended value chain • Global growth potential for recreational boats and in the refit industry • NZ Marine Export Group providing single contact.

⁸² Auckland Regional Council (2009) *Industry snapshot for the Auckland Region: The marine sector*

⁸³ Ibid; BECA (2009) *Auckland marine industry feasibility study*

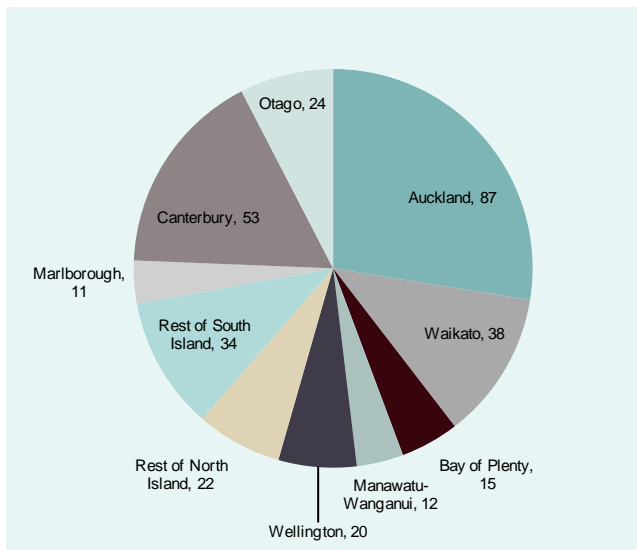
Other transport equipment manufacturing

Sub-sector definition – ANZSIC codes

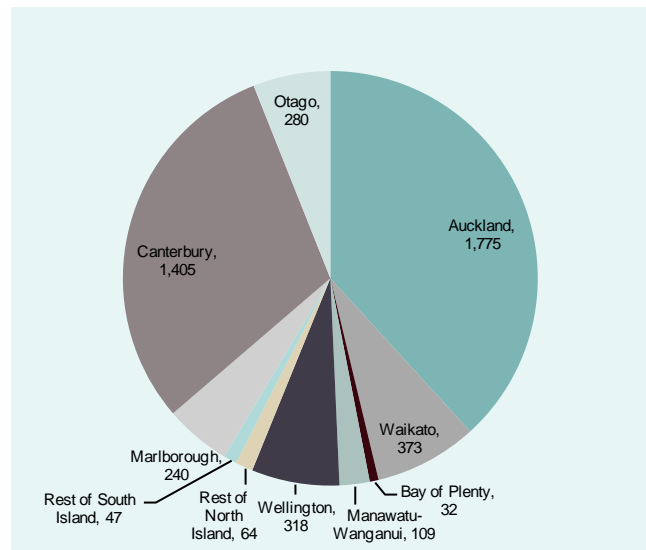
C239300	Railway Rolling Stock Manufacturing and Repair Services: manufacturing or repairing railway locomotives or other rolling stock.
C239400	Aircraft Manufacturing and Repair Services: manufacturing or repairing aircraft, aircraft engines and frames, as well as specialist aircraft repair services not elsewhere classified.
C239900	Other Transport Equipment Manufacturing: manufacturing bicycles, motor cycles, hovercrafts and other transport equipment not elsewhere classified (including unusual terrain vehicles).

Number and location of businesses

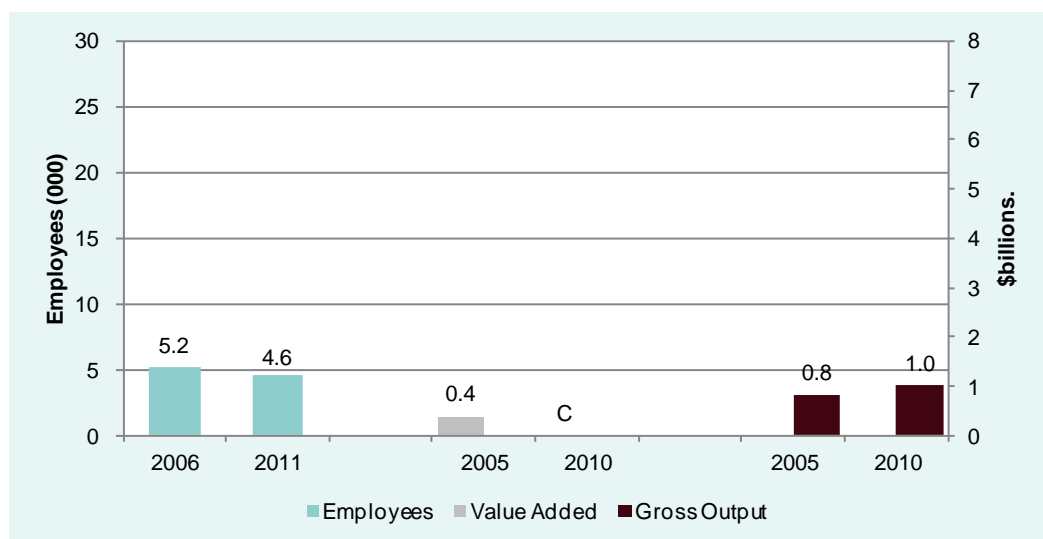
Geographic Units – 316



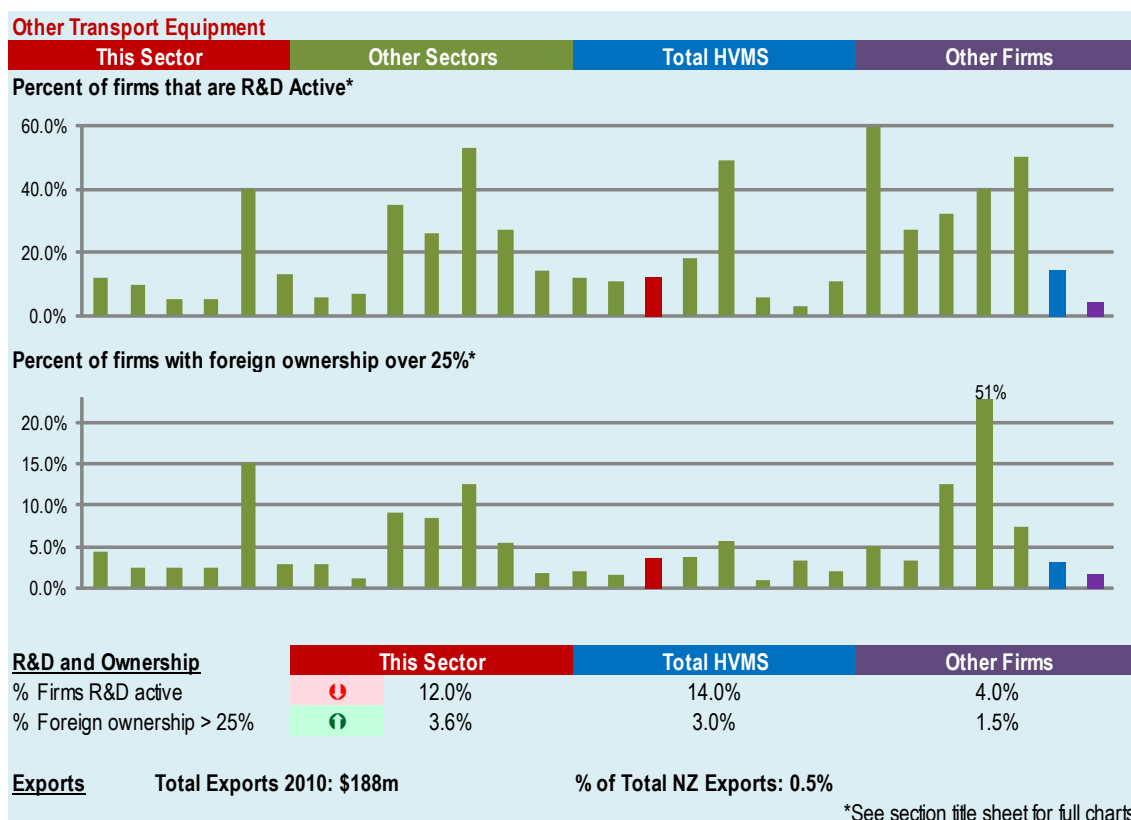
Employees – 4,643



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Aircraft exceeding an unladen weight of 15000 kg; Helicopters; Motor vehicles for transport of goods/materials; Childrens toys, indoor games, etc.; Parts, n.e.s. accessories for meters/measuring app. These make up 76% of Other Transport Equipment exports by value.

Comments

Very strong competition from China for rail locomotive and carriage manufacturing, resulting in consolidation and shrinkage of New Zealand operations.

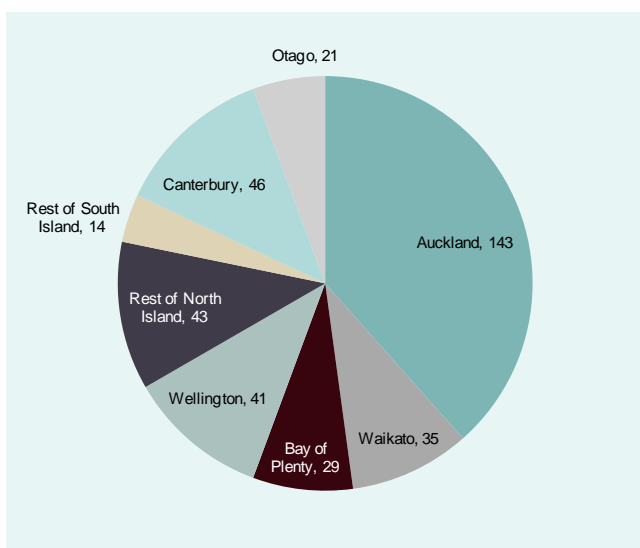
Scientific instruments manufacturing

Sub-sector definition – ANZSIC codes

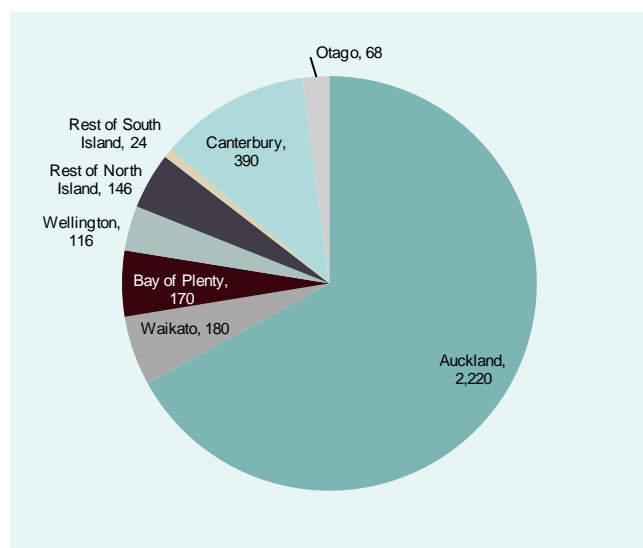
C241100	Photographic, Optical and Ophthalmic Equipment Manufacturing: manufacturing photographic equipment (except sensitised photographic film, paper, plates or chemicals), optical instruments or equipment, or ophthalmic equipment. Also included are units mainly engaged in grinding optical lenses.
C241200	Medical and Surgical Equipment Manufacturing: manufacturing medical, surgical or dental equipment, including dentures.
C241900	Other Professional and Scientific Equipment Manufacturing: manufacturing navigational, measuring or other professional and scientific equipment not elsewhere classified such as control or meteorological or surveying equipment or instruments, or specialised parts for such equipment.

Number and location of businesses

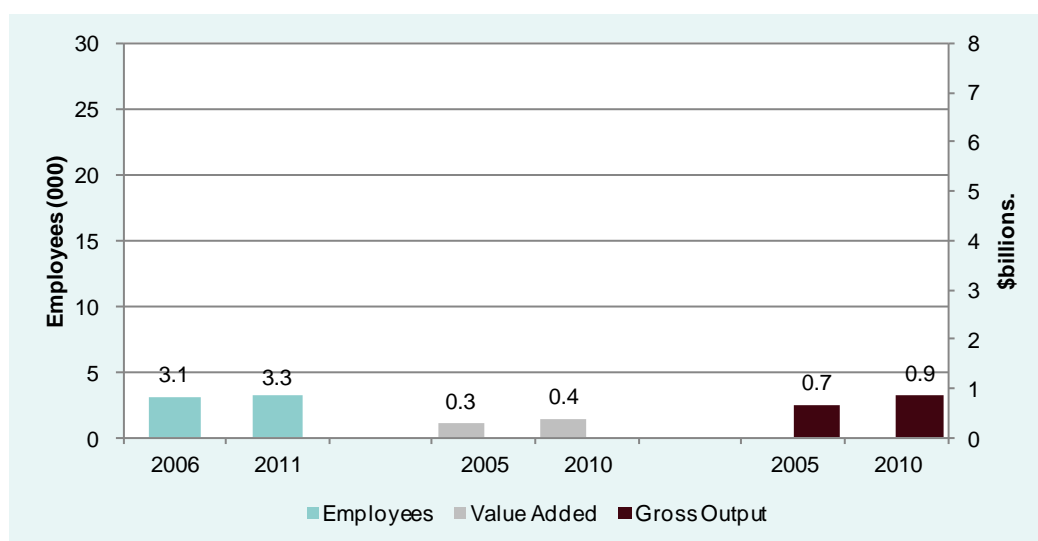
Geographic Units – 372



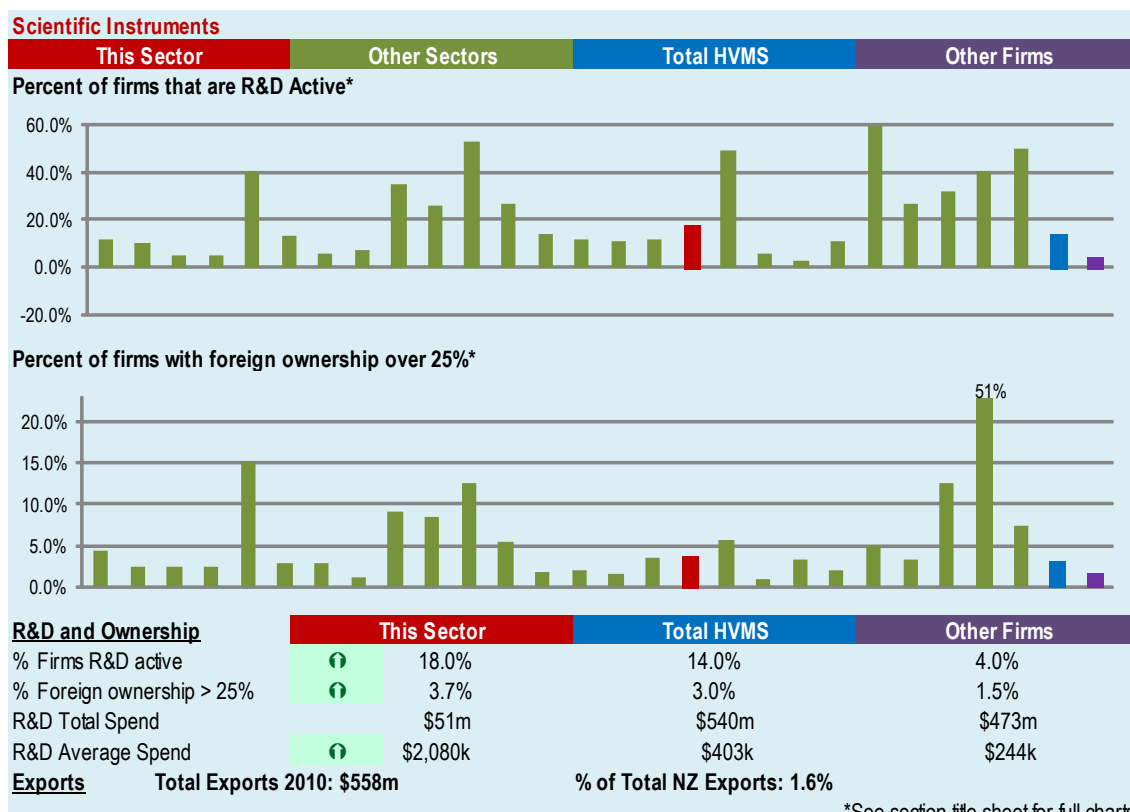
Employees – 3,314



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes by value are Medical instruments and appliances; Jewellery of gold, silver or platinum; Electrical measuring, checking, analysing instruments; Surveying, hydrographic, compasses etc.; Orthopaedic appliances, surgical belts and the like. These make up 87% of Other Transport Equipment exports by value.

Comments

Growing demand of medical/health technologies given ageing populations in NZ and globally.

Significant growth in medical and surgical equipment manufacturing from 2002 to 2009. As shown above, the Scientific Instruments Manufacturing sector as a whole was the only manufacturing sub-sector to grow employees from 2006 to 2011.

Larger foreign medical equipment companies are seeking partnerships with small companies that have a technological niche.

Challenges and opportunities⁸⁴

Challenges	Opportunities
<ul style="list-style-type: none"> Scale: limited number of firms able to innovate. Difficult to commercialise technologies and scale up through domestic markets. Fragmented health system can discourage international clinical trials coming to NZ. 	<ul style="list-style-type: none"> Demonstrated international success (F&P Health) Recognised clinical trial structure, local experience Low barriers to holding trials, very good test-bed Strong manufacturing base in Auckland, complemented by Christchurch.

⁸⁴ AERU & Flicka (2009). *New Zealand medical technologies – A sector overview*

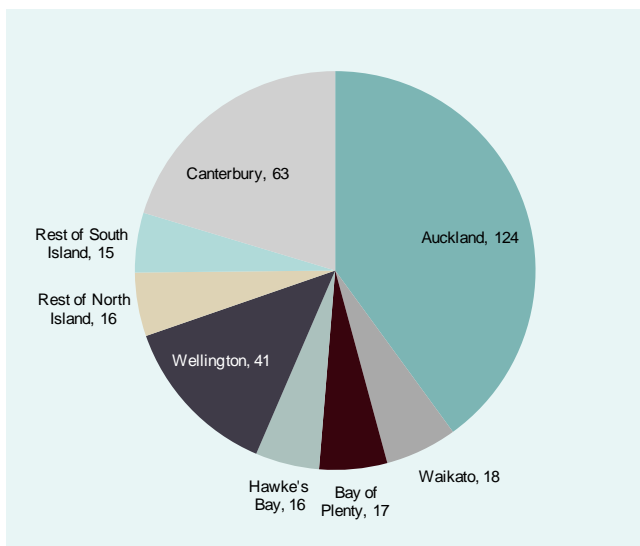
Electronic Equipment (ICT)

Sub-sector definition – ANZSIC codes

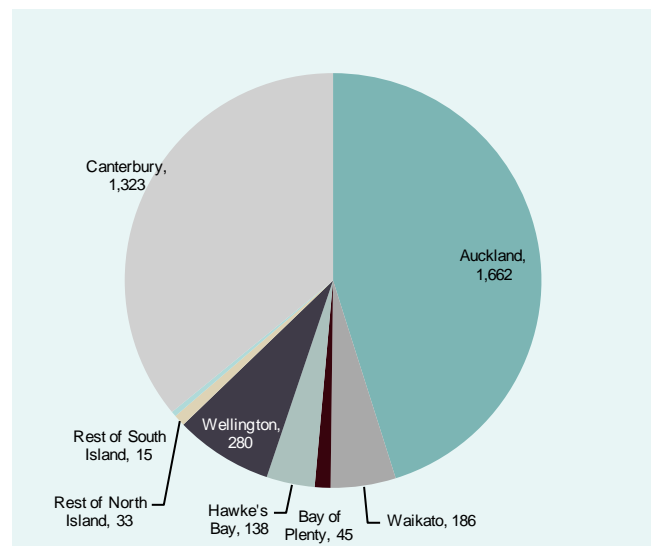
C242100	Computer and Electronic Office Equipment Manufacturing: manufacturing computers, computer peripheral equipment or other electronic office equipment.
C242200	Communications Equipment Manufacturing: manufacturing electronic and/or studio equipment for television or radio broadcasting; data transmission equipment, such as routers or modems; or telecommunication (including telephone) data communication, receiver or transceiver equipment.
C242900	Other Electronic Equipment Manufacturing: manufacturing audio or visual receiving sets, sound reproducing and/or recording equipment, radio receiving sets (except radio transceivers or radio telegraphic or telephone receivers), television receiving sets, headphones, electronic equipment or components not elsewhere classified.

Number and location of businesses

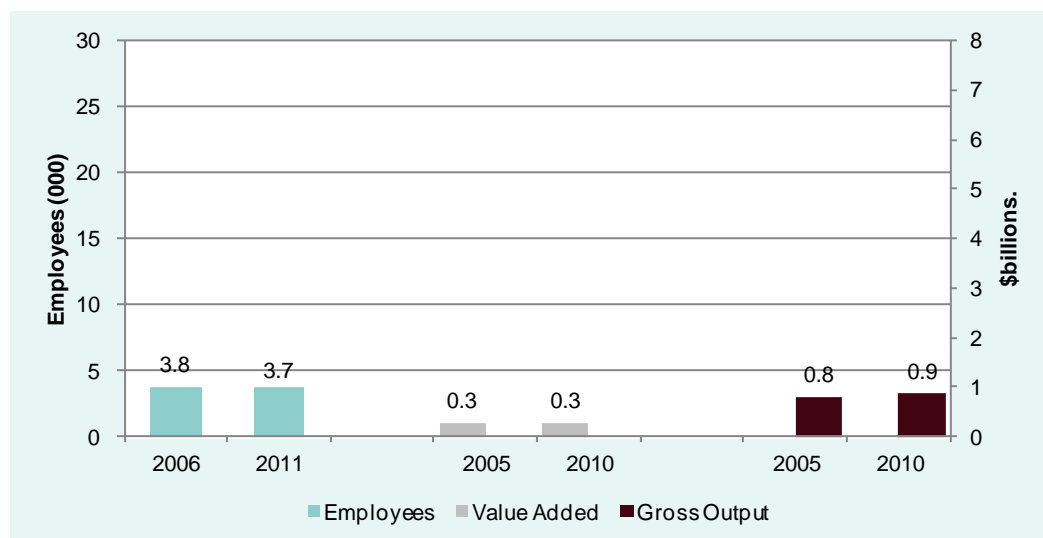
Geographic Units – 310



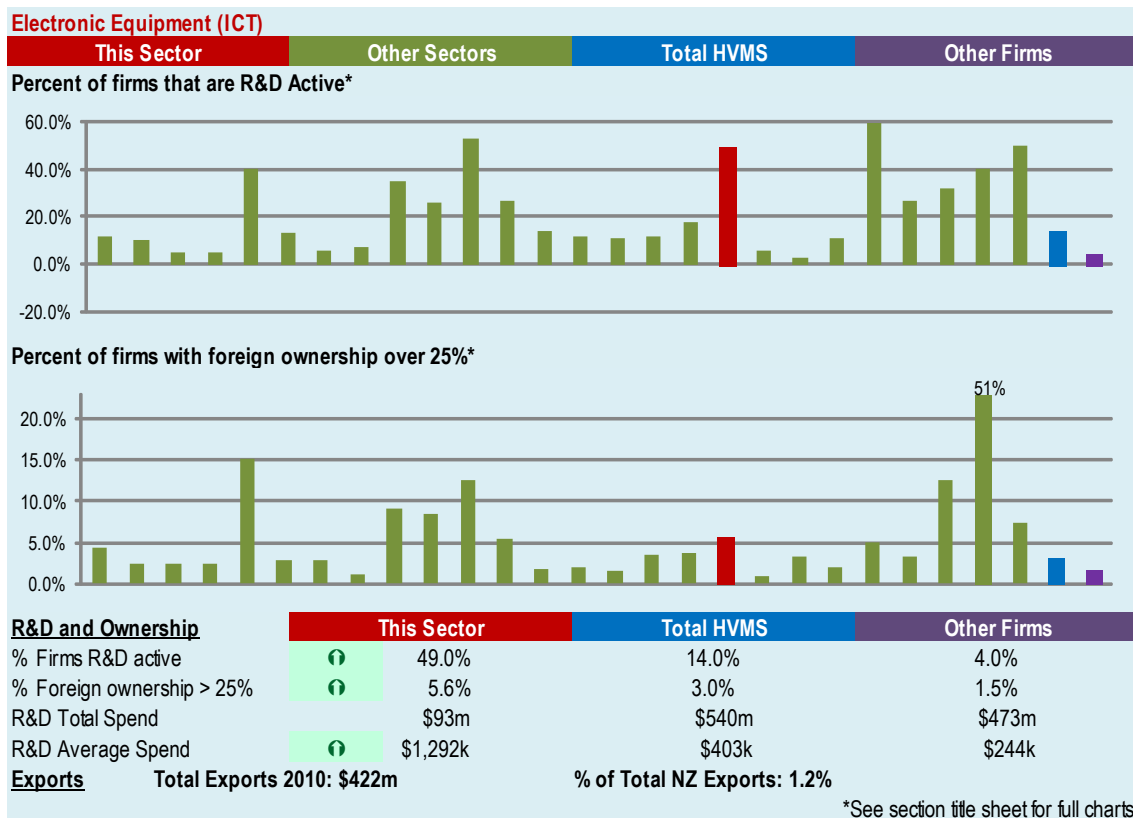
Employees – 3,682



Sector growth – employees, value added and gross output



R&D, ownership and exports



The top five export product classes are Other electronic machinery and equipment; Piezo-electric crystals, mounted, parts of 776-; Radiotelegraphic & radiotelephonic transmitters; Complete digital data processing machines; Telecommunications equipment. These make up 79% of Electronic Equipment exports by value.

Comments

Important for transformative growth in sectors of comparative advantage that are intensive users of technology.

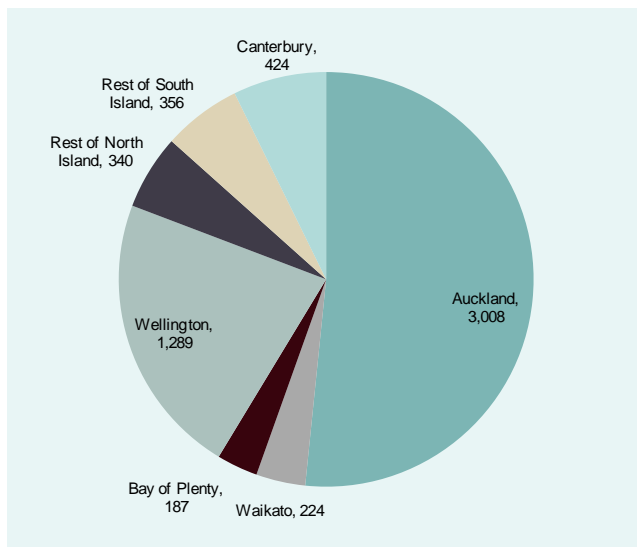
Digital and creative services

Sub-sector definition – ANZSIC codes

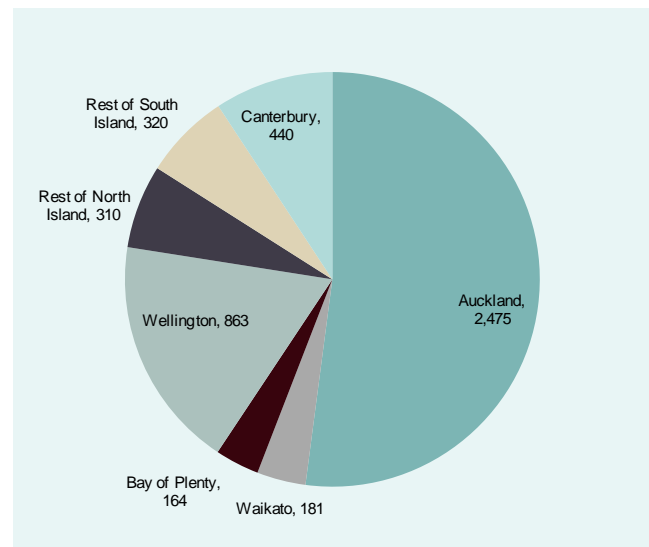
J551100	Motion Picture and Video Production: producing motion pictures, videos and television programs or commercials. These productions are recorded and stored on a variety of analogue or digital visual media such as film, video tape or DVD.
J551400	Postproduction Services and Other Motion Picture and Video Activities: post-production services and other motion picture and video activities, including specialised motion picture or video post-production services such as editing, film/tape transfers, titling, subtitling, credits, closed captioning and computer-produced graphics, animation and special effects, as well as developing and processing motion picture film.
J552200	Music and Other Sound Recording Activities: producing original (sound) master recordings such as tapes and CDs and releasing and distributing these sound recordings to wholesalers, retailers or directly to the public. Also included in this class are units engaged in operating sound recording studios and in the production of pre-recorded radio programs.
M692400	Other Specialised Design Services: Commercial art service, fashion design service, graphic design service, interior design service, jewellery design service, sign-writing, textile design service, ticket writing.

Number and location of businesses

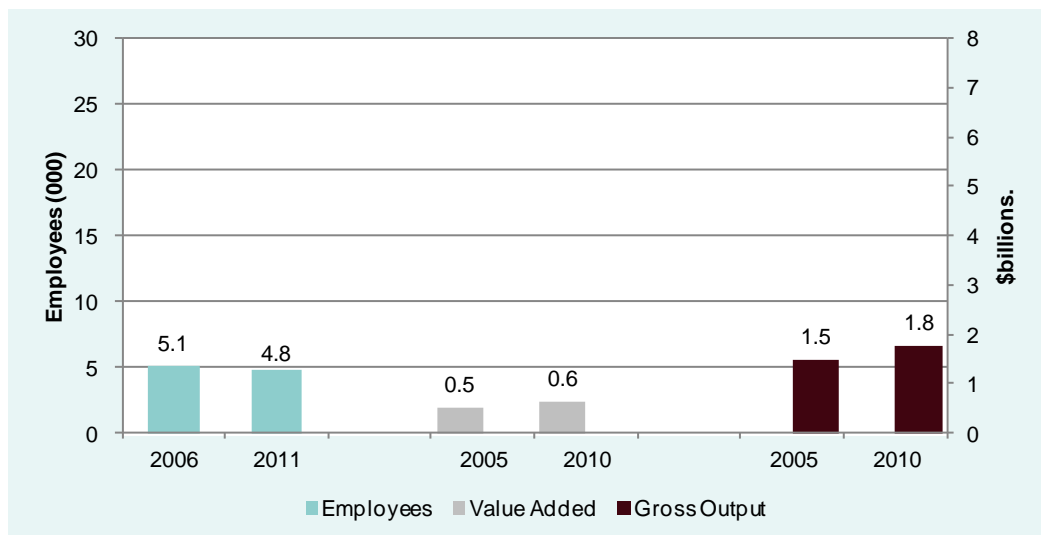
Geographic Units – 5,828



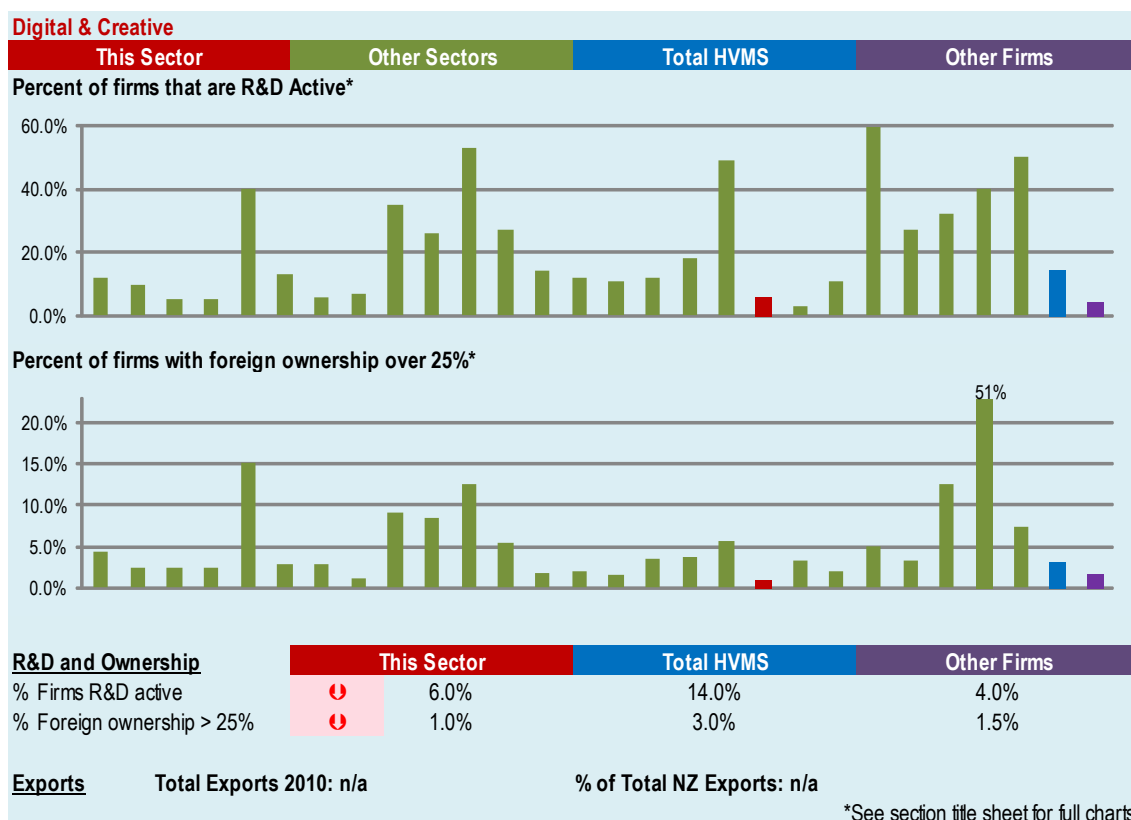
Employees – 4,753



Sector growth – employees, value added and gross output



R&D, ownership and exports



Comments

International market trends: Film: continued use of green screen, multi-camera production; fewer people going to cinema, but increased sales of DVDs and growing interest in watching films on demand on TV and the internet mean more films are being seen; the making, distribution and exhibition of films continues to be dominated by a small number of vertically integrated groups; approx 80% of all films shown are Hollywood productions; India is larger producer, releasing approx 1,100 films each year, mainly for domestic market.

Challenges and opportunities⁸⁵

Challenges	Opportunities
<ul style="list-style-type: none"> Highly mobile workforce can seek opportunities elsewhere. Shortage of trained and experienced business managers Creative design not a cohesive/coherent sector. 	<ul style="list-style-type: none"> Film is small sector but high potential for positive spill-overs – ICT, tourism Established reputation and continuing success and exposure of key players is enabling new film projects.

⁸⁵ OECD (2007). *OECD Reviews of Innovation Policy - New Zealand*; <http://www.med.govt.nz/sectors-industries/screen-industry/benefits-of-screen-industry>

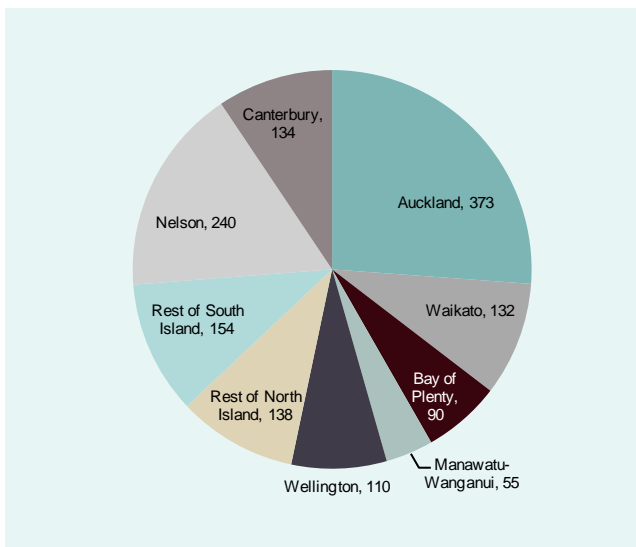
Heavy and civil engineering services

Sub-sector definition – ANZSIC codes

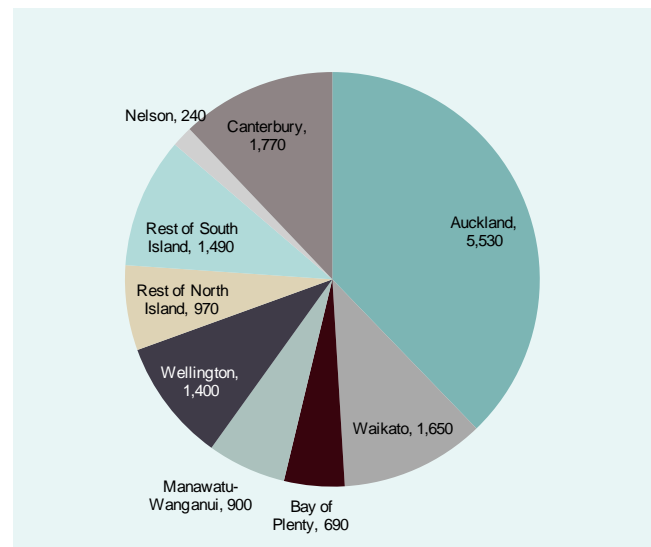
E310900 Other Heavy and Civil Engineering Construction: construction of railway permanent way, dams, irrigation systems, harbour or river works, water or gas supply systems, oil refineries (except buildings), pipelines or construction projects not elsewhere classified, in the on-site assembly of furnaces or heavy electrical machinery from prefabricated components, or in the general repair of such structures, machinery or equipment, or in organising or managing these activities

Number and location of businesses

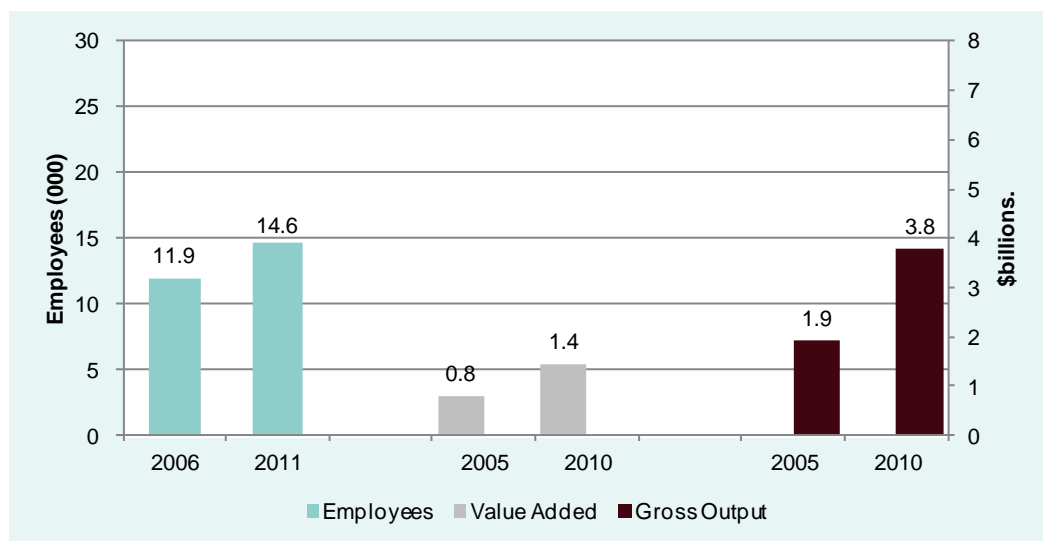
Geographic Units – 1,426



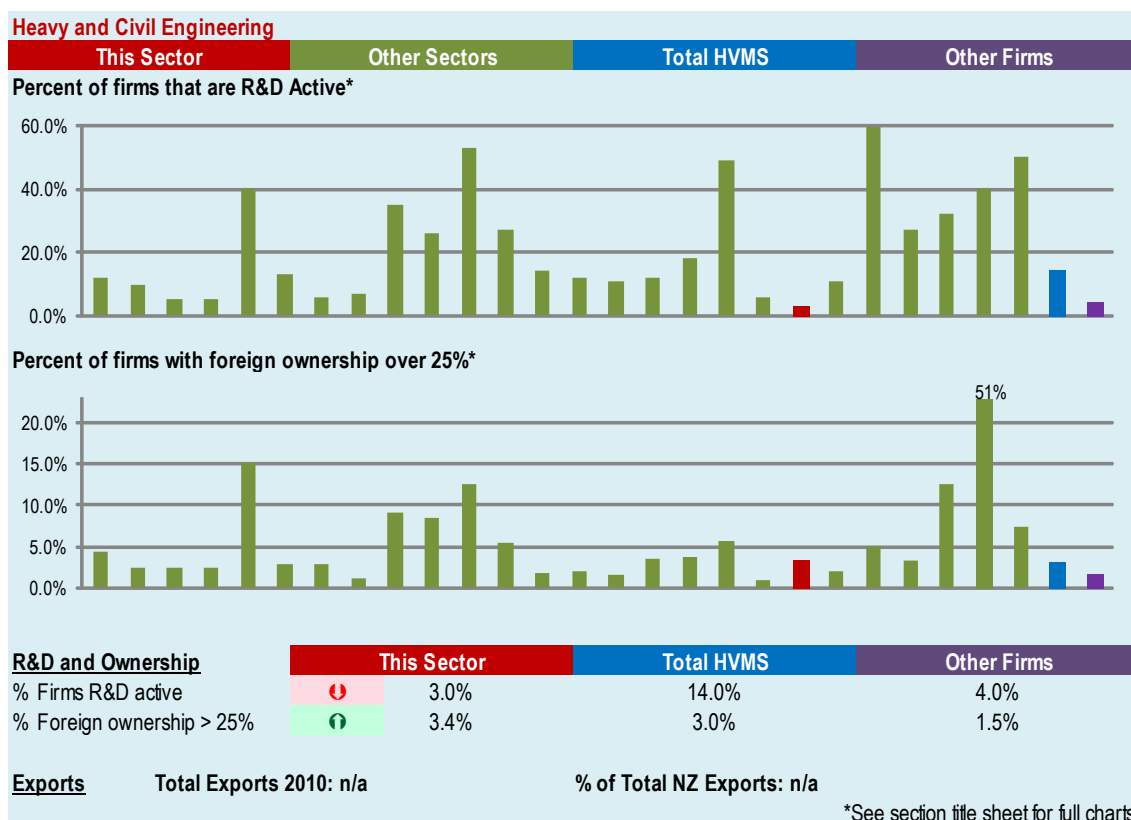
Employees – 14,640



Sector growth – employees, value added and gross output



R&D, ownership and exports



Comments

International trends: Government stimulus packages are often the driver for increased investment in infrastructure.

Not a strong global sector as different planning laws, material laws and building regulations restrict easy transfer of people and knowledge.

Challenges and opportunities

Challenges	Opportunities
<ul style="list-style-type: none"> A cyclical industry, with large highs and lows Large planned projects (electricity transmission and generation, roads, rail) now competing with Christchurch re-build. 	<ul style="list-style-type: none"> Significant infrastructure investment still required in NZ Strong NZ dollar has limited building price increases (off-setting higher commodity prices).

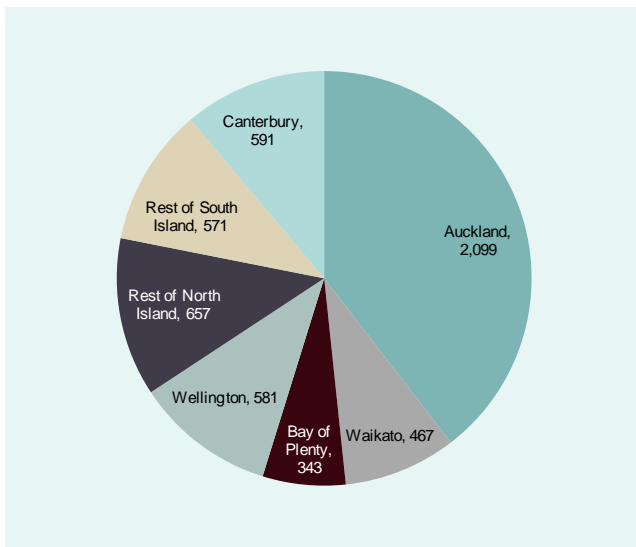
Engineering, surveying & mapping services

Sub-sector definition – ANZSIC codes

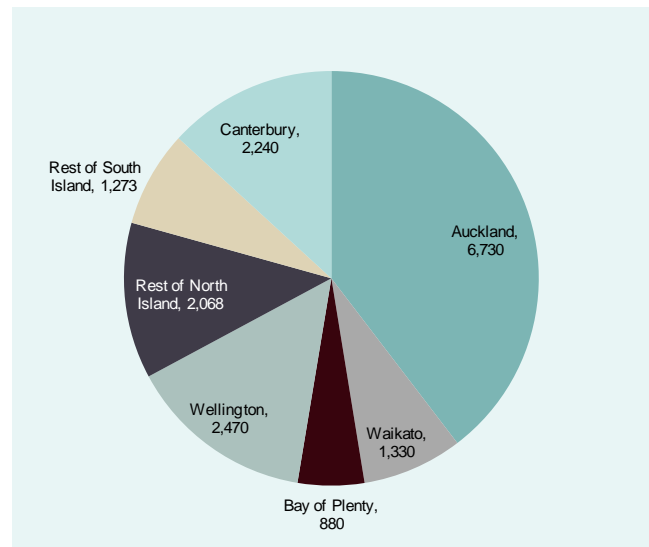
M692200	Surveying and Mapping Services: surveying and mapping services (including exploration surveying services on contract). Units in this class use a variety of surveying techniques depending on the purpose of the survey, including magnetic surveys, gravity surveys, seismic surveys or electrical and electromagnetic surveys. These services may also include surveying and mapping of areas above or below the surface of the earth.
M692300	Engineering Design and Engineering Consulting Services: applying physical laws and principles of engineering in the design, development and utilisation of machines, materials, instruments, structures, processes and systems. Units provide advice, prepare feasibility studies, prepare preliminary and final plans and designs, provide technical services during the construction or installation phase, inspect and evaluate engineering projects, and related services.

Number and location of businesses

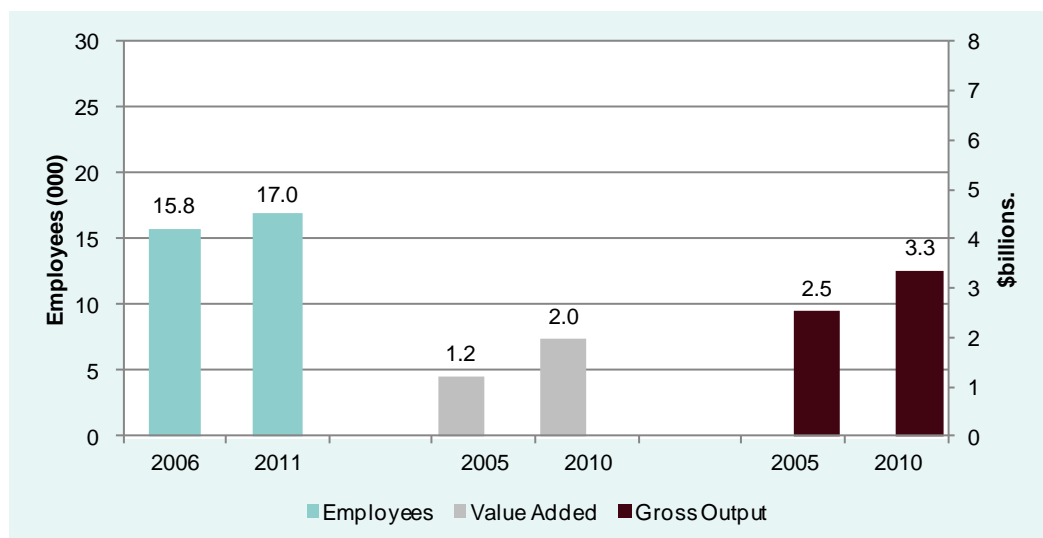
Geographic Units – 5,309



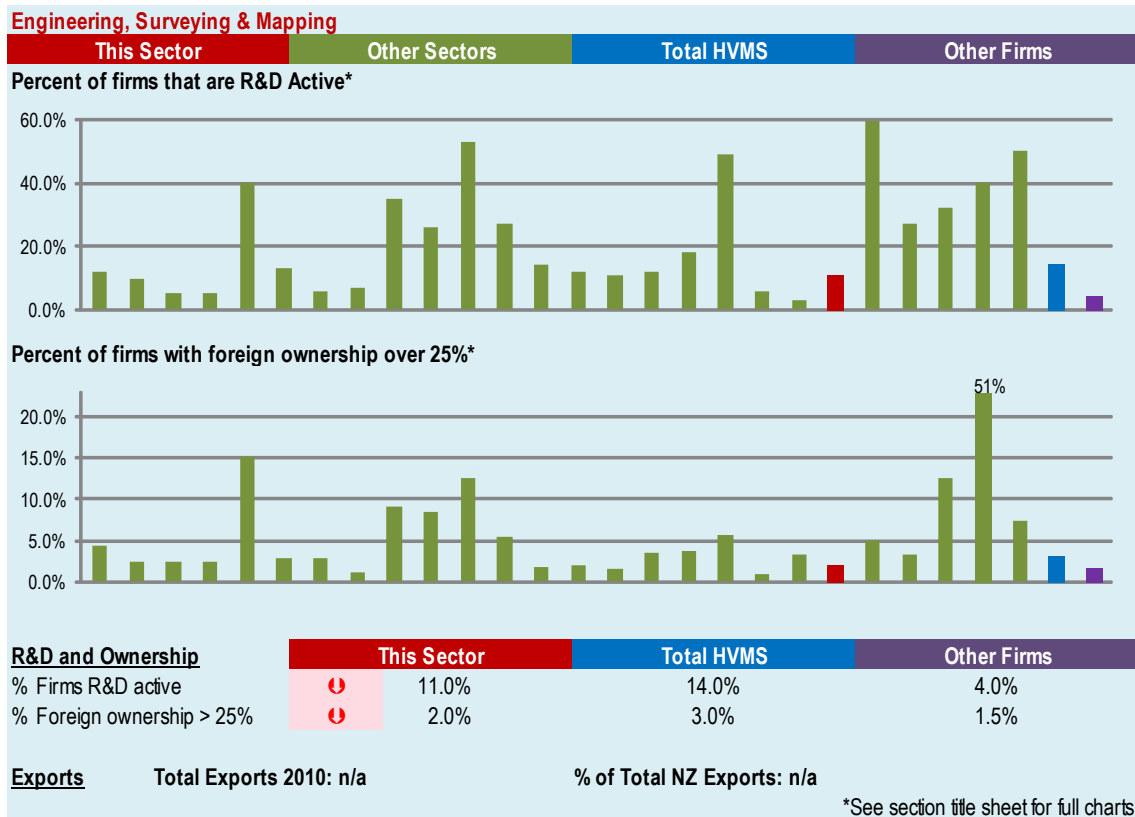
Employees – 16,991



Sector growth – employees, value added and gross output



R&D, ownership and exports



Scientific research and testing services

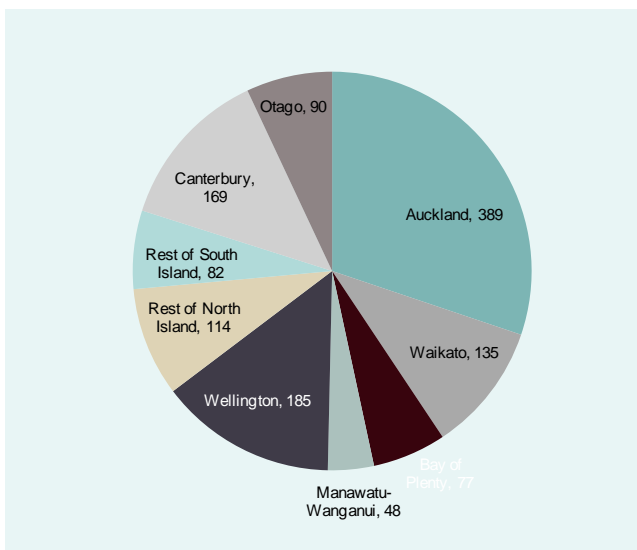
Sub-sector definition – ANZSIC codes

M691000 **Scientific Research Services:** research in the agricultural, biological, physical or social sciences. Units may undertake the research for themselves or others. (Includes biotechnology research services. Biotechnological manufacturing is included in Pharmaceuticals).

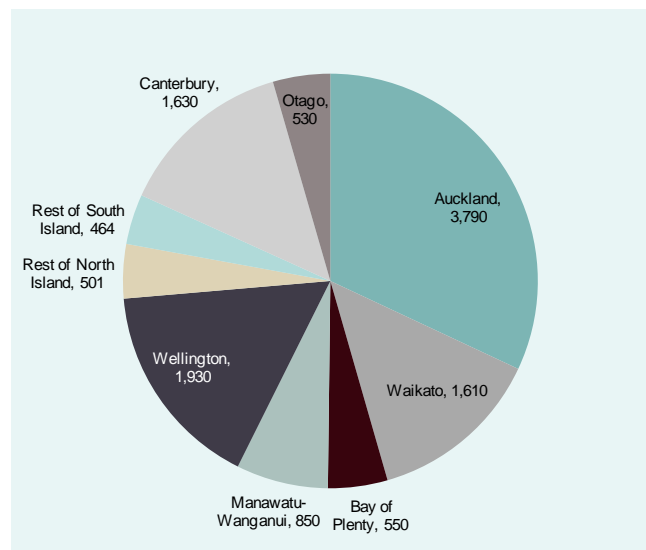
M692500 **Scientific Testing and Analysis Services:** scientific testing and analysis services such as physical or chemical testing, calibration testing, mechanical testing, thermal testing and biological testing (except medical or veterinary). The testing may occur in a laboratory or on site.

Number and location of businesses

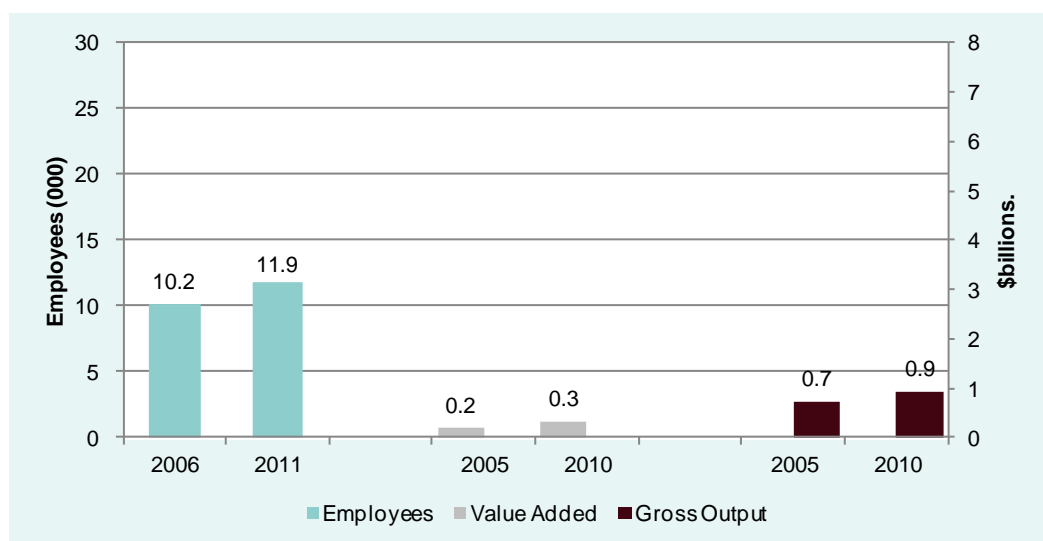
Geographic Units – 1,289



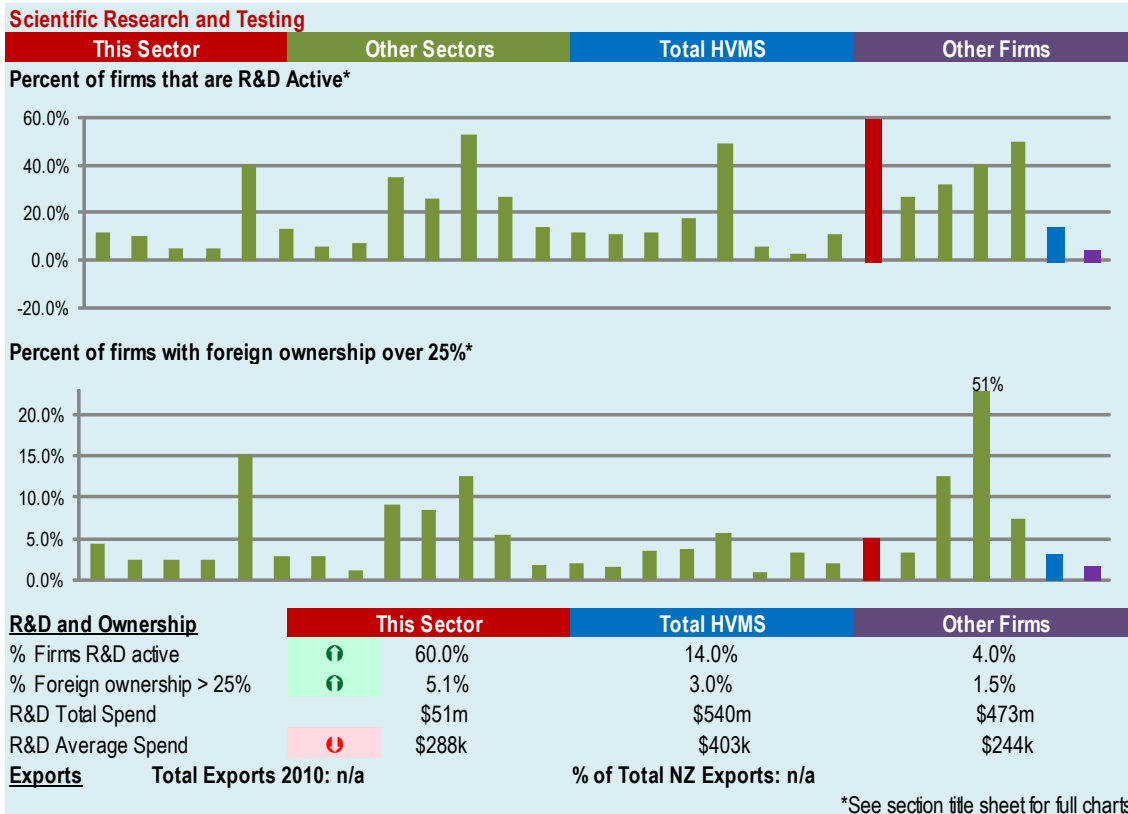
Employees – 11,855



Sector growth – employees, value added and gross output



R&D, ownership and exports



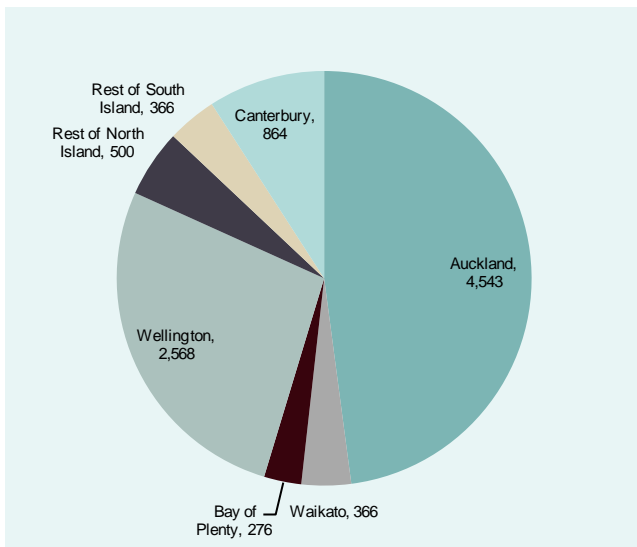
ICT Services, design & publishing

Sub-sector definition – ANZSIC codes

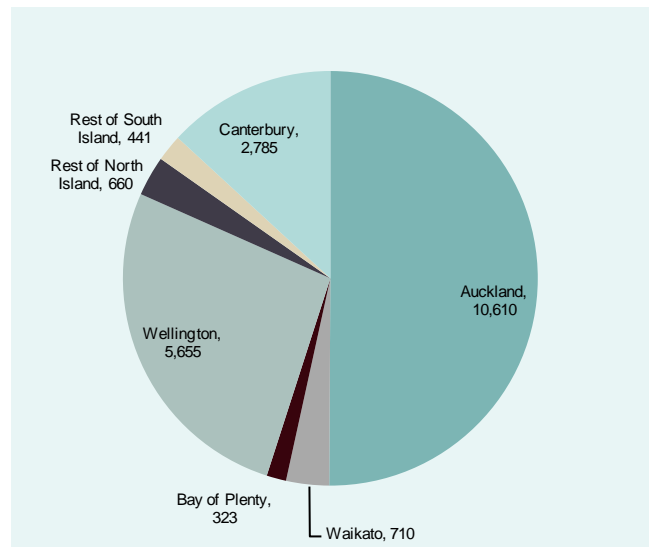
J542000	Software publishing: creating and disseminating ready-made (non-customised) computer software
M700000	Computer Systems Design and Related Services: writing, modifying, testing or supporting software to meet the needs of a particular consumer; or planning and designing computer systems that integrate computer hardware, software and communication technologies

Number and location of businesses

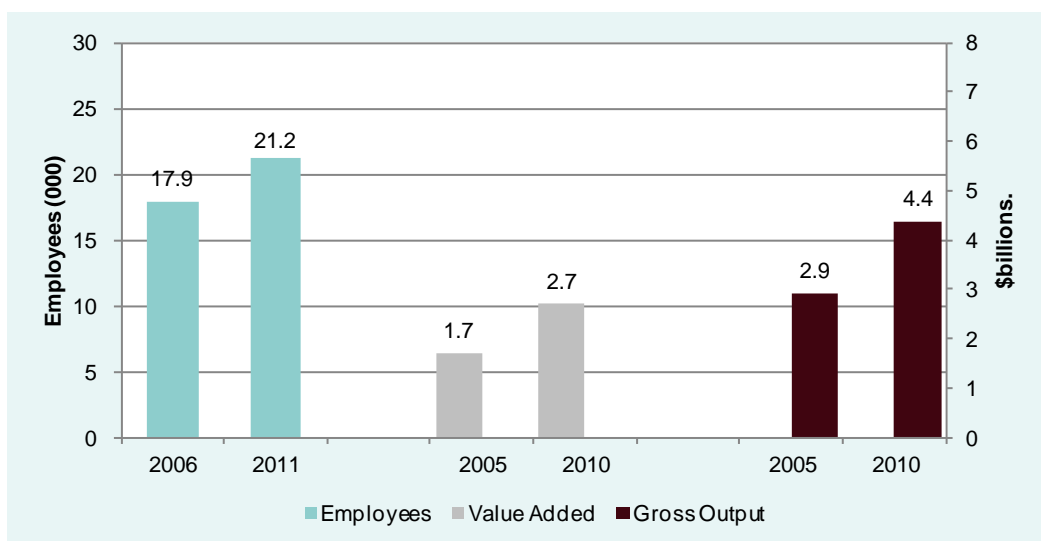
Geographic Units – 9,483



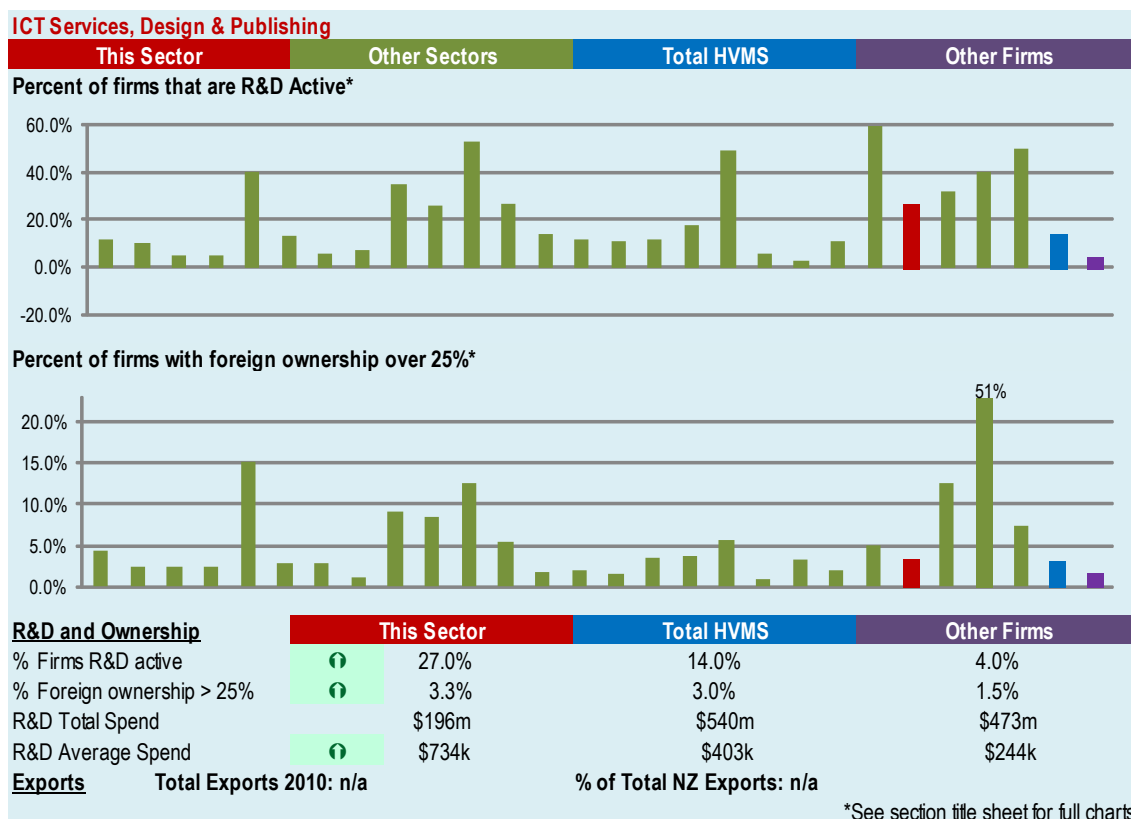
Employees – 21,184



Sector growth – employees, value added and gross output



R&D, ownership and exports



Comments

Information technology is more a capability and enabling technology than a product market. There are generally low barriers to entry. Firms have modest capital requirements while they are establishing in New Zealand, though capital needs are much greater if they seek to internationalise.⁸⁶ These technologies also support higher productivity in other NZ firms.⁸⁷

International: Traditional toy sales declining, digital games growing, particularly multi-player. New games targeting older men, market growing for women's games. Manufacturers collaborating.

Challenges and opportunities⁸⁸

Challenges	Opportunities
<ul style="list-style-type: none"> Limited access to broadband at reasonable cost Primarily small companies, some in very narrow market niches – implications for development and exports Lack of professional, management and leadership skills 	<ul style="list-style-type: none"> Collaboration with multinationals Strategic linkages developing with key international markets e.g. Launchpad in San Francisco Established in niche markets, able to target niche products & services for SMEs.

⁸⁶ MED, Industry Policy and KIMs Business (not publicly available).

⁸⁷ MED, Knowledge Intensive Manufacturing and Services (not publicly available).

⁸⁸ OECD (2007). *OECD Reviews of Innovation Policy - New Zealand*

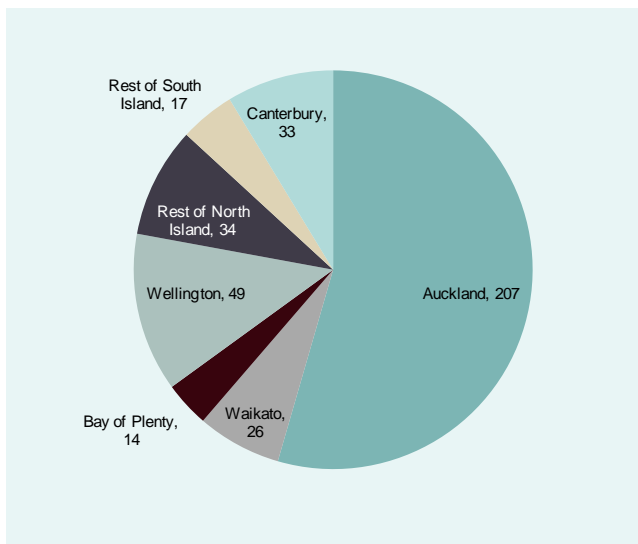
Telecommunications services

Sub-sector definition – ANZSIC codes

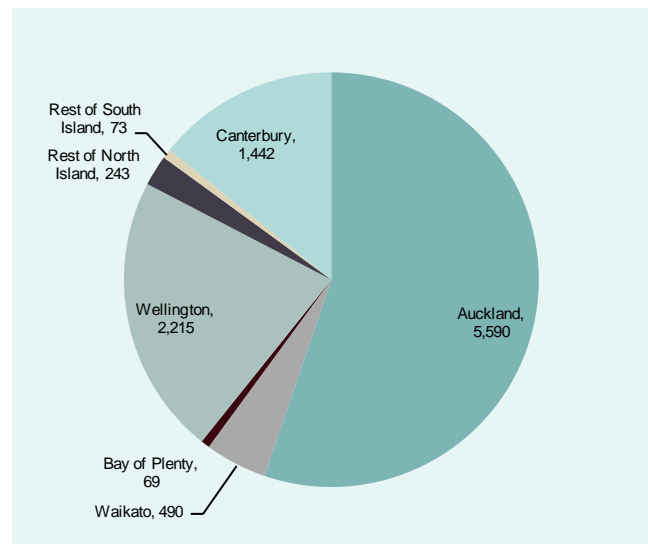
J580100	Wired Telecommunications Network Operation: operating, maintaining or providing access to facilities for the transmission of voice, data, text, sound and video using wired telecommunications networks. Units operate fixed (wired) telecommunications infrastructure, but may also utilise other types of technologies in order to deliver services.
J580200	Other Telecommunications Network Operation: operating and maintaining switching and transmission facilities that provide omni-directional or point-to point communications via wireless telecommunication networks. Transmission facilities may be based on a single technology or a combination of technologies, including communications via airwaves and through satellite systems.
J580900	Other Telecommunications Services: providing a range of other telecommunication services such as paging services and other specialised telecommunications applications. Also included in this class are units of telecommunications resellers purchasing access and network capacity from telecommunication carriers

Number and location of businesses

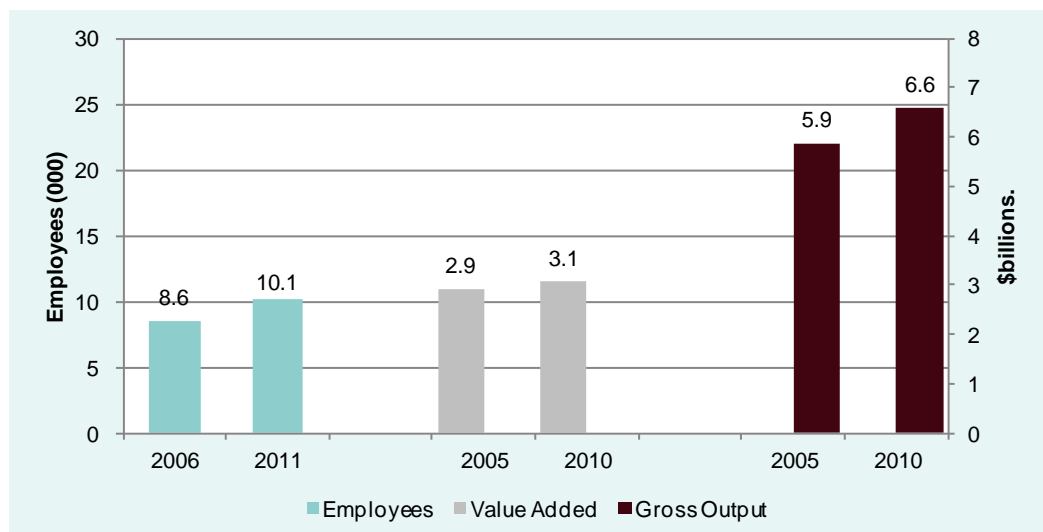
Geographic Units – 380



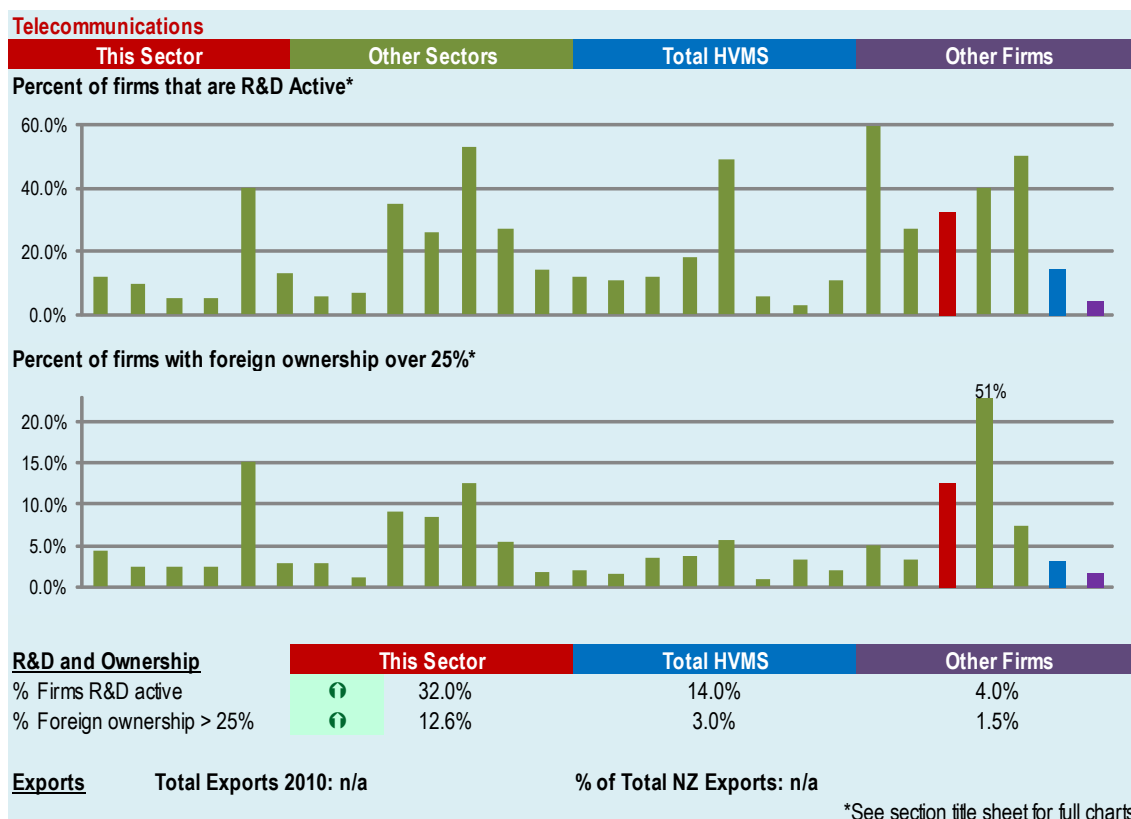
Employees – 10,122



Sector growth – employees, value added and gross output



R&D, ownership and exports



Comments

The Government’s stated objective is to “accelerate the roll-out of ultra-fast broadband to 75 percent of New Zealanders over ten years, concentrating in the first six years on ‘priority users’ such as businesses, schools and health services, plus greenfield developments and certain tranches of residential areas”.⁸⁹ Led to de-merger of Chorus and Telecom in 2011, and new entrants in the market.

International trends⁹⁰: One-third of the world’s population is online, 45% of internet users are under 25; mobile phone saturation almost reached in developed world; move from 3G to 4G under way. Text messaging tripled internationally between 2007 and 2010.

Challenges and opportunities

Challenges	Opportunities
<ul style="list-style-type: none"> Decline in traditional fixed line voice revenues. 	<ul style="list-style-type: none"> Continued expansion of broadband Continued smart-phone development and increase in uptake.

⁸⁹ <http://www.crownfibre.govt.nz/>

⁹⁰ OECD (2007). *OECD Reviews of Innovation Policy - New Zealand*

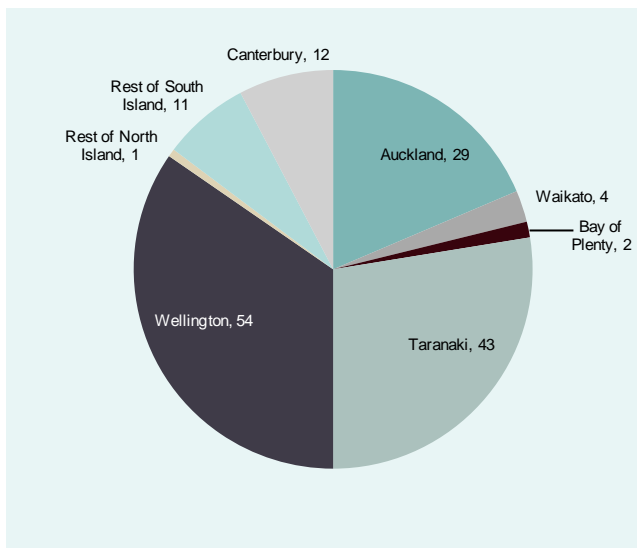
Mining - extraction & exploration

Sub-sector definition – ANZSIC codes

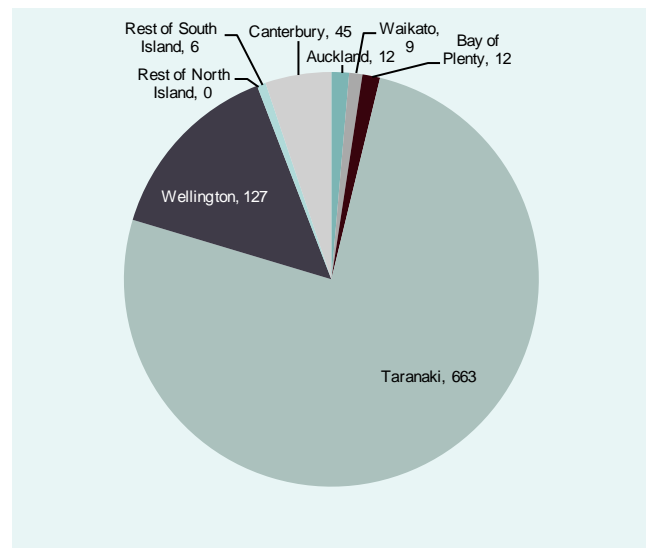
B070000	Oil and Gas Extraction: producing crude oil, natural gas or condensate through the extraction of oil and gas deposits.
B101100	Petroleum Exploration: exploring for crude petroleum and natural gas.
B101200	Mineral Exploration: exploring for minerals (except for crude petroleum or natural gas).

Number and location of businesses

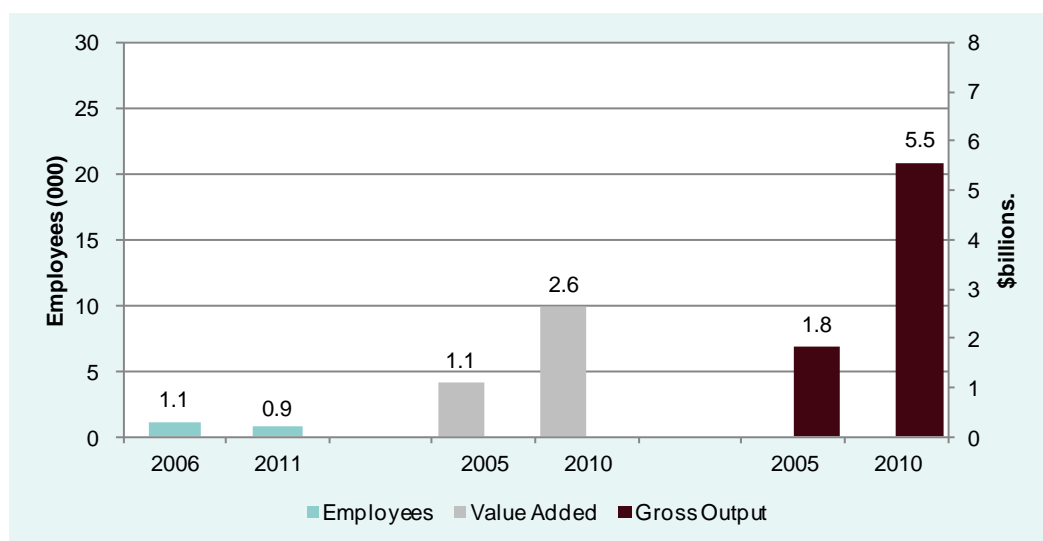
Geographic Units – 156



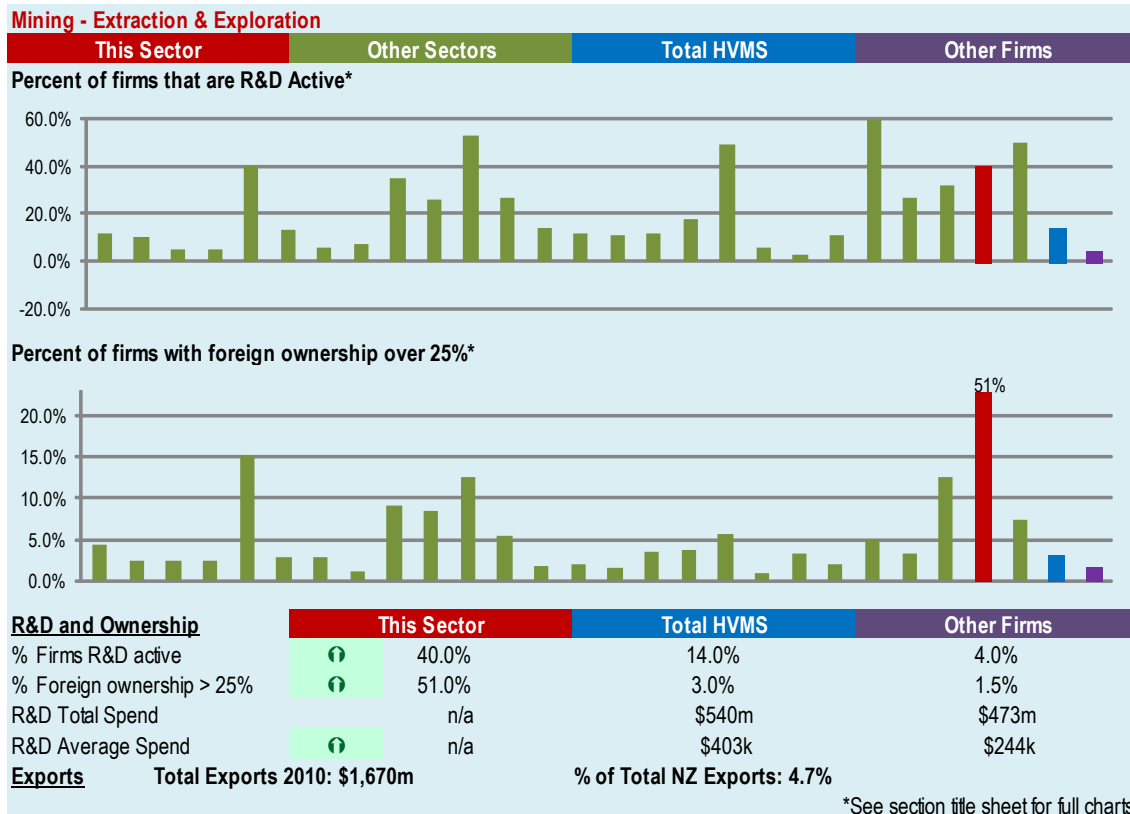
Employees – 874



Sector growth – employees, value added and gross output



R&D, ownership and exports



The two export products making up the Mining – Extraction & Exploration subsector are Petroleum oils & crude oils obtained from bituminous minerals; and Petroleum gases and other gaseous hydrocarbons n.e.s.

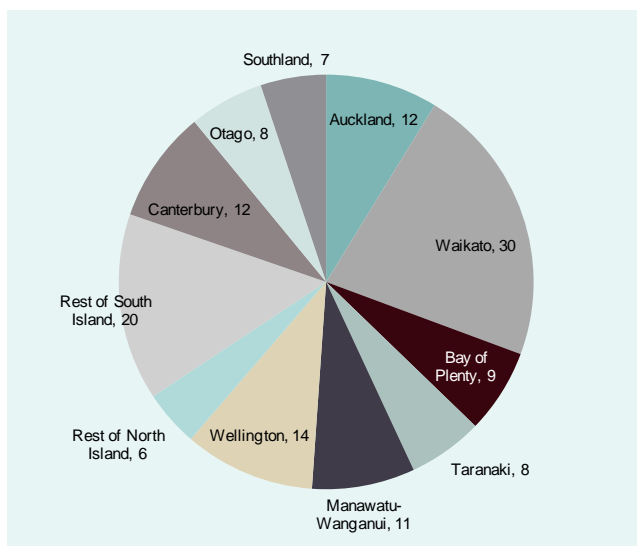
Energy generation & transmission

Sub-sector definition – ANZSIC codes

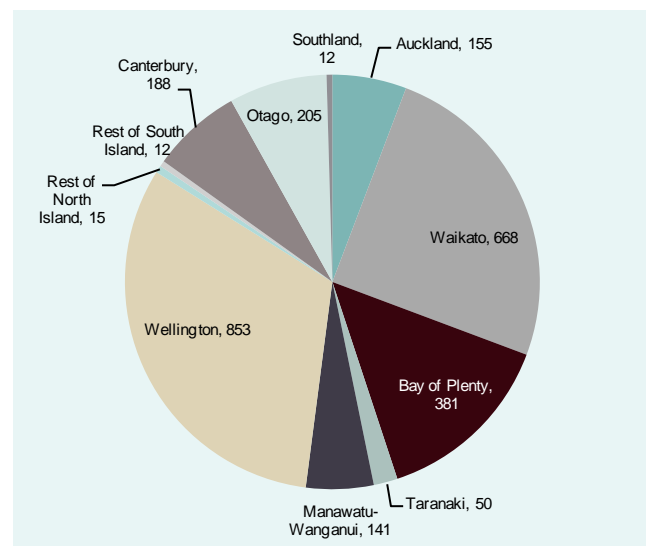
D261100	Fossil Fuel Electricity Generation: generation of electricity using mineral or fossil fuels (eg coal or coal derived products, mineral gases, mineral oil or mineral oil derived products) in internal combustion or combustion-turbine conventional steam processes
D261200	Hydro-electricity Generation: generation of electricity using hydro-electric generation processes. Units that use pumped hydro storage generation processes are included
D261900	Other Electricity Generation: generation of electricity using wind, solar, tidal, biomass not elsewhere classified and other methods of electricity generation not elsewhere classified
D262000	Electricity Transmission: operating high voltage electricity transmission systems including lines and transformer stations. These units transmit or facilitate the transmission of electricity from the generating source to the low voltage electricity distribution system.

Number and location of businesses

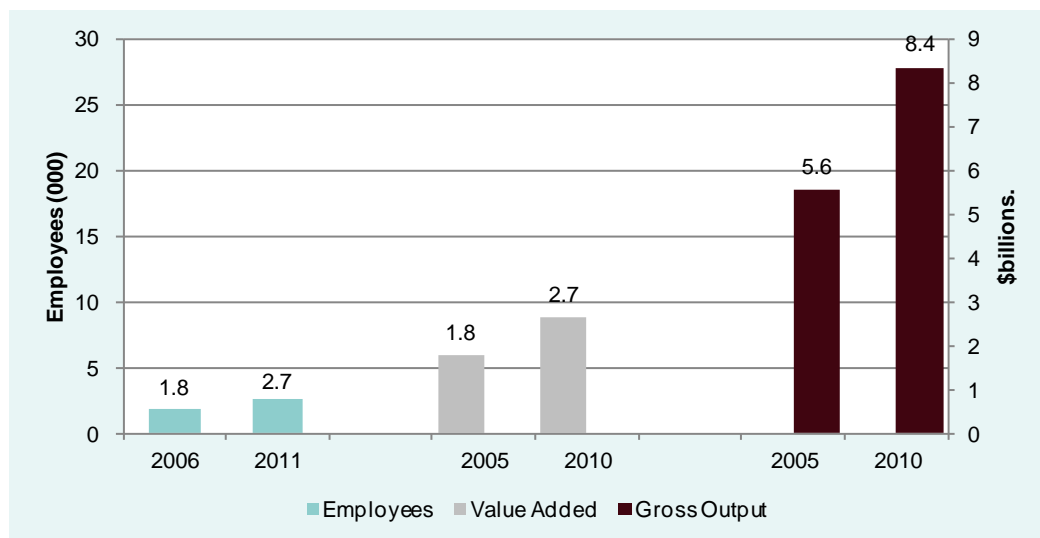
Geographic Units – 137



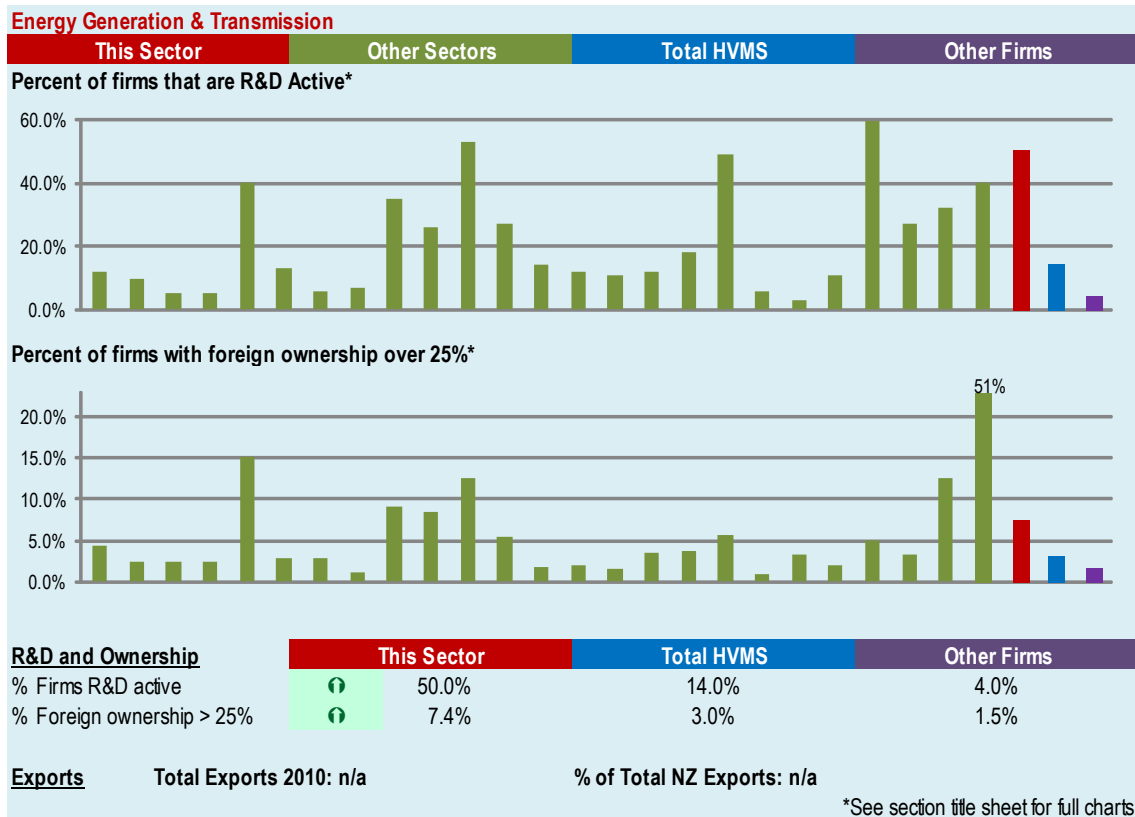
Employees – 2,680



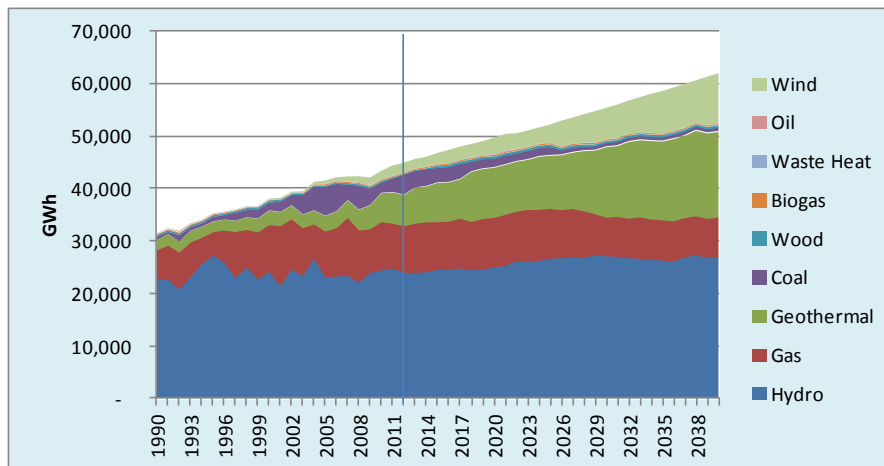
Sector growth – employees, value added and gross output



R&D, ownership and exports



Forecast electricity generation growth by type⁹¹

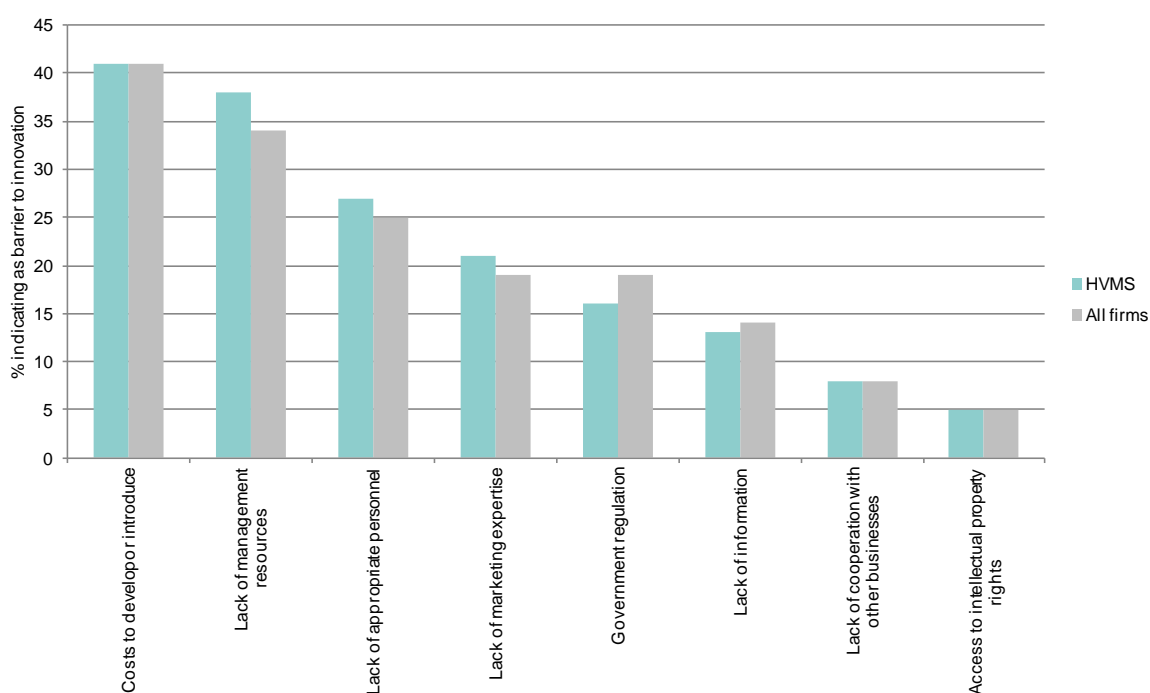


⁹¹ MED Energy Outlook 2011. High exchange rate case (NZD:USD long run average 76c). The case presented above has higher wind and geothermal generation and lower gas and coal generation than the MED's Reference (66c) and Low (56c) exchange rate cases.

Issues/challenges constraining innovation

- 109 Successful commercialisation of innovation is not simply a matter of inventing new products and processes or improving existing ones. Successful commercialisation depends on the complementary capabilities of design, marketing, production and distribution.⁹²
- 110 Despite almost half (46%) of all New Zealand firms reporting that they had undertaken innovative activities in the last two years, they struggle to commercialise innovations at scale and to gain significant share in global markets.⁹³
- 111 HVMS firms were more likely to innovate over the last two years than other New Zealand firms (51% compared with 43% for non-HVMS firms), they were also more likely to report introducing innovations that were 'New to World' (26%) and 'New to New Zealand' (47%) than other firms.
- 112 Although they were more likely to innovate, HVMS firms still reported facing similar barriers to innovation as all other firms. The most common barriers to innovation for HVMS firms (hampering them to a 'high' or 'medium' degree) were the cost to develop products (41%) and access to staff resources and expertise - management (38%), appropriate personnel (27%), and marketing expertise (21%).

Figure 35: 'Medium' or 'High' barriers to innovation



Source: Statistics New Zealand Business Operations Survey – Innovation module

⁹² MSI (2011), Business R&D in New Zealand – Presentation for BERD workshop November 18 2011 (not publicly available).

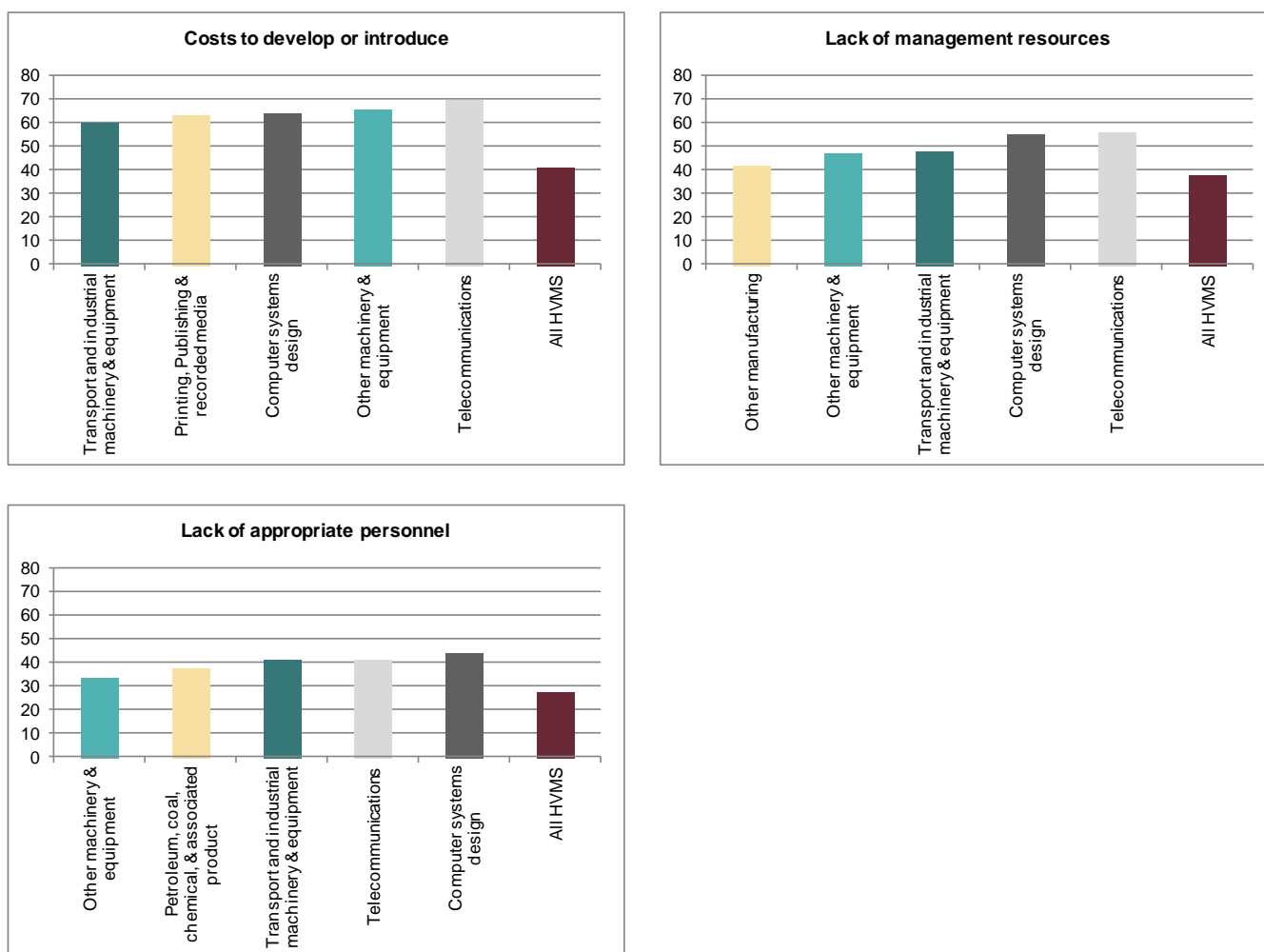
⁹³ MSI (2011), Business R&D in New Zealand – Presentation for BERD workshop November 18 2011 (not publicly available).

113 Looking at the HVMS sector as a whole masks some significant differences between HVMS sub-sectors regarding barriers to innovation. Telecommunications and Other Machinery manufacturers were the sub-sectors most likely to report barriers to innovation – being represented in the top 5 for six out of the eight barriers reported.

114 The barriers that an ATI would most likely to be able to address directly are: costs to develop (e.g. through the provision of R&D services or co-research); lack of management resource (e.g. through the provision of support for undertaking R&D or linking firms with support); and lack of appropriate personnel (e.g. through the provision of expert advice or by linking firms to appropriate resources).

115 Telecommunications, Computer Systems Design, Transport & Industrial Machinery and Other Machinery and Equipment manufacturers were represented in the top 5 sub-sectors for each of these three barriers.

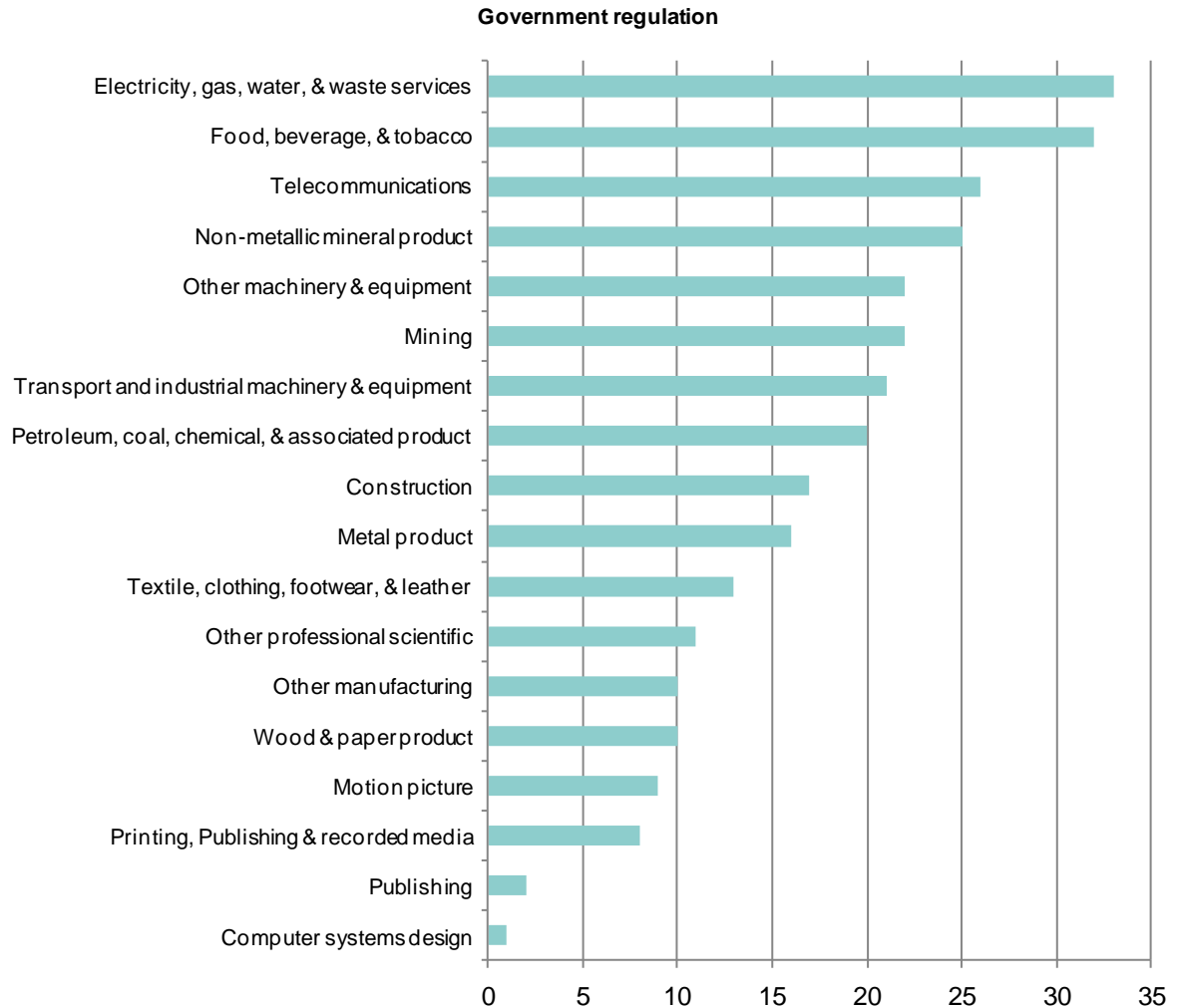
Figure 36: Barriers to innovation by top 5 sub-sectors



Source: Statistics New Zealand Business Operations Survey – Innovation module

116 Utilities (Electricity, Gas, Water & Waste Services (33%)) and Telecommunications (26%) and Food & Beverage firms (32%) were most likely to identify 'Government Regulation' as a barrier to innovation.

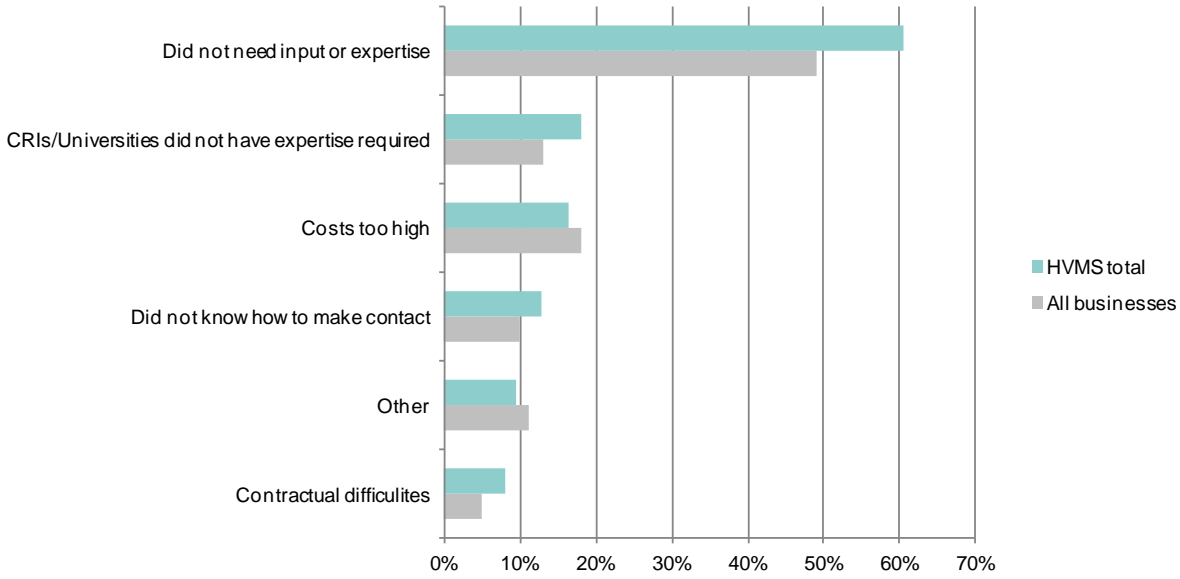
Figure 37: Government regulation as a barrier to innovation



Source: Statistics New Zealand Business Operations Survey – Innovation module

117 Historically, CRIs and Universities have not been key sources of ideas for businesses, and there is only a limited amount of cooperative activity between CRIs and Universities and the business sector. The following chart suggests that, for those firms needing CRI or University support, the main reasons they did not seek it were: that the CRI or University did not have the expertise required; that the costs for support were too high; or that the firm did not know how to make contact.

Figure 38: Reasons for not seeking CRI or University support for R&D



Source: Statistics New Zealand R&D survey

Key implications for the ATI project

- 118 If the purpose of the ATI is to lift the competitiveness of HVMS firms (and therefore New Zealand) through supporting technological innovation, it is likely that the greatest chance it has to achieve this is if it directs its attention towards New Zealand's most competitive and productive sectors.
- 119 Competitiveness can be a function of a number of factors, but may be signalled by the size of an industry, the level of exports it produces, by the number of products where it has a revealed comparative advantage (RCA), or by improvements in productivity. Productivity improvements that cannot be put down to increased labour and capital utilisation are often seen as the result of innovation by firms. In labour and capital constrained markets, it is innovative firms that are most likely to increase their productivity.
- 120 Because it is difficult to predict what sectors will be the most competitive and productive in the future, the ATI may make the greatest difference through focusing its activities toward supporting industries where there is already established comparative advantage, which are growing, or which are undertaking innovative activities. The sections below highlight some of the key HVMS sub-sectors based on these features, and where they are likely to be located.

Scale and growth sub-sectors

- 121 Food & Beverage is the largest HVMS sub-sector by value added and by employment (by some margin). Based on scale alone, the Food & Beverage sub-sector should be considered an important target of the ATI, although this raises questions about the dividing line between AgResearch, Plant & Food and an ATI.
- 122 In terms of growth, it is the Services and Energy & Mining sub-sectors which have grown the most rapidly (both in terms of employment and value added) in recent years. Mining, Heavy & Civil Engineering, Engineering, Surveying & Mapping, and ICT Services, Design & Publishing have all experienced growth of 60% or more in the last five years and are all sub-sectors producing more than \$1 billion in value added per year. The Mining and Engineering sub-sectors are likely to share common platform technologies and expertise and supporting development in the underlying platform technologies may prove beneficial for all of these sub-sectors.
- 123 More than 90% of New Zealand's total exports are derived from the HVMS sector. The majority of exports are in low complexity product classes in the Food & Beverage and Wood & Paper sub-sectors and these are the product classes in which the majority of New Zealand's RCA lies. One high value exception is the Scientific Instruments sub-sector, with \$350 million worth of Medical Instruments and Appliances exported in 2010.
- 124 Although it is the traditional industries that have the most exports by value, the most export intensive sub-sectors (exports as a proportion of total output) are Pharmaceuticals and Scientific Instruments. Employment is highly concentrated in Auckland for both of these sectors.

R&D and Innovative activity

- 125 R&D is often used as a formal measure of innovative activity. Although small firms (less than 50 employees using the OECD definition) make up the majority of R&D spend in New Zealand, larger firms are more likely to be engaged in R&D and innovative activities, and to spend more on those activities. Firms with more than 100 employees spend significantly more on R&D than any other sized firm.
- 126 The HVMS sub-sectors with the greatest total number of firms undertaking R&D were: ICT Services, Design & Publishing; Scientific Research and Testing; and Food & Beverage Manufacturing. The ICT Services sub-sector contributes almost 20% of total HVMS spend on R&D.
- 127 The industries with the highest incidence of R&D (proportion of firms undertaking R&D) are Scientific Research & Testing and Pharmaceuticals. Employment in the Pharmaceuticals sub-sector is highly concentrated in Auckland, employment in Scientific Research & Testing is more evenly spread across New Zealand.
- 128 HVMS firms report that the biggest barriers to innovation are: cost of development; lack of management resources; and lack of appropriate personnel. On the face of it, these are all barriers that an ATI could be well-positioned to address, but to be effective, it will first need to address issues related to its perceived relevance for innovating firms. Demonstrating relevance will require:
- Improving firms' understanding of how the services that an ATI offered could be of use to them – 60% of innovating HVMS firms currently report that they do not need the input or expertise of a CRI or University.
 - Developing the expertise that firms want – just under 20% of innovating HVMS firms reported that CRIs or Universities did not possess the expertise they required.
 - Carefully considering how to price services – over 15% of innovating HVMS firms cited the current cost of CRI or University support for R&D as a reason for not seeking it.
 - Making it easier for firms that are seeking support to get in touch – over 10% of innovating HVMS firms claim that they did not seek support because they did not know how to make contact.

Location

- 129 The Auckland region is the most significant employer in the HVMS sector and is home to a large portion of all HVMS firms.
- 130 50% of HVMS Manufacturing employment occurs in Auckland and Canterbury and these regions are also home to 50% of the Manufacturing geographic units.
- 131 62% of HVMS Services employment occurs in Auckland and Wellington and these regions are also home to 65% of the Services geographic units.
- 132 Almost half of HVMS firms employing more than 100 employees are located in Auckland or Canterbury.

- 133 The large scale Food & Beverage sub-sector is geographically distributed throughout New Zealand but with concentrations in Auckland and Canterbury.
- 134 The high-growth Engineering sub-sectors tend to be concentrated in Auckland, Waikato, Wellington and Canterbury.
- 135 The stand out industry in term of export value (outside primary products) is Scientific Instrument manufacturing. Almost 40% of geographic units in this sub-sector are based in Auckland, with the rest distributed around New Zealand.
- 136 IT Services is the largest sub-sector investor in R&D. IT geographic units are heavily concentrated in Auckland and Wellington (75% of all geographic units are located in these regions).

Appendix 1 Full list of HVMS ANZSIC Codes

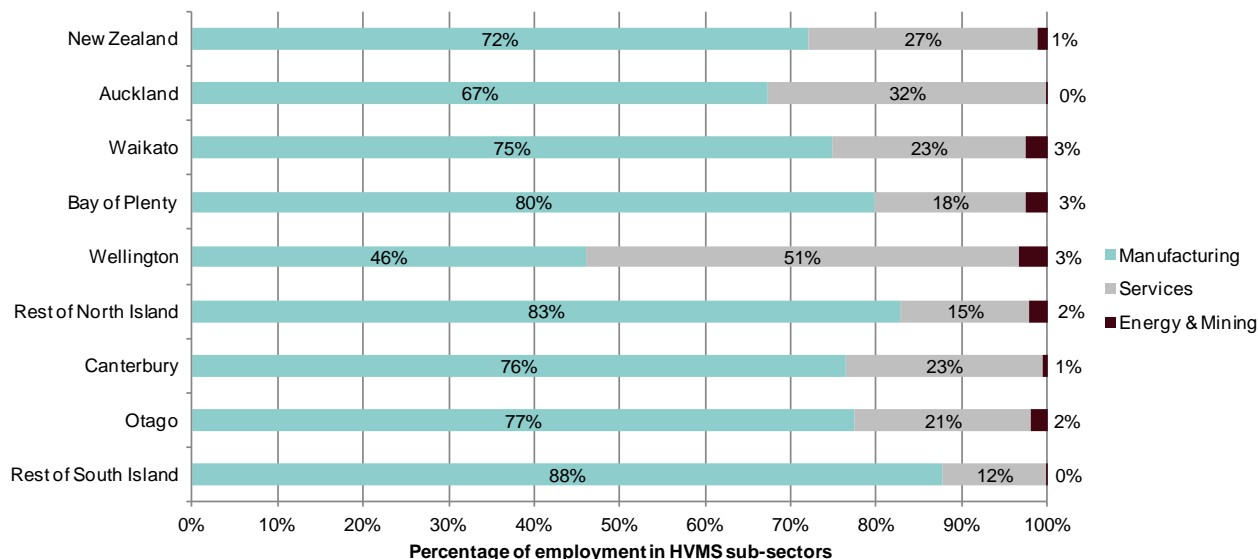
HVMS category	ANZSIC 06 code	ANZSIC 06 Description
Manufacturing		
Food & Beverage		
Food & Beverage	C11	Food Product Manufacturing
Food & Beverage	C121	Beverage Manufacturing
Textiles, Clothing & Footwear		
Textiles, Clothing & Footwear	C13	Textile, Leather, Cloth and Footwear Manufacturing
Wood & Paper		
Wood & Paper	C141	Log Sawmilling and Timber Dressing
Wood & Paper	C149	Other Wood Product Manufacturing
Wood & Paper	C15	Pulp, Paper and Converted Paper Product Manufacturing
Printing		
Printing	C16	Printing (including the Reproduction of Recorded Media)
Petroleum & Coal		
Petroleum & Coal	C17	Petroleum and Coal Product Manufacturing
Non-metal Materials		
Non-metal Materials	C20	Non-Metallic Mineral Product Manufacturing
Metal Materials		
Metal Materials	C21	Primary Metal and Metal Product Manufacturing
Metal Materials	C22	Fabricated Metal Product Manufacturing
Furniture and Other		
Furniture and Other	C25	Furniture and Other Manufacturing
Basic Chemicals		
Basic Chemicals	C181100	Industrial Gases Manufacturing
Basic Chemicals	C181200	Basic Organic Chemical Manufacturing
Basic Chemicals	C181300	Basic Inorganic Chemical Manufacturing
Basic Chemicals	C183100	Fertiliser Manufacturing
Basic Chemicals	C183200	Pesticide Manufacturing
Basic Chemicals	C185100	Cleaning Compound Manufacturing
Basic Chemicals	C185200	Cosmetic and Toiletry Preparation Manufacturing
Basic Chemicals	C189100	Photographic Chemical Manufacturing
Basic Chemicals	C189200	Explosives Manufacturing
Basic Chemicals	C189900	Other Basic Chemical Product Manufacturing n.e.c.
Polymers & Rubber		
Polymers & Rubber	C182100	Synthetic Resin and Synthetic Rubber Manufacturing
Polymers & Rubber	C182900	Other Basic Polymer Manufacturing
Polymers & Rubber	C191100	Polymer Film and Sheet Packaging Material Manufacturing
Polymers & Rubber	C191200	Rigid and Semi Rigid Polymer Product Manufacturing
Polymers & Rubber	C191300	Polymer Foam Product Manufacturing
Polymers & Rubber	C191400	Tyre Manufacturing
Polymers & Rubber	C191500	Adhesive Manufacturing
Polymers & Rubber	C191600	Paint and Coatings Manufacturing
Polymers & Rubber	C191900	Other Polymer Product Manufacturing
Polymers & Rubber	C192000	Natural Rubber Product Manufacturing
Pharmaceuticals		
Pharmaceuticals	C184100	Human Pharmaceutical and Medicinal Product Manufacturing
Pharmaceuticals	C184200	Veterinary Pharmaceutical and Medicinal Product Manufacturing
Electrical Equipment and Appliances		
Electrical Equipment and Appliances	C243100	Electric Cable and Wire Manufacturing
Electrical Equipment and Appliances	C243200	Electric Lighting Equipment Manufacturing
Electrical Equipment and Appliances	C243900	Other Electrical Equipment Manufacturing
Electrical Equipment and Appliances	C244100	Whiteware Appliance Manufacturing
Electrical Equipment and Appliances	C244900	Other Domestic Appliance Manufacturing
Electrical Equipment and Appliances	C245100	Pumps and Compressors Manufacturing
Electrical Equipment and Appliances	C245200	Fixed Space Heating, Cooling and Ventilation Equipment Manufacturing

HVMS category	ANZSIC 06 code	ANZSIC 06 Description
Machinery and Equipment		
Machinery and Equipment	C246100	Agricultural Machinery and Equipment Manufacturing
Machinery and Equipment	C246200	Mining and Construction Machinery Manufacturing
Machinery and Equipment	C246300	Machine Tool and Parts Manufacturing
Machinery and Equipment	C246900	Other Specialised Machinery and Equipment Manufacturing
Machinery and Equipment	C249100	Lifting and Material Handling Equipment Manufacturing
Machinery and Equipment	C249900	Other Machinery and Equipment Manufacturing n.e.c.
Motor Transport Equipment		
Motor Transport Equipment	C231100	Motor Vehicle Manufacturing
Motor Transport Equipment	C231200	Motor Vehicle Body and Trailer Manufacturing
Motor Transport Equipment	C231300	Automotive Electrical Components Manufacturing
Motor Transport Equipment	C231900	Other Motor Vehicle Parts Manufacturing
Marine Transport Equipment		
Marine Transport Equipment	C239100	Shipbuilding and Repair Services
Marine Transport Equipment	C239200	Boatbuilding and Repair Services
Other Transport Equipment		
Other Transport Equipment	C239300	Railway Rolling Stock Manufacturing and Repair Services
Other Transport Equipment	C239400	Aircraft Manufacturing and Repair Services
Other Transport Equipment	C239900	Other Transport Equipment Manufacturing n.e.c.
Scientific Instruments		
Scientific Instruments	C241100	Photographic, Optical and Ophthalmic Equipment Manufacturing
Scientific Instruments	C241200	Medical and Surgical Equipment Manufacturing
Scientific Instruments	C241900	Other Professional and Scientific Equipment Manufacturing
Electronic Equipment (ICT)		
Electronic Equipment (ICT)	C242100	Computer and Electronic Office Equipment Manufacturing
Electronic Equipment (ICT)	C242200	Communications Equipment Manufacturing
Electronic Equipment (ICT)	C242900	Other Electronic Equipment Manufacturing
Services		
Digital & Creative		
Digital & Creative	J551100	Motion Picture and Video Production
Digital & Creative	J551400	Postproduction Services and Other Motion Picture and Video Activities
Digital & Creative	J552200	Music and Other Sound Recording Activities
Digital & Creative	M692400	Other Specialised Design Services
Heavy and Civil Engineering		
Heavy and Civil Engineering	E310900	Other Heavy and Civil Engineering Construction
Engineering, Surveying & Mapping		
Engineering, Surveying & Mapping	M692200	Surveying and Mapping Services
Engineering, Surveying & Mapping	M692300	Engineering Design and Engineering Consulting Services
Scientific Research and Testing		
Scientific Research and Testing	M691000	Scientific Research Services
Scientific Research and Testing	M692500	Scientific Testing and Analysis Services
ICT Services, Design & Publishing		
ICT Services, Design & Publishing	J542000	Software Publishing
ICT Services, Design & Publishing	M700000	Computer Systems Design and Related Services
Telecommunications		
Telecommunications	J580100	Wired Telecommunications Network Operation
Telecommunications	J580200	Other Telecommunications Network Operation
Telecommunications	J580900	Other Telecommunications Services
Energy and Mining		
Mining - Extraction & Exploration		
Mining - Extraction & Exploration	B070000	Oil and Gas Extraction
Mining - Extraction & Exploration	B101100	Petroleum Exploration
Mining - Extraction & Exploration	B101200	Mineral Exploration
Energy Generation & Transmission		
Energy Generation & Transmission	D261100	Fossil Fuel Electricity Generation
Energy Generation & Transmission	D261200	Hydro-electricity Generation
Energy Generation & Transmission	D261900	Other Electricity Generation
Energy Generation & Transmission	D262000	Electricity Transmission

Appendix 2 Tables/charts

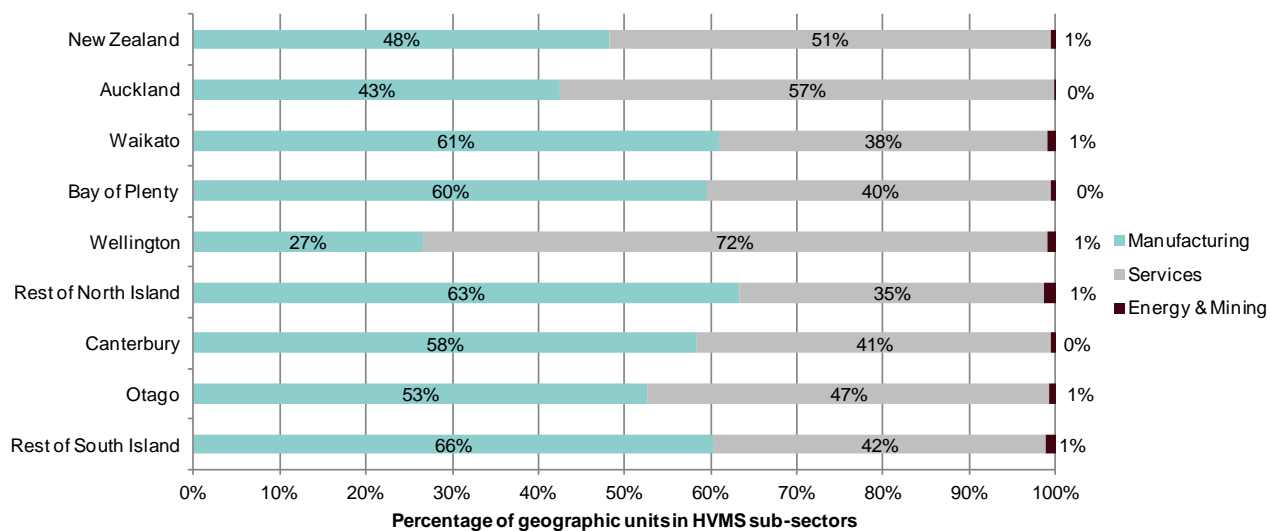
Regional breakdown of employment and geographic units

Figure 39: Percentage of employment in the HVMS sub-sectors by region



Source: Statistics New Zealand Business Frame

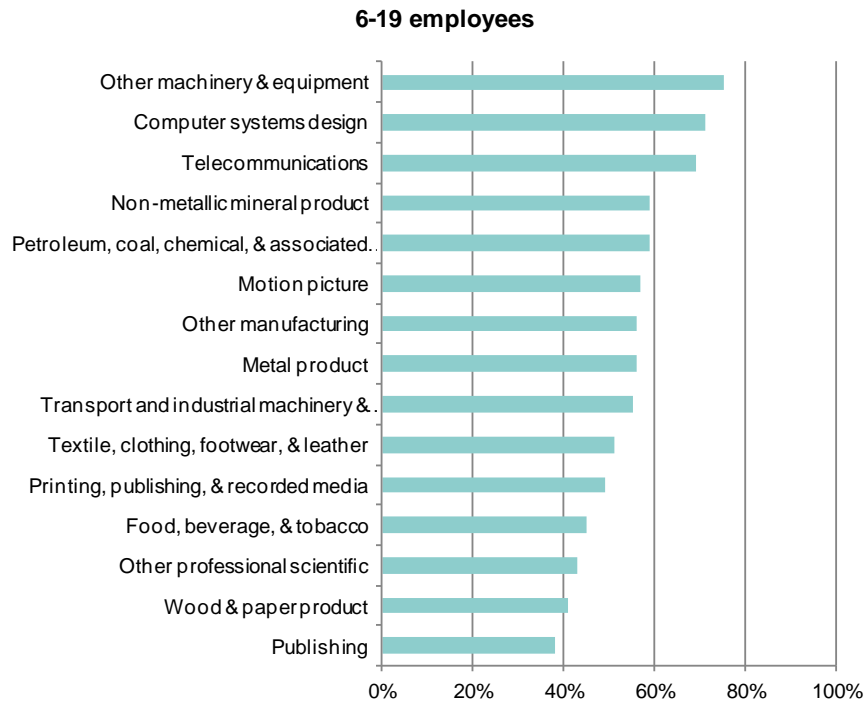
Figure 40: Percentage of Geographic Units in HVMS sub-sectors by region



Source: Statistics New Zealand Business Frame

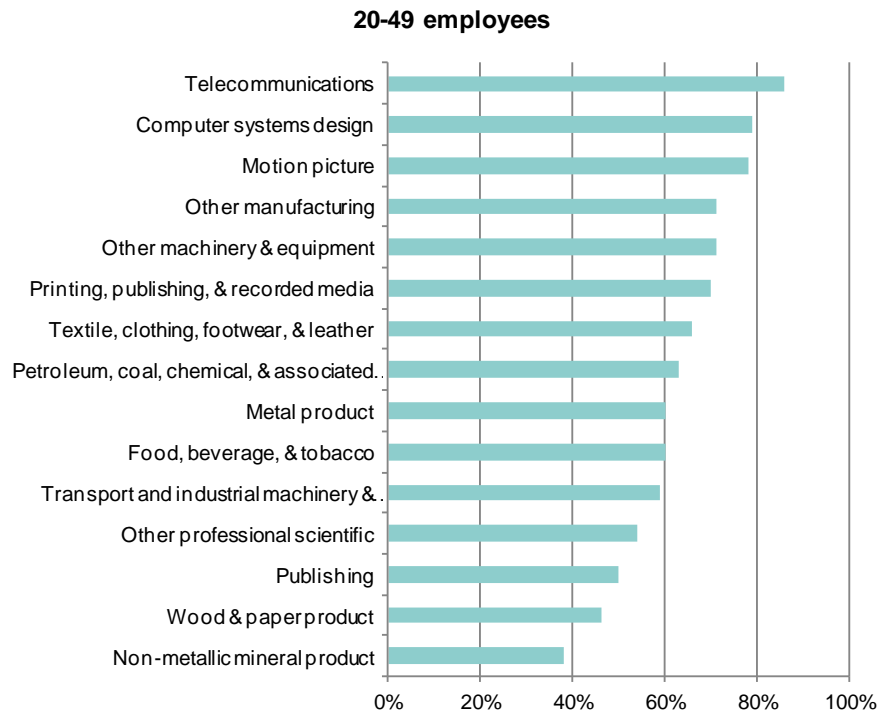
Proportion of firms innovating by size of firm and HVMS sub-sector

Figure 41: Innovation rate by HVMS sub-sector and firm size (6-19 employees)



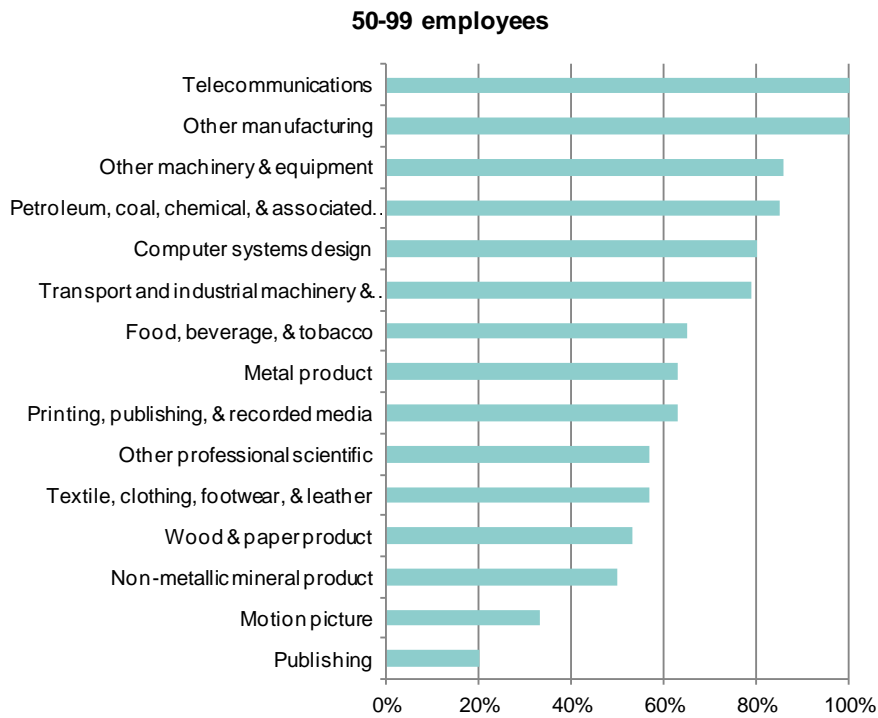
Source: Statistics New Zealand Business Operations Survey – Innovation module

Figure 42: Innovation rate by HVMS sub-sector and firm size (20-49 employees)



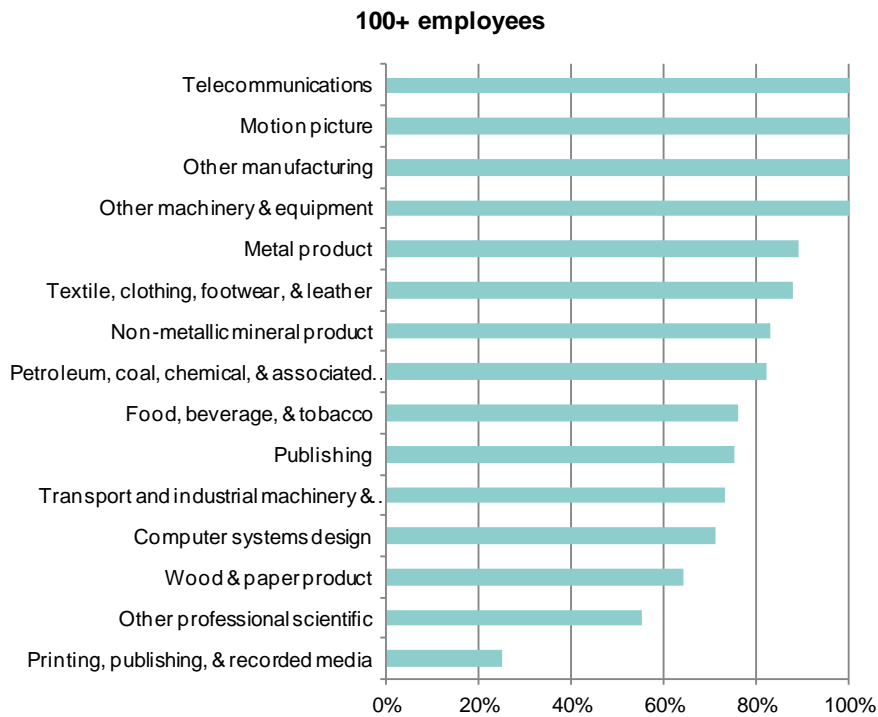
Source: Statistics New Zealand Business Operations Survey – Innovation module

Figure 43: Innovation rate by HVMS sub-sector and firm size (50-99 employees)



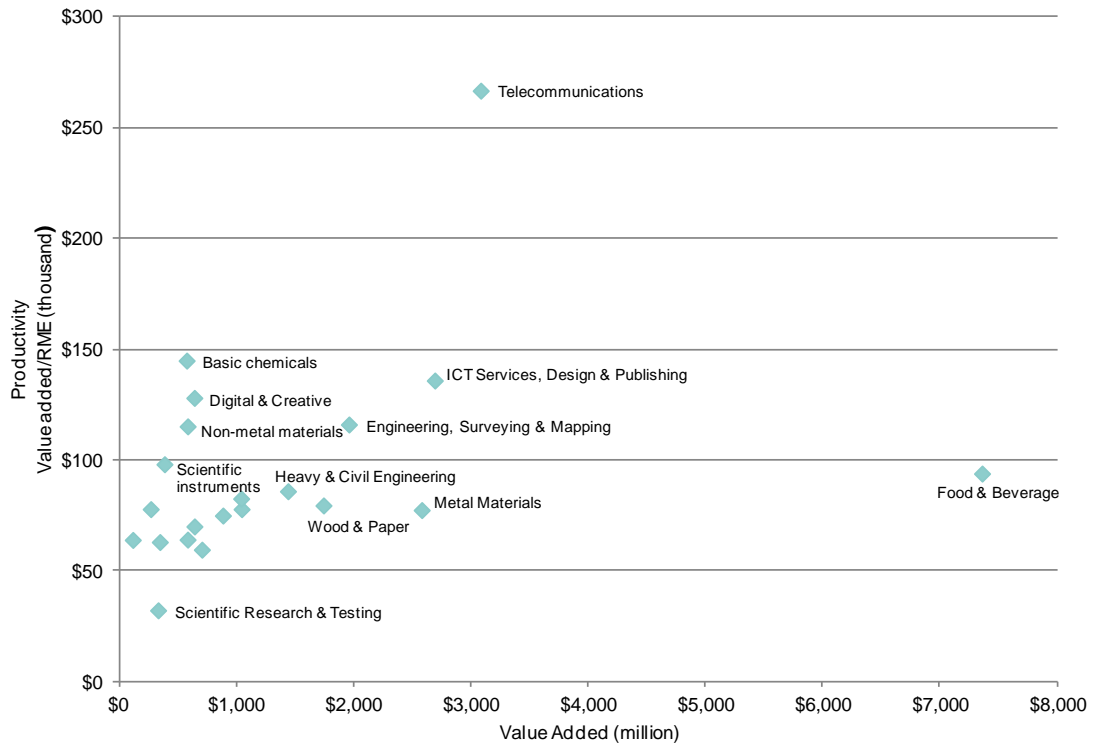
Source: Statistics New Zealand Business Operations Survey – Innovation module

Figure 44: Innovation rate by HVMS sub-sector and firm size (100+ employees)



Source: Statistics New Zealand Business Operations Survey – Innovation module

Figure 45: Productivity and Value Added by HVMS sub-sectors scatter plot



Source: Statistics New Zealand Annual Enterprise Survey (2010)

Appendix 3 Existing definitions

137 Several definitions of the HVMS sector exist. The key differences in definitions relates to the methodology applied to create the sector:

- Sector based. The OECD and Eurostat have developed a definition for international comparison purposes which is based on the comparative R&D intensity of different sectors.
 - The intensity classification is relative. Many manufacturing activities could be considered “high-technology” but by looking at direct R&D intensities the definition is making a classification according to relative recent R&D performance.
 - Although R&D is an extremely important characteristic of HVMS firms, it is not the only one. The OECD classification of knowledge-intensive service and high-technology manufacturing industries is an imprecise measure for a number of reasons. For example, high-technology manufacturing and knowledge-intensive service industries may produce non-high-technology products or non-knowledge-intensive services, and technologically advanced manufacturing industries are excluded if they do not spend a high proportion of their revenues on R&D.⁹⁴
 - Applying the sector approach can therefore be biased against sectors and periods in which turnover or production increase more rapidly than R&D expenditure. Another concern is that the lack of detailed data using this approach means that many products manufactured by high-tech sectors could be considered medium or low-tech products, and vice versa.
- Product based. The OECD has also developed a product based definition to supplement the sector based approach.
 - The product based approach can allow for more detailed analysis of trade and competitiveness, but it is a cumbersome exercise to evaluate and code products, and the results cannot readily be reproduced. This makes it difficult to compare to other industry variables that are available using standardised codes.⁹⁵
- Firm based. The Ministry of Economic Development has created a list of over 1,500 firms it deems to be ‘firms of future comparative advantage’. The criteria for meeting this list are that the firm is genuinely innovative, located to a significant extent in New Zealand, and outside the core homogenous sectors⁹⁶.

⁹⁴ National Science Fund (2010), Science and Engineering Indicators: 2010. Accessed at: <http://www.nsf.gov/statistics/seind10/c6/c6s1.htm>.

⁹⁵ Hatzichronoglou, T. (1997) Revision of the High-Technology Sector and Product Classification, OECD Science, Technology and Industry Working Papers, 1997/02, OECD Publishing.

⁹⁶ These criteria are similar to the Tin100 criteria which are that the businesses: Originate in New Zealand; Retain a meaningful presence in New Zealand; Operate in the Hi Tech Manufacturing, ICT or Biotechnology Sectors (not Food Technology including health supplements); Generate their own technology based intellectual property; and Generate at least 10% of their revenues offshore.

Although they range across a variety of ANZSIC codes, they generally produce differentiated or specialised products.⁹⁷

- The MED HVMS firm list was developed over time and makes use of business longitudinal data and its own industry coding system. We were not able to get a list of ANZSIC codes for these firms, so it was not possible to compare the overlap of the MED list with the list of firms generated taking a sector approach.
- As with the product based approach, this exercise can take some time to undertake (the MED list was developed over several years) and is not easy to replicate.
- This approach may understate the number of HVMS firms.
- Occupation based. The Department of Labour (DoL) examines the prevalence of knowledge intensive industries at a regional level by defining a set of knowledge intensive sectors and examines employment in this set of sectors.
 - To be classified as a knowledge intensive sector, an industry must satisfy two criteria: (i) at least 25 per cent of the workforce must be qualified to degree level, and (ii) at least 30 per cent of the workforce must be employed in professional, managerial and scientific and technical occupations. This definition, while using industry level data, takes account of occupation (defined principally by knowledge intensity rather than creativity).⁹⁸
 - An occupation based approach may not be appropriate in the context of an ATI, given that the key points of interest for an ATI are likely to be around the type of technology used, and the way it is implemented, and what it is capable of, rather than the person implementing it.

138 The modifications to the MED's sectors comprised:

- Removal of non-relevant industry categories - such as legal and accounting services, arts and recreation and education and training. While these are undoubtedly knowledge intensive services, they are not industry categories that are dominated by technology-based firms. To the extent that IT and other high technology firms provide services within these industry categories, such firms will generally be captured elsewhere in the data.
- Addition of further relevant high value categories - such as polymer product manufacturing and digital and creative industries.

⁹⁷ What is a KIMS firm?

They were knowledge-intensive manufacturing and services firms (excluding primary industries). This means they had to be firms that used knowledge (as opposed to increased inputs of raw materials, capital and unskilled labour) as a key part of the business product or service.

They were New Zealand firms in that they were either New Zealand owned or governed or managed, or had most of their value added and innovative activities in New Zealand.

They were innovative firms. That is, they had to be producing new products, processes or significantly new functionality. This excludes trivial product differentiation. It also excludes knowledge-intensive firms that provide routine, repetitive services that involve no significant new innovation.

⁹⁸ Grimes, Le Vaillant, McCann (2011), Auckland's Knowledge Economy: Australasian and European Comparisons.

- Addition of further manufacturing categories that might not be considered high value, but which could benefit from advanced technologies to produce significant productivity gains. Such categories include food and beverage manufacturing and some primary product manufacturing industries.

139 The initial list of sub-sectors was cross-checked against:

- The ANZSIC categories in the September 2010 BERL Economics draft report to the Foundation for Research Science and Technology, “Testing a Sector based Approach to Investment”.
- The sub-sector categories of firms in MED’s firm-based KIMS analysis. MED developed groups that were designed to align with a range of government policy areas and the list was built up over time from known firms (ANZSIC codes were not available for each firm on the list, so it was not possible to align sector coverage).

Comparison of HVMS subsectors to MED’s KIMS subsectors and OECD’s HVMS subsectors

140 The following table shows the HVMS subsectors developed for this report and the subsector descriptions used by the MED and OECD in describing KIMS and HVMS respectively.

141 The sub-sectors in each column do not align, but are shown alongside similar categories where possible:

Table 4: Comparison of HVMS sub-sectors to OECD Eurostat sub-sectors

HVMS	OECD Eurostat
Manufacturing (Non high-tech)	
Food & Beverage Textiles, Clothing and Footwear Wood & Paper Printing Petroleum & Coal Non-metal Materials Metal Materials Furniture and Other	
Manufacturing (Medium to high-tech)	Manufacturing (Medium to high-tech)
Basic Chemicals Polymers & Rubber Pharmaceuticals Electrical Equipment and Appliances Machinery and Equipment Motor Transport Equipment Marine Transport Equipment Other Transport Equipment Scientific Instruments Electronic Equipment (ICT)	Chemicals Pharmaceuticals Electrical machinery; Computers & office machinery Non electrical machinery Motor vehicles Other transport equipment Aerospace; Other transport equipment Scientific Instruments Electronics - communications
Services	Services
Digital & Creative Heavy and Civil Engineering Engineering, Surveying & Mapping Scientific Research and Testing ICT Services, Design and Publishing Telecommunications	Research and development Computers & related activities Post and telecommunications
Energy and Mining	
Mining – Extraction & Exploration Energy Generation & Transmission	
	Services not included in HVMS
	Finance & insurance Other business activities Water transport Air transport Real estate Renting of machinery & equipment & other Health and social work Education Recreational, cultural and sporting activities

Appendix 4 Top 5 export products by value for HVMS sub-sectors

Table 5. Top 5 export products by value for HVMS sub-sectors

HVMS subsector	Product class (SITC4 Rev. 2)	2010 Export Value (NZD)	RCA (2008)	% of subsector exports
Food & Beverage	Milk & cream, preserved, concentrated or sweetened	\$4,992,320,282	82.017	28%
	Meat of sheep and goats, fresh, chilled or frozen	\$2,352,900,899	189.563	13%
	Butter	\$1,871,908,277	95.772	10%
	Meat of bovine animals, fresh, chilled or frozen	\$1,665,378,328	19.808	9%
	Cheese and curd	\$1,239,799,835	20.345	7%
	Total	\$12,122,307,622		67%
Wood & Paper	Sawlogs and veneer logs, of coniferous species	\$1,148,510,991	37.736	33%
	Wood of coniferous species, sawn, planed, tongued et	\$833,095,185	11.591	24%
	Chemical wood pulp, soda or sulphate	\$357,517,595	4.998	10%
	Building board of wood pulp or of vegetable fibre	\$189,015,326	8.191	5%
	Kraft paper and paperboard, in rolls or sheets	\$138,671,277	4.253	4%
	Total	\$2,666,810,374		76%
Metal Materials	Aluminium and aluminium alloys ,unwrought	\$841,587,870	8.154	30%
	Gold, non-monetary	\$506,122,892	1.658	18%
	Silver, unwrought, unworked or semi-manufactured	\$171,703,411	0.005	6%
	Waste and scrap metal of iron or steel	\$152,338,122	1.477	5%
	Other non-ferrous base metal waste and scrap, n.e.s	\$142,105,895	1.684	5%
	Total	\$1,813,858,190		64%
Extraction	Petrol. oils & crude oils obt. from bituminous minerals	\$1,669,786,134	0.666	100%
	Petroleum gases and other gaseous hydrocarbons n.es	\$695,329	0.000	0%
	Total	\$1,670,481,463		100%
Textiles, Clothing & Footwear	Sheeps or lambswool, degreased ,in the mass	\$333,896,824	176.484	25%
	Leather of other bovine cattle and equine leather	\$173,128,888	4.380	13%
	Yarn of wool or animal hair (including wool tops)	\$80,324,141	8.793	6%
	Sheep & lamb skins without the wool, raw(fresh etc)	\$73,606,737	129.155	5%
	Carpets, carpeting ,rugs, mats & matting, of wool etc.	\$70,867,783	16.885	5%
	Total	\$731,824,372		54%
Basic Chemicals	Albuminoidal substances; glues	\$784,652,620	23.259	58%
	Organic surface-active agents, n.e.s.	\$73,126,466	1.058	5%
	Perfumery, cosmetics and toilet preparations	\$61,052,853	0.309	5%
	Polyethylene	\$60,117,564	0.247	4%
	Weed killers (herbicides)packed for sale etc.	\$56,815,387	2.035	4%
	Total	\$1,035,764,890		77%
Machinery and Equipment	Mach.& appliances for specialized particular ind.	\$104,087,067	0.272	10%
	Other non-electrical mach.amp parts	\$83,519,393	0.762	8%
	Engines & motors, n.e.s. such as water turbines etc.	\$78,720,812	2.279	7%
	Parts and accessories suit. for office/data-proc. mach.	\$73,097,770	0.171	7%

	Harvesting & threshing machinery and parts	\$63,831,847	1.349	6%
	Total	\$403,256,889		37%
Polymers	Ships, boats and other vessels	\$250,961,759	0.916	37%
	Art. for the conveyance or packing of goods	\$150,347,631	1.185	22%
	Miscellaneous art. of materials of div.58	\$128,819,154	0.753	19%
	Parts of heading 792 (aircraft etc.), excl. tyres, engines	\$55,293,604	0.254	8%
	Other parts & accessories of motor vehicles	\$53,907,656	0.076	8%
	Total	\$639,329,804		93%
Electrical Equipment & Appliances	Elect. app. such as switches, relays, fuses, pwgs etc.	\$155,057,788	0.422	23%
	Insulated, elect. wire, cable, bars, strip and the like	\$91,830,070	0.441	14%
	Household refrigerators and food freezers	\$76,676,248	1.569	11%
	Refrigerators & refr. equipment, ex. household, parts	\$68,213,021	1.117	10%
	Air conditioning mach. self-contained and parts	\$60,101,027	0.539	9%
	Total	\$451,878,155		67%
Scientific Instruments	Medical instruments and appliances	\$354,950,888	1.695	64%
	Jewellery of gold, silver or platinum	\$48,454,317	0.401	9%
	Electrical measuring, checking, analysing instruments	\$30,581,294	0.500	5%
	Surveying, hydrographic, compasses etc.	\$27,231,588	1.034	5%
	Orthopaedic appliances, surgical belts and the like	\$23,960,842	0.198	4%
	Total	\$485,178,929		87%
Electronic Equipment (ICT)	Other elect. machinery and equipment	\$143,854,682	0.498	34%
	Piezo-electric crystals, mounted, parts of 776-	\$79,914,167	0.973	19%
	Radiotelegraphic & radiotelephonic transmitters	\$62,637,568	0.249	15%
	Complete digital data processing machines	\$25,533,528	0.106	6%
	Telecommunications equipment	\$21,938,452	0.645	5%
	Total	\$333,878,396		79%
Pharmaceuticals	Medicaments(including veterinary medicaments)	\$154,121,601	0.206	52%
	Glycosides; glands or other organs & their extracts	\$70,005,253	0.468	24%
	Chemical products and preparations, n.e.s.	\$25,176,392	0.126	9%
	Hormones, natural or reproduced by synthesis	\$16,460,088	0.786	6%
	Provitamins & vitamins, natural or reprod. by synthesis	\$11,463,643	0.695	4%
	Total	\$277,226,978		94%
Motor Transport Equipment	Trailers & specially designed containers	\$55,727,339	0.927	25%
	Passenger motor cars, for transport of pass.& good	\$44,490,096	0.037	20%
	Electr. equip. for internal combustion engines, parts	\$25,659,139	0.284	12%
	Parts of int. comb. piston engines of 713.2-/713.8-	\$21,247,037	0.131	10%
	Parts of the pumps & liq .elevators of 742-	\$16,909,465	0.574	8%
	Total	\$164,033,075		75%
Other Transport Equipment	Aircraft exceeding an unladen weight of 15000 kg	\$49,008,228	0.677	26%
	Helicopters	\$43,824,079	1.499	23%
	Motor vehicles for transport of goods/materials	\$17,515,051	0.041	9%
	Childrens toys, indoor games, etc.	\$17,092,617	0.086	9%
	Parts, n.e.s. accessories for meters/measuring app.	\$15,270,552	0.447	8%
	Total	\$142,710,527		76%

Non-metal Materials	Lighting fixtures and fittings and parts	\$39,833,895	0.601	35%
	Manufactures of mineral materials, n.e.s.	\$14,074,951	0.499	12%
	Portland cement, aluminous cement, slag cement etc.	\$12,897,468	0.237	11%
	Quicklime, slaked lime and hydraulic lime	\$9,827,477	3.539	9%
	Electric insulating equipment	\$6,277,101	0.433	5%
	Total	\$82,910,892		73%
Printing	Printed matter, n.e.s.	\$51,821,691	0.562	55%
	Books, pamphlets, maps and globes, printed	\$21,895,731	0.454	23%
	Registers, exercise books, note books, etc.	\$14,742,065	1.113	16%
	Newspapers journals, periodicals	\$2,764,527	0.217	3%
	Picture postcards, greeting cards	\$2,559,411	0.373	3%
	Total	\$93,783,426		100%
Furniture and Other	Other furniture and parts	\$57,930,846	0.358	64%
	Chairs and other seats and parts	\$22,184,338	0.098	24%
	Coin(other than gold) not being legal tender	\$4,573,979	3.926	5%
	Pens, pencils and fountain pens	\$2,749,965	0.134	3%
	Aircraft, n.e.s. balloons, gliders etc and equipment	\$1,343,065	3.882	1%
	Total	\$88,782,193		97%
Petrol & Coal	Petroleum bitumen, petrol. coke & bitumin. mixtur.nes	\$26,182,935	0.016	60%
	Petroleum gases and other gaseous hydrocarbons	\$8,336,366	0.003	19%
	Constructn. mater. of asbestos-cement & fibre-cement	\$7,752,958	0.382	18%
	Lubricating petrol. oils & other heavy petrol .oils	\$1,382,055	0.058	3%
	Mineral tars and products of their distillation	\$94,280	0.002	0%
	Total	\$43,748,594		100%
Marine Transport Equipment	Tugs, special purpose vessels, floating structures	\$8,725,914	0.327	79%
	Warships of all kinds	\$2,388,728	2.465	21%
	Total	\$11,114,642		100%

Source: Data supplied by MSI

Appendix 5 Product Classes with Revealed Comparative Advantage

Table 6. Product classes with RCA>1 in HVMS industries

ANZISC96	SITC4 REV.2 Product Class Name	NZ RCA (2008)	2010 Export Value (NZD)
C211100	Meat of sheep and goats, fresh, chilled or frozen	189.563	\$2,352,900,899
C221100	Sheep or lambswool, degreased,in the mass	176.484	\$333,896,824
C226120	Sheep & lamb skins without the wool,raw (fresh etc)	129.155	\$73,606,737
C212900	Butter	95.772	\$1,871,908,277
C211200	Other fresh, chilled, frozen meat or edible offals	93.672	\$180,319,703
C212900	Milk & cream, preserved, concentrated or sweetened	82.017	\$4,992,320,282
C233100	Mechanical wood pulp	49.903	\$79,884,652
C211100	Bones, horns, ivory, hooves, claws, coral, shells etc.	38.622	\$39,807,190
C231100	Sawlogs and veneer logs, of coniferous species	37.736	\$1,148,510,991
C212100	Milk & cream, fresh, not concentrated or sweetened	27.008	\$771,969,360
C253500	Albuminoidal substances; glues	23.259	\$784,652,620
C212900	Cheese and curd	20.345	\$1,239,799,835
C211100	Meat of bovine animals, fresh, chilled or frozen	19.808	\$1,665,378,328
C226120	Sheep & lamb skins with wool on, raw (fresh, salted)	19.595	\$31,862,139
C211300	Animal oils, fats and greases, n.e.s	18.466	\$128,779,157
C215200	Malt extract; prep.of flour etc, for infant food	17.678	\$578,881,954
C222200	Carpets, carpeting, rugs, mats & matting, of wool etc.	16.885	\$70,867,783
C233100	Other cellulosic pulps	15.118	\$102,235,415
C211100	Flours, Meals & Pellets	14.383	\$135,717,157
C211100	Meat extracts and meat juices; fish extracts	13.017	\$13,685,176
C211100	Edible offals of animals in headings 001.1 -001.5	11.643	\$161,134,693
C231300	Wood of coniferous species,sawn, planed, tongued et	11.591	\$833,095,185
C221100	Sheeps/lambs wool/other animal hair, carded/combed	11.156	\$1,194,190
C226120	Calf skins, raw (fresh, salted, dried, pickled/limed	10.478	\$35,774,957
C218300	Wine of fresh grapes (including grape must)	10.137	\$937,963,839
C226120	Calfleather	10.029	\$0
C286100	Dairy machinery and parts	9.904	\$28,421,139
C217300	Fish, frozen (excluding fillets)	9.464	\$363,968,188
C221100	Yarn of wool or animal hair (including wool tops)	8.793	\$80,324,141
C232200	Building board of wood pulp or of vegetable fibre	8.191	\$189,015,326
C272200	Aluminium and aluminium alloys, unwrought	8.154	\$841,587,870
C217300	Crustaceans and molluscs, fresh, chilled, frozen etc	7.888	\$461,735,238
C226110	Sheep and lamb skin leather	7.803	\$23,283,415
C212900	Other sugars; sugar syrups; artificial honey; caramel	7.768	\$43,168,693
C253500	Tanning extracts of veget. origin; tan.& derivatives	7.598	\$7,035,151
C282400	Aircraft not exceeding an unladen weight 2000 kg	6.892	\$14,436,128
C271100	Slag, dross, scalings and similar waste, n.e.s.	6.629	\$7,601,465
C217300	Fish fillets, frozen	6.422	\$160,075,323
C226120	Hides and skins, n.e.s waste and used leather	6.361	\$3,685,161
C285100	Dish washing machines of household type	5.782	\$1,656,449

ANZISC96	SITC4 REV.2 Product Class Name	NZ RCA (2008)	2010 Export Value (NZD)
C213000	Vegetables, frozen or in temporary preservative	5.635	\$156,119,175
C211300	Edible products and preparations n.e.s.	5.033	\$576,492,841
C233100	Chemical wood pulp, soda or sulphate	4.998	\$357,517,595
C286900	Producer gas and water gas generators and parts	4.796	\$8,739,373
C211300	Meat& edib.offals, n.e.s.salt.in brine dried/smok.	4.570	\$432,110
C231100	Pitprops, poles, piling, posts & other wood in rough	4.543	\$16,158,092
C232100	Wood sawn lengthwise, sliced/peeled, but not prepar.	4.435	\$51,328,793
C226120	Leather of other bovine cattle and equine leather	4.380	\$173,128,888
C233100	Kraft paper and paperboard, in rolls or sheets	4.253	\$138,671,277
C294100	Coin(other than gold) not being legal tender	3.926	\$4,573,979
C226110	Furskins, tanned/dressed, pieces/cuttings of furskin	3.885	\$17,682,680
C294200	Aircraft, n.e.s. balloons, gliders etc and equipment	3.882	\$1,343,065
C263100	Quicklime, slaked lime and hydraulic lime	3.539	\$9,827,477
C284900	Cinematographic cameras, projectors, sound-rec, par	3.273	\$7,123,853
C273200	Lead and lead alloys, worked	3.240	\$35,339
C226120	Bovine & equine hides (other than calf),raw	3.172	\$21,748,114
C286300	Agric.mach.& appliances, n.e.s.and parts	3.134	\$63,444,883
C218300	Acyclic alcohols & their halogenated, derivatives	2.845	\$543,505
C211100	Fish,fresh(live/dead)or chilled,excl.fillet	2.844	\$119,153,901
C213000	Vegetables,dried,dehydrated or evaporated	2.843	\$15,334,124
C213000	Jams,fruit jellies, marmalades,fruit puree,cooked	2.704	\$43,161,363
C213000	Fruit,temporarily preserved	2.658	\$21,769,354
C211300	Other prepared or preserved meat or meat offals	2.577	\$118,003,240
C233100	Waste paper,paperboard;only for use paper-making	2.574	\$50,855,280
C232200	Improved wood and reconstituted wood	2.517	\$38,116,368
C282100	Warships of all kinds	2.465	\$2,388,728
C222900	Twine, cordage, ropes & cables. & manufactur. thereof	2.455	\$21,729,589
C217200	Sugar confectionery and other sugar preparations	2.392	\$55,209,279
C286900	Engines & motors,n.e.s.such as water turbines etc.	2.279	\$78,720,812
C214000	Fats and oils of fish and marine mammals	2.233	\$5,955,922
C212100	Chocolate & other food preptns. Containing cocoa	2.188	\$87,592,970
C255900	Baby carriages,and parts	2.177	\$311,707
C233900	Paper & paperboard,impregnat.coat.surface-coloure	2.125	\$128,956,360
C286900	Mach.for washing, cleaning,drying,bleaching text.	2.100	\$3,741,043
C216300	Bakery products (eg bread,biscuits,cakes) etc.	2.077	\$128,742,115
C254400	Weed killers (herbicides)packed for sale etc.	2.035	\$56,815,387
C254500	Felt & articl.of felt,nes,whether/not impregnated	2.007	\$9,412,137
C253500	Chemical products & flashlight materials	2.004	\$21,427,578
C226110	Leather of other hides or skins	1.962	\$17,470,425
C217300	Crustaceans and molluscs,prepared or preserved	1.957	\$58,482,949
C218100	Non alcoholic beverages,n.e.s.	1.923	\$91,632,913
C253300	Natural resins modified by fusion;artific.resins	1.895	\$10,151,915
C232300	Builderscarpentry and joinery	1.885	\$96,386,721
C217200	Food wastes and prepared animal feeds,n.e.s	1.828	\$89,199,429
C233100	Paper and paperboard,cut to size or shape,n.e.s.	1.778	\$43,637,028
C233900	Paper& paperboard,corrugated,crepedcrinkled etc	1.705	\$20,191,316
C283200	Medical instruments and appliances	1.695	\$354,950,888

ANZISC96	SITC4 REV.2 Product Class Name	NZ RCA (2008)	2010 Export Value (NZD)
C214000	Waxes of animal or vegetable origin	1.686	\$969,440
C272300	Other non-ferrous base metal waste and scrap,n.e.s	1.684	\$142,105,895
C273200	Gold,non-monetary	1.658	\$506,122,892
C233900	Writing blocks,envelopes,etc.correspondence card	1.626	\$8,878,276
C222100	Tarpaulins,sails,awnings,sunblinds,tents etc.	1.593	\$13,449,412
C226120	Goat & kid skins,raw (fresh,salted,dried,pickled)	1.571	\$0
C285100	Refrig hh,fd frz,e/o	1.569	\$76,676,248
C213000	Beans,peas,lentils & other leguminous vegetables	1.557	\$29,616,245
C232100	Plywood consisting of sheets of wood	1.544	\$56,804,522
C213000	Juices;fruit & veget.(incl.grape must) unfermented	1.522	\$46,085,588
C286900	Metal forming machine tools	1.512	\$54,144,107
C282400	Helicopters	1.499	\$43,824,079
C271200	Waste and scrap metal of iron or steel	1.477	\$152,338,122
C272300	Lead and lead alloys,unwrought	1.436	\$22,929,153
C221100	Waste of sheeps/lambs wool or of other anim.hair	1.411	\$62,999
C215100	Cereal grains,worked/prepared,(breakfast foods)	1.392	\$21,917,468
C215100	Other cereal meals and flours	1.362	\$6,036,195
C286100	Harvesting & treshing machinery and parts	1.349	\$63,831,847
C253400	Carboxylic acids with alcohol,phenol etc.function	1.345	\$22,747,197
C271100	Wire rod of iron or steel	1.295	\$21,109,222
C217300	Fish,prepared or preserved,n.e.s. including caviar	1.266	\$47,136,615
C211100	Meat of horses,asses,etc.,fresh,chilled,frozen	1.205	\$1,392,751
C286600	Other pumps for liquids & liquid elevators	1.204	\$32,338,380
C256600	Art.for the conveyance or packing of goods	1.185	\$150,347,631
C276900	Articles of iron or steel, n.e.s.	1.185	\$99,176,237
C254400	Insecticides packed for sale etc.	1.184	\$25,765,945
C275100	Steel & iron forgings & stampings,in rough state	1.167	\$23,012,138
C232900	Wood, simply shaped,n.e.s.	1.128	\$1,772,663
C285100	Refrigerators & refr.equipment,ex.household,parts	1.117	\$68,213,021
C241200	Registers,exercise books,note books,etc.	1.113	\$14,742,065
C226110	Fur clothing,articles made of furskins	1.110	\$3,817,001
C254600	Organic surface-active agents,n.e.s.	1.058	\$73,126,466
C286200	Mach.for sorting,screening,separating,washing ore	1.056	\$48,717,907
C283900	Surveying,hydrographic,compasses etc.	1.034	\$27,231,588
C213000	Vegetable products,roots & tubers,for human food	1.031	\$1,404,286
C276100	Other tools for use in the hand	1.016	\$14,341,792

Source: Data supplied by MSI