

Patterns of Innovation in Australian Businesses 2005



Patterns of Innovation in Australian Businesses

Australia

2005

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AUSTRALIAN BUREAU OF STATISTICS

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MAIN FEATURES

PATTERNS OF INNOVATION IN AUSTRALIAN BUSINESSES 2005

Main features

The proportion of businesses that undertook one or more of the three types of innovation (new goods or services, new operational process and new organisational processes) increased from around 30% of businesses in the 2002 to 2003 calendar year period to around 34% of businesses in the 2004 to 2005 calendar year period.

- Among the innovating businesses in Australia, about 22% of these businesses were involved in two or more forms of innovation activity. For businesses in this category, the majority undertook all three types of innovation.

The proportion of innovating businesses increased across all three types of innovation activities between the 2002 to 2003 and the 2004 to 2005 calendar years.

- The proportion of businesses that introduced or implemented goods or services and/or organisational processes innovation increased by about 6 percentage points since the 2002 to 2003 calendar years. There was around a 3 percentage point increase in the proportion of operational processes innovation and an increase in the proportion around 7 percentage points for businesses that undertook organisational processes innovation since the 2002 to 2003 calendar years.

The proportion of businesses that only undertook innovation by providing new goods and/or services in the 2004 to 2005 calendar years (19 percentage points) is lower than the proportions of businesses that only undertook operational processes innovation (22 percentage points) or only undertook organisational processes innovation (25 percentage points) in the same period. This result is consistent with the patterns of innovation measured in the 2002 to 2003 calendar years.

The proportions of innovation novelty for "New to the industry", "New to Australia" and "New to the world" have all declined since the 2002 to 2003 calendar years. Innovation novelty for "New to the business" increased by 13 percentage points since 2002 to 2003. This is an interesting development on which further detailed research may provide some key insights.

The proportion of innovation novelty in the 2004 to 2005 calendar years shows that when compared to the European Union, Australia has a relatively low proportion of businesses introducing or implementing innovations which are "New to the industry", "New to Australia" or "New to the world".

- The proportions of innovation novelty have declined between the two survey reference periods as follows: from 17% to 8% for "New to the industry", from 18% to 10% for "New to Australia" and from 11% to 8% for "New to the world".
- Novelty in "New organisational processes" innovation in the 2004 to 2005 calendar years was mainly concentrated in the "New to the business" category (about 94% of total businesses that introduced or implemented new organisational processes) and "New to the industry" innovation (about 5%). "New to Australia" and "New to the world" innovation novelty for "New organisational processes" were both less than 1%.

MAIN FEATURES *continued*

Main features continued

Innovation proportions at the State and Territory level

- During the 2004 to 2005 calendar years, South Australia and Western Australia recorded the highest proportions (about 40% and 37% respectively) of innovating businesses. Victoria and Queensland each represent around 34% of innovating businesses. All other States and Territories had around 30% of their businesses identified as innovating.

The proportion of turnover generated from new goods or services innovation

- For the 2004-05 financial year, about 65% of businesses introducing new or significantly improved goods or services generated "10% or less" of their turnover from these goods or services.
- Among all industries, the Mining and Property and Business services industries reported the largest proportion of turnover generated by innovation (about 11% and 10% respectively). The Electricity, gas and water supply, Construction, Retail trade and Communication services industries reported the lowest (about 4% each) proportions of turnover generated by innovation in the 2004-05 financial year. The overall turnover attributed to new goods or services in 2004-05 was about 7%.

Industry with the highest proportional increase in innovation

- The Accommodation, cafes and restaurants industry showed the highest proportional increase in innovation amongst all industries, increasing by around 13 percentage points since the 2002 to 2003 period to about 36% in 2004 to 2005 calendar years. All three types of innovation showed an increase since the 2002 to 2003 calendar years. Innovation in the Mining industry and the Wholesale trade industry each showed an increase of seven percentage points since the earlier period.

Age of the business under current ownership

- Results from the 2005 Innovation Survey show that the overall proportion of innovation activity varies significantly across business age categories and ranged between 31% (businesses under current ownership of "Nine years or more") and 38% (businesses under current ownership between "1 year to less than 4 years"). About 35% of businesses in the "Less than 1 year" category indicate that they have engaged in innovation activities, especially new organisational processes.

Business size, foreign ownership and innovation in the 2004 to 2005 calendar years

- For businesses with 250 or more employees, 58% were identified as innovators. The medium sized businesses ("20 to 49" and "50 to 99" employees) had 46% and 48% of businesses innovating respectively. For businesses with "5 to 9" employees, 25% were innovating, while 34% of businesses with "10 to 19" employees were innovating.
- "New to the business" innovation in goods or services was the largest among other innovation novelties (ranging between 60% and 80%) in all business sizes. Businesses in the "5 to 9" employees category and the "250+" employees category showed similar proportions in each innovation novelty especially "New to the world" and "New to Australia".
- The proportion of innovating businesses in the "Greater than 50%" foreign ownership category has declined since the 2002 to 2003 calendar years.

CHAPTER 1 INTRODUCTION

CHAPTER 1

This paper provides an overview of the main patterns of innovation and characteristics of innovating businesses using data from the 2003 and 2005 ABS Innovation Surveys. It provides additional tables providing greater details of possible analytical interest compared to those published in *Innovation in Australian Businesses, 2005 (ABS Cat. No. 8158.0)*¹. It also compares the latest data with some of the results contained in an earlier study (which used 2003 Innovation Survey data) jointly published by the ABS and the Department of Industry, Tourism and Resources (DITR). This study was published in January 2006 (*ABS Cat. No. 8163.0*).

The reference period for the 2003 Innovation Survey was the three calendar years 2001 to 2003. In contrast, in the 2005 survey the reference period is the two calendar years 2004 to 2005. For purposes of comparability, this study uses modelled estimates of innovation proportions from the 2003 survey based on the calendar years 2002 to 2003. The modelled estimates have only been used at aggregated levels and as a result, the comparisons are carried out for broad categories of innovation.

This publication presents innovation estimates that relate to innovating businesses, that is, it excludes innovation that has been abandoned by the business or is classed as being incomplete during the reference period. The reason for this approach is that it allows for direct comparison between innovation estimates derived from the 2005 Innovation Survey and the 2003 Innovation Survey, where abandoned or incomplete innovation was not collected.

The number of businesses estimated as being in scope of the ABS Innovation Survey 2005 at 31 December 2005 was approximately 141,300. This compares to around 135,800 businesses estimated as being in scope of the 2003 Innovation Survey. Estimates relating to the number of counts of businesses can be derived from many sources within the ABS. As a result, care should be taken when using the estimates to take account of changes in scope and coverage between different surveys and variations which may be due to sampling and non-sampling error.

In 2002, the ABS with strong support from government departments, made the decision to conduct a broad based innovation survey. An Innovation Technical Reference Group involving government agencies with a policy interest in innovation and users of innovation data was established in 2003 to assist the ABS develop the conceptual framework, scope, coverage and potential analytical uses of the innovation survey. The 2003 Innovation Survey was the result of this effort. This survey was the first broad innovation survey conducted by the ABS.

The ABS conducted another innovation survey in 2005. This survey was largely based on the content of the 2003 survey, but introduced some improvements to the design of the questionnaire to improve the reliability of the estimates and lessen provider load. Following on from the 2005 survey, the ABS is now collecting biennial business innovation data using the ABS Business Characteristics Survey (BCS) which combines a range of business characteristics data. In addition, the BCS is an important source of data for the ABS Business Longitudinal Database (BLD) and the BLD will provide users with the ability to conduct longitudinal analyses of business innovation along with other business characteristics. The BCS 2006-07 will be the first time that detailed innovation data is collected from this vehicle and outputs from this survey are expected to be released progressively from mid 2008.

CHAPTER 2 INNOVATION IN AUSTRALIAN INDUSTRY

CHAPTER 2

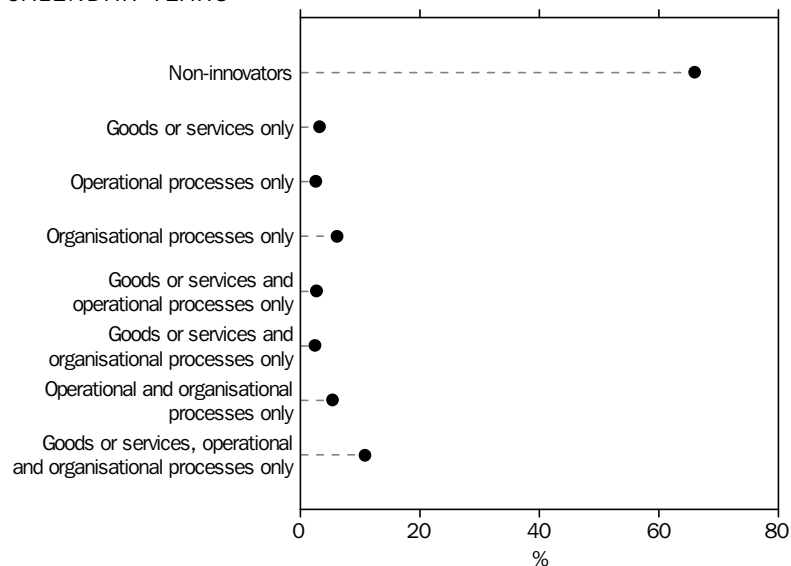
The ABS survey identifies three main categories of innovation in Australian industry:

- The introduction of any new or significantly improved goods or services. Examples are: a change in materials such as a breathable textile material and the introduction of a telephone or internet bill payment system.
- The introduction of new operational processes (the methods of producing or delivering goods or services). Examples are: the digitalisation of printing processes and the introduction of an automated ticketing system.
- The implementation of new organisational/managerial process (meaning strategies, structures or routines that aim to improve business performance). Examples are: changed corporate directions and significant workplace reorganisation.

Businesses were considered as "Innovators" if they had introduced or implemented at least one of the above types of innovation at any time during the calendar years 2004 to 2005. Any business included in the survey could report more than one type of innovation.

Figure 1 illustrates how the businesses are distributed across the innovation categories. During 2004 to 2005, about 66% of businesses have been identified as non-innovators. The total number of innovating businesses is estimated to be approximately 48,000 (or about 34% of all businesses). Amongst innovating businesses, about 22% were involved in two or more types of innovative activity. The businesses involved in innovation across all three types (ie new goods or services, new operational process or new organisational processes) had the highest innovation proportion amongst all innovating businesses.

FIGURE 1: EXTENT AND TYPE OF INNOVATION - 2004 TO 2005 CALENDAR YEARS



The results of the 2005 Innovation Survey show that about 34% of Australian businesses undertook one or more of the main types of innovation (see Figure 2) during the 2004 to 2005 calendar years. In contrast, this was about 30% in 2002 to 2003. In the 2004 to 2005 calendar years, approximately 19% of businesses undertook goods or services innovation. For the same period, around 22% of businesses undertook operational processes innovation and about 25% of businesses undertook organisational processes innovation. Both goods or services innovation and organisational processes innovation

showed about a 6 percentage point increase since the 2002 to 2003 reference period. The proportion of businesses undertaking operational processes innovation increased by about 3 percentage points since the 2002 to 2003 period.

FIGURE 2: PROPORTION OF INNOVATING BUSINESSES IN AUSTRALIA, by Type of Innovation - 2002 to 2003 and 2004 to 2005 Calendar Years

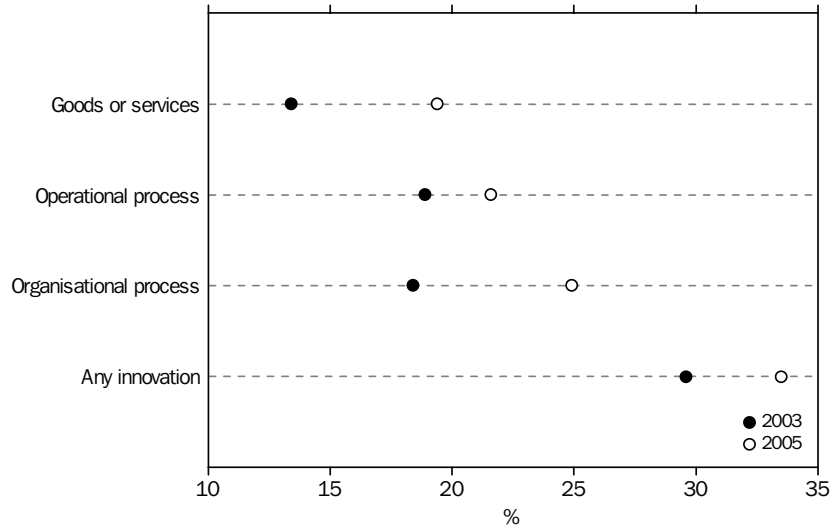


Table 1 summarises the total estimated businesses and the proportions of innovating businesses in each State and Territory. South Australia recorded the highest proportion (about 40%) of innovating businesses out of 9,100 estimated total businesses in scope of the Innovation Survey. Western Australia had the second highest proportion (about 37%) of innovating businesses. Out of the 49,600 estimated businesses in New South Wales, around 31% were innovators. The proportion of innovation amongst Victorian and Queensland businesses was about 34% each. Tasmania, Northern Territory and the Australian Capital Territory all had around 30% of total businesses innovating.

TABLE 1: INNOVATION IN AUSTRALIAN BUSINESSES (a), by State/Territory—2004 to 2005 (b)

.....

State/Territory	Total estimated businesses	Proportion of businesses that innovated
	no.	%
NSW	49 600	31
Vic	35 800	34
Qld	26 400	34
SA	9 100	^ 40
WA	14 000	37
Tas	2 700	^ 30
NT	1 300	^ 32
ACT	2 400	^ 28
Total	141 300	34

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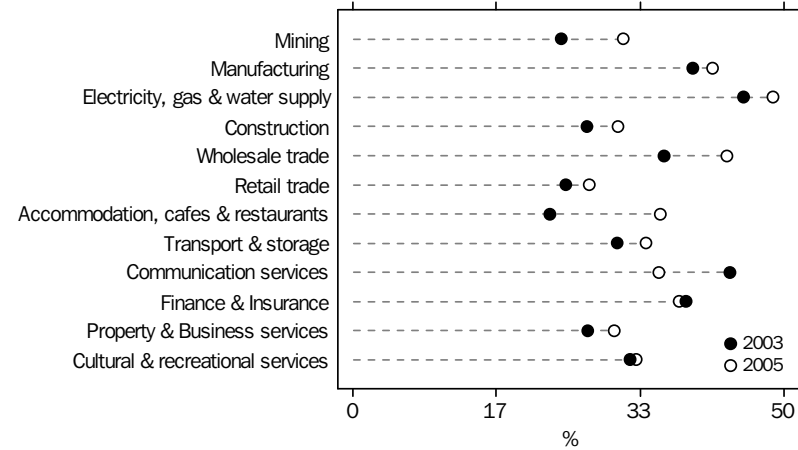
^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Total number of estimated businesses is rounded to the nearest 100

(b) Calendar years

Figure 3 shows the distribution of innovation activity across Australian industries between the 2002 to 2003 calendar years and the 2004 to 2005 calendar years. The ANZSIC divisions for Electricity, gas and water supply (49%), Wholesale trade (43%) and Manufacturing (42%) were the leading industries in terms of innovating businesses in the 2004 to 2005 calendar years. The Retail trade industry (27%) showed the lowest percentage amongst innovating businesses.

FIGURE 3: PROPORTION OF INNOVATING BUSINESSES, by ANZSIC Division-2002 to 2003 and 2004 to 2005 Calendar Years



Innovation amongst businesses in the Accommodation, cafes and restaurants industry exhibited the highest increase in the proportion of innovation (13 percentage points) since the 2002 to 2003 calendar years.

The innovation proportion for the Mining and Wholesale trade industries showed an increase of seven percentage points each since the 2002 to 2003 calendar years. The growth in the incidence of innovation in Wholesale trade is mainly due to its innovation in operational and organisational processes. Innovation in the Communication and Finance and insurance industries has decreased by eight and one percentage points respectively during the 2004 to 2005 calendar years.

Table 2 summarises the proportions of innovating businesses by ANZSIC divisions for a selected number of States. Tasmania, the Northern Territory and the Australian Capital Territory have been excluded from Table 2 to preserve confidentiality.

The breakdown of innovating businesses by State and industry division results in the majority of estimates having RSEs greater than 10%. As a result, the estimates should be used with caution. The manufacturing industry has a relatively large number of businesses in each State and around 40% of these businesses have been identified as innovative. The proportion of innovating businesses in the construction industry was 38% in Victoria, 35% in Queensland and 39% in South Australia. In terms of the Accommodation, cafes and restaurants industry division, Queensland recorded the highest proportion (about 50%) of businesses classed as innovative in this industry. The Transport and Storage industry division also identified around 56% of businesses in this division in Queensland as being innovative.

TABLE 2: PROPORTION OF INNOVATING BUSINESSES, by ANZSIC Division in Selected States—2004 to 2005(a)

	NSW	Vic	Qld	SA	WA
	%	%	%	%	%
Industry					
Mining	^ 27	* 48	^ 37	* 38	^ 26
Manufacturing	42	43	38	42	^ 47
Electricity, gas & water supply	^ 47	^ 45	^ 59	^ 55	^ 43
Construction	^ 20	^ 38	^ 35	* 39	^ 30
Wholesale trade	^ 41	^ 48	^ 45	* 50	^ 31
Retail trade	^ 23	^ 40	^ 13	* 32	* 41
Accommodation, cafes & restaurants	^ 28	^ 33	^ 50	* 38	^ 38
Transport & storage	^ 35	^ 22	^ 56	^ 27	^ 23
Communication services	^ 36	^ 39	^ 21	* 27	^ 43
Finance & Insurance	^ 38	^ 38	^ 36	* 52	^ 36
Property & Business services	^ 32	^ 20	^ 37	* 47	^ 37
Cultural & Recreational services	^ 28	^ 35	^ 35	* 40	^ 27
Total	31	34	34	^ 40	37

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Calendar years

2.1. Type of innovation

Table 3 shows the proportions of innovating businesses by types of innovation across all ANZSIC divisions. The majority of industry divisions, except the Communication services division, indicated that they were innovating most in organisational process innovation compared to the other two types of innovation. Among those industry divisions who were innovating in organisational processes, the Electricity, gas and water supply division exhibited the highest proportion of innovation (41%). The Communication services industry division was the only division that showed a higher proportion of innovating businesses that were producing new goods or services compared to the other two types of innovation.

TABLE 3: PROPORTION OF INNOVATING BUSINESSES BY TYPE OF INNOVATION AND INDUSTRY(a)—2004 to 2005(b)

	<i>Goods or services</i>	<i>Operational process</i>	<i>Organisational process</i>
	%	%	%
Mining	11	18	22
Manufacturing	27	27	28
Electricity, gas & water supply	23	32	41
Construction	16	22	26
Wholesale trade	26	26	33
Retail trade	16	15	19
Accommodation, cafes & restaurants	24	25	28
Transport & storage	18	25	27
Communication services	29	25	27
Finance & Insurance	19	26	31
Property & Business services	16	20	23
Cultural & Recreational services	18	19	26
Total	19	22	25

(a) Industry refers to ANZSIC division

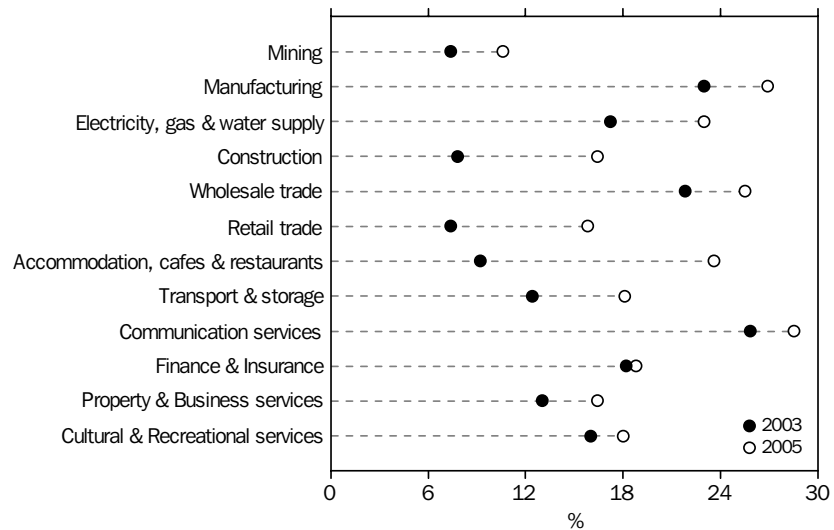
(b) Calendar years

2.1. Type of innovation
continued

Figure 4 illustrates the proportions of innovating businesses producing new goods or services across industry divisions. In the 2004 to 2005 calendar years, the Mining industry showed the lowest proportion (about 11%) when compared to other industry divisions producing new goods or services. However, this figure has increased by 3 percentage points since the 2002 to 2003 calendar years. The Communication Services industry division showed the highest proportion (about 29%) when compared to other industry divisions in the production of new goods or services. This was followed by the Manufacturing industry (about 27%), Wholesale trade (about 26%), Accommodation, cafes and restaurants (about 24%) and Electricity, gas and water supply services (23%).

The 2004 to 2005 calendar year data shows that all industry divisions increased their proportions of innovation for new goods or services since the 2002 to 2003 calendar years. In terms of the proportions of innovation among all industry divisions, Accommodation, cafes and restaurants recorded the highest increase since the 2002 to 2003 period (about 15 percentage points). The Construction and Retail trade industry divisions increased by eight and nine percentage points respectively. The Finance and insurance industry division exhibited the lowest percentage increase since 2002 to 2003, which was about one percentage point. A chi-square test result indicated that type of industry may have an influence on the goods or services innovation (see Appendix 2, Table A1).

FIGURE 4: PROPORTION OF BUSINESSES UNDERTAKING NEW GOODS OR SERVICES INNOVATION, by ANZSIC Division-2003 to 2003 and 2004 to 2005 Calendar Years



2.1. Type of innovation
continued

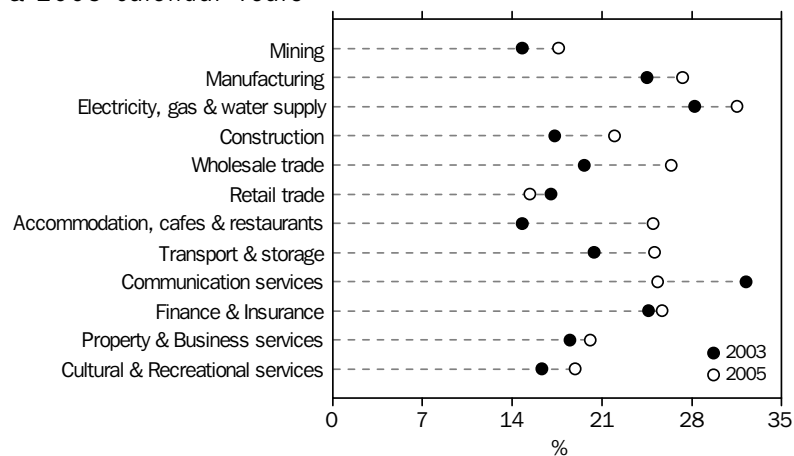
The proportions of businesses undertaking operational process innovation across ANZSIC divisions are shown below in Figure 5. The lowest proportion for this type of innovation occurs for the Retail trade industry (15%) in the 2004 to 2005 calendar years. In the 2002 to 2003 calendar years, the proportion of innovation was two percentage points higher at 17%.

The Electricity, gas and water supply industry division showed the highest proportional increase in operational process innovation (32%) in the 2004 to 2005 calendar years. The average proportion of innovation for operational processes across all ANZSIC divisions was about 23%. The following industry divisions recorded innovation proportions above the all industry average for operational process innovation in the 2004 to 2005 calendar years: Manufacturing (27%); Wholesale trade and Finance and insurance (26% each); Accommodation, cafes and restaurants, Transport and storage, and Communication services (25% each).

Interestingly, the Communication services industry division exhibited a seven percentage point reduction in operational process innovation since the 2002 to 2003 calendar years. In addition, the Retail trade industry showed a two percentage point reduction since the previous period. The eight percentage point decline in the overall innovation proportion for the Communication services industry division (previously shown in Figure 3) can be attributed to the decline in operational process innovation for this industry division.

The Accommodation, cafes and restaurants and the Wholesale trade industry divisions recorded the largest increase in operational process innovation (about ten and seven percentage points respectively) since the 2002 to 2003 calendar years.

FIGURE 5: PROPORTION OF BUSINESSES UNDERTAKING OPERATIONAL PROCESS INNOVATION, by ANZSIC Division-2002 to 2003 and 2004 & 2005 calendar Years

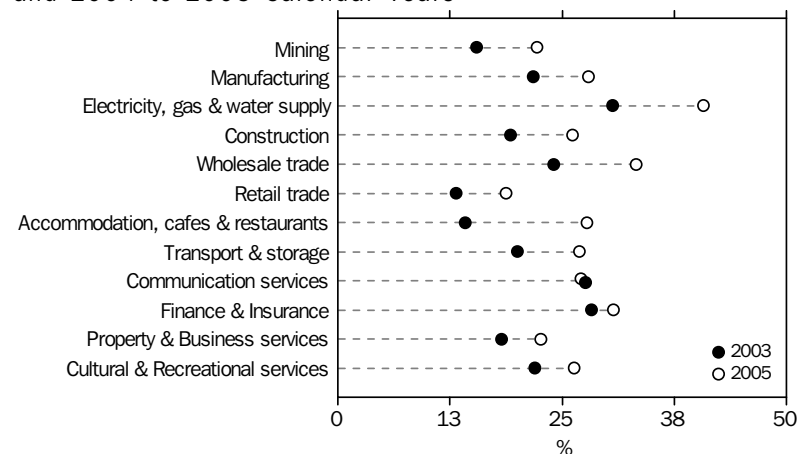


2.1. Type of innovation
continued

Figure 6 shows the proportion of businesses undertaking organisational innovation by ANZSIC division. When examining all industry divisions, Electricity, gas and water supply showed the largest proportion of businesses undertaking organisational innovation (about 41%), while the Retail trade industry showed the lowest proportion of businesses (about 19%). The average proportion of innovation for organisational innovation across all industries was about 25%.

The majority of industry divisions, except Communication services, showed an increase in the proportion of businesses undertaking organisational innovation compared to the 2002 to 2003 calendar years. The Accommodation, cafes and restaurants industry division had the largest increase in organisational innovation (about 14 percentage points) followed by Electricity, gas and water supply (about ten percentage points) and Wholesale trade (about nine percentage points). A chi-square test result indicated that type of industry may have influenced organisational innovation (see Appendix 2. Table A1).

FIGURE 6: PROPORTION OF BUSINESSES UNDERTAKING ORGANISATIONAL INNOVATION, by ANZSIC Division-2002 to 2003 and 2004 to 2005 Calendar Years



2.2. Innovation novelty

This section investigates the degree of innovation novelty amongst Australian businesses classed as innovators, in order to understand how competitive these businesses are in the marketplace.

The four types of innovation novelty measured by the ABS Innovation Survey 2005 are innovations that are:

- New to the business
- New to the industry
- New to Australia
- New to the world.

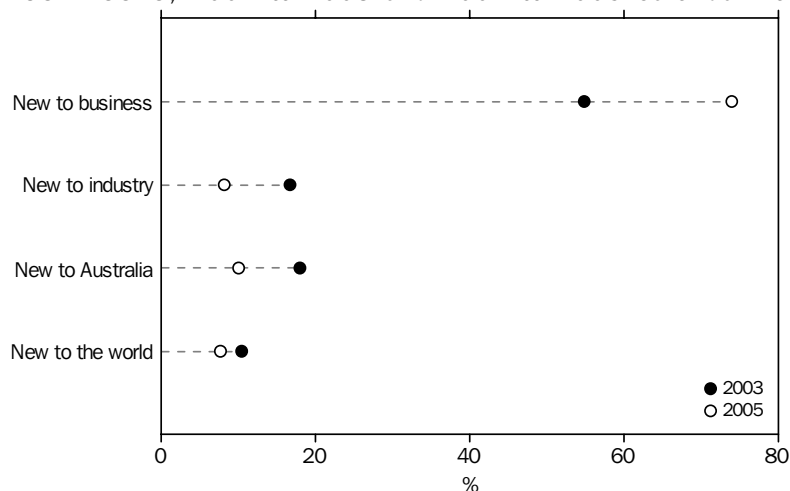
The concept of innovation measured in the ABS Innovation Survey focuses primarily on new or significantly improved goods or services, operational and/or organisational processes that have been developed or put in place by the business. This means that innovators are not necessarily engaged in the development of new to the world goods or services, or operational/organisational processes. The businesses identified as innovators may be reproducing goods that are already in the marketplace, perhaps using off the shelf technology inputs or making small incremental improvements in their goods or

2.2. Innovation novelty
continued

services. Alternatively they may be implementing well-understood forms of operational or organisational change adopted by other businesses. Therefore, innovation is used in the broad sense to capture a range of activities including technology diffusion and small-scale incremental changes. As a result, the proportion of innovators provides a basic indicator of how many businesses are innovating, but it does not capture the complexity of novelty of the innovation introduced. However, distinctions between the degrees of novelty can be made when analysing goods or services innovation, operational process innovation and organisational innovation in the 2005 survey. Businesses were asked to distinguish between new goods or services innovation that was "New to the business", "New to the industry", "New to Australia" or "New to the world". In this analysis, to avoid multiple counting only the highest degree of novelty reported is considered, rather than each individual business' response to innovation novelty.

Figure 7 shows the degree of novelty of innovation in goods or services in the two Innovation Survey reference periods, 2002 to 2003 and the 2004 to 2005 calendar years. Goods or services innovation that was identified as being "New to the business" showed a very high proportion (about 74%) compared to the other three categories of innovation novelty in the 2004 to 2005 calendar year period. It is also about 19 percentage points higher than the proportion in the 2002 to 2003 calendar year period.

FIGURE 7: NOVELTY OF GOODS OR SERVICES INNOVATION FOR BUSINESSES, 2002 to 2003 and 2004 to 2005 Calendar Years



In the 2002 to 2003 calendar years, the proportion of businesses each introducing or implementing "New to the industry", "New to Australia" and "New to the world" goods or services innovation was over 10%. In the 2004 to 2005 calendar years, these three categories recorded proportions of businesses innovating at 10% or below (about 8%, 10% and 8% respectively).

The total number of estimated businesses under these novelty types has decreased over the two Innovation Surveys. In the 2004 to 2005 calendar years, the total number of estimated businesses introducing or implementing "New to the industry" goods or services innovation was about 2,300 businesses compared to 3,100 businesses in the 2002 to 2003 calendar years. A similar drop was seen in "New to Australia" novelty innovation. In the 2004 to 2005 calendar years, the total number of estimated businesses

2.2. Innovation novelty *continued*

introducing or implementing new goods or services innovation that was "New to Australia" was about 2,800. In the 2002 to 2003 calendar years, it was about 3,300. The total number of estimated businesses in the "New to the world" category has slightly increased in the 2004 to 2005 calendar years to 2,100 businesses. This compares with around 2,000 businesses in the 2002 to 2003 period.

Table 4 shows the novelty of goods or services innovation occurring across ANZSIC divisions. All divisions showed more than 50% of businesses introducing new goods and services innovation with highest degree of novelty being "New to the business". The Wholesale trade division reported a negligible proportion (less than 1%) of businesses introducing goods and services innovation categorised as "New to the industry". However, the same division showed the highest proportion (about 23%) of businesses introducing goods or services innovation categorised as "New to Australia". The Construction, Retail trade and Transport and storage divisions also recorded negligible proportions of businesses (less than 1%) introducing or implementing goods or services innovation categorised as "New to the world" in the 2004 to 2005 calendar years. The Manufacturing and Property and business services divisions showed the highest proportions (about 14% each) of goods or services innovation categorised as "New to the world" goods or services. A chi-square test result indicated that type of industry may have an influence on the degree of novelty in goods or services (see Appendix 2, Table A1).

CHAPTER 2 INNOVATION IN AUSTRALIAN INDUSTRY *continued*

2.2. Innovation novelty *continued*

TABLE 4: NOVELTY OF GOODS OR SERVICES INNOVATION FOR BUSINESSES BY INDUSTRY(a)—2002 to 2003 and 2004 to 2005(b)

	<i>New to business</i>	<i>New to industry</i>	<i>New to Australia</i>	<i>New to the world</i>
	%	%	%	%
2004 TO 2005				
Mining	*66	^ 13	*16	5
Manufacturing	64	8	14	14
Electricity, gas & water supply	83	5	7	5
Construction	^ 89	4	7	—
Wholesale trade	^ 67	—	^ 23	10
Retail trade	^ 78	^ 15	^ 7	—
Accommodation, cafes & restaurants	^ 85	^ 9	3	3
Transport & storage	^ 81	^ 11	8	—
Communication services	^ 53	^ 20	^ 20	7
Finance & Insurance	^ 74	9	11	6
Property & Business services	^ 72	7	7	^ 14
Cultural & Recreational services	^ 67	^ 13	^ 12	^ 8
<i>Total</i>	74	8	10	8
2002 TO 2003				
Mining	*47	7	*33	^ 13
Manufacturing	51	16	18	15
Electricity, gas & water supply	38	30	14	18
Construction	*54	*22	^ 23	1
Wholesale trade	^ 51	14	^ 21	^ 14
Retail trade	*56	^ 20	*24	—
Accommodation, cafes & restaurants	*66	*28	6	—
Transport & storage	^ 71	^ 16	3	^ 10
Communication services	^ 22	^ 20	^ 32	^ 26
Finance & Insurance	^ 47	^ 28	^ 17	^ 8
Property & Business services	^ 58	10	^ 18	^ 14
Cultural & Recreational services	^ 59	^ 20	^ 13	8
<i>Total</i>	55	16	18	11

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Industry refers to ANZSIC division

(b) Calendar years

All divisions showed an increase in the proportion of "New to the business" innovation for goods or services over the 2004 to 2005 period compared with the proportions for the 2002 to 2003 period. The most significant divisions were Electricity, gas and water supply and the Communications industry, which showed an increase in their proportions by more than double between the two survey reference periods (Table 4). In terms of "New to the industry" innovation proportions, both Electricity, gas and water supply and the Construction divisions dropped by about six times since the 2002 to 2003 calendar years, while it was about three times for the Finance and insurance services division. The Mining, Electricity, gas and water supply, Transport and storage and Communication

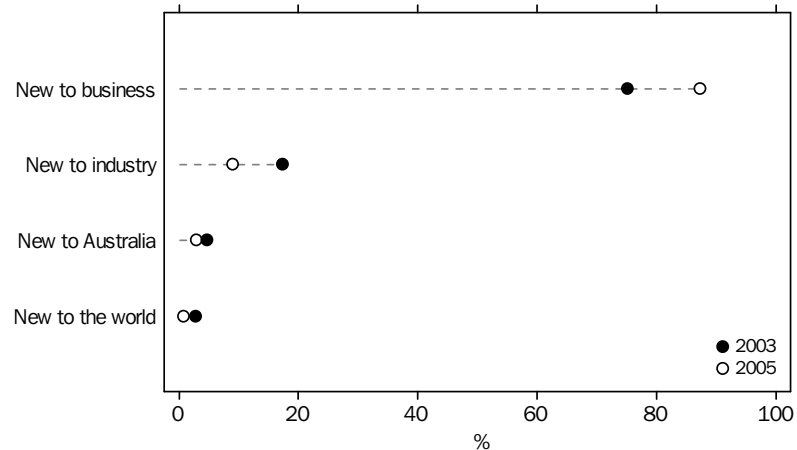
2.2. Innovation novelty
continued

services divisions were the most significant groups which showed more than double in the drop of proportions in "New to the world" goods or services innovation (Table 4).

Similar to the novelty in goods or services innovation, operational processes also exhibited a significantly high proportion (87%) of "New to the business" innovation during the 2004 to 2005 period (see Figure 8). The total number of estimated businesses introducing or implementing "New to the business" operational processes innovation was about 26,700 businesses in the 2004 to 2005 calendar years. In contrast, this estimate was about 19,400 businesses in the 2002 to 2003 period.

Unlike novelty in goods or services innovation, operational processes innovation showed very few businesses (about 1%) introducing "New to the world" processes. The total number of estimated businesses introducing or implementing "New to the world" operational processes innovation was about 700 in the 2002 to 2003 calendar years and only about 200 in the 2004 to 2005 period. A similar trend was seen in the "New to industry" operational process category (estimated total businesses around 4,500 in the 2002 to 2003 period and about 2,700 businesses in the 2004 to 2005 period) and the "New to Australia" operational process category (estimated total businesses around 1,200 in the 2002 to 2003 period and about 1,000 businesses in the 2004 to 2005 period).

FIGURE 8: NOVELTY OF OPERATIONAL PROCESSES INNOVATION FOR BUSINESSES, 2002 to 2003 and 2004 to 2005 Calendar Years



CHAPTER 2 INNOVATION IN AUSTRALIAN INDUSTRY *continued*

2.2. Innovation novelty *continued*

Novelty in operational processes innovation for 2004 to 2005 also showed very high proportions (over 70%) of "New to the business" processes across all industry divisions. The Construction, Retail trade and Accommodation, cafes and restaurants divisions had none or few (less than 1%) businesses innovating in operational processes innovation that was "New to Australia". The Mining industry division had the highest proportion (about 8%) of businesses involved in "New to the world" operational processes innovation, perhaps reflecting Australia's comparative advantage in mining activities.

TABLE 5: NOVELTY OF OPERATIONAL PROCESS INNOVATION FOR BUSINESSES BY INDUSTRY(a)—2002 to 2003 and 2004 to 2005(b)

	<i>New to business</i>	<i>New to industry</i>	<i>New to Australia</i>	<i>New to the world</i>
	%	%	%	%
2004 TO 2005				
Mining	^ 71	^ 13	8	8
Manufacturing	84	6	8	2
Electricity, gas & water supply	74	14	12	—
Construction	^ 84	^ 16	—	—
Wholesale trade	89	6	5	—
Retail trade	^ 86	^ 14	—	—
Accommodation, cafes & restaurants	94	6	—	—
Transport & storage	^ 85	8	3	4
Communication services	87	8	4	1
Finance & Insurance	88	4	6	2
Property & Business services	90	9	1	—
Cultural & Recreational services	^ 87	6	^ 7	—
<i>Total</i>	87	9	3	1
2002 TO 2003				
Mining	^ 68	11	^ 19	2
Manufacturing	74	13	9	4
Electricity, gas & water supply	75	10	8	7
Construction	^ 68	^ 32	—	—
Wholesale trade	^ 81	^ 13	6	—
Retail trade	^ 78	^ 16	6	—
Accommodation, cafes & restaurants	^ 78	^ 18	4	—
Transport & storage	88	7	2	3
Communication services	^ 65	^ 17	8	^ 10
Finance & Insurance	^ 71	^ 24	3	2
Property & Business services	^ 70	^ 20	3	7
Cultural & Recreational services	^ 87	6	3	4
<i>Total</i>	75	17	5	3

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Industry refers to ANZSIC division

(b) Calendar years

2.2. Innovation novelty continued

Apart from the Electricity, gas and water supply division, all other divisions have increased their proportion of operational process innovation categorised as "New to the business" since the 2002 to 2003 calendar years. However, the increases were not relatively large when compared to some other industry divisions for goods or services innovation (Table 5). The Electricity, gas and water supply division showed a slight decrease from the 2002 to 2003 period when compared to the 2004 to 2005 period (about 75% and 74% respectively). Similar to the goods or services innovations, operational process innovation also showed a decrease in the "New to world" innovation since the 2002 to 2003 period. Only the Mining and Transport and storage industry divisions have increased (about six and one percentage points respectively).

The total number of estimated businesses introducing or implementing new organisational processes in the 2004 to 2005 calendar years was about 35,100 businesses. The novelty in organisational processes innovation in the 2004 to 2005 period was mainly concentrated in the "New to the business" category (about 94% of total businesses introducing or implementing new organisational processes) and "New to industry" (about 5%). "New to Australia" and "New to the world" novelty were each less than 1%.

Innovation novelty data shows that Australia has relatively low proportions in introducing or implementing innovations which are categorised as "New to Australia" or "New to the world". The Department of Industry, Tourism and Resources (2006) found that companies that collaborated in innovation with other businesses or entities had a much greater chance of achieving a "New to the world" degree of novelty.

2.3. Share of Turnover from New Goods or Services Innovation

This section examines the contribution of innovation activity in terms of turnover for businesses. The Innovation Survey 2005 asked businesses to report the proportion of total turnover that arises from new products (i.e. not including products that were unchanged or products that had been changed in minor ways). This indicator provides data that facilitates the comparison of innovative performance across businesses and industries. It also reflects the scale of goods and service replacement over the period covered, providing some indication of technological renewal and upgrading, in value terms. Comparison with 2002-2003 turnover data was not possible due to the unreliability of the data for this period.

2.3. Share of Turnover
from New Goods or
Services Innovation
continued

Table 6 shows how the proportion of turnover attributed to new goods or services innovation varies across industry divisions. A higher proportion (over 40%) of businesses in all industry divisions reported turnover attributed to goods or services innovation "10% or less". The turnover "Greater than 10 to 25%" category ranged between 11% (in Construction and Electricity, gas and water supply) to 34% (Accommodation, cafes and restaurants). The Property and business services industry division recorded the highest proportion for the "Greater than 50%" turnover category (about 17%) while the Mining industry division recorded the lowest (0%). The remaining industry divisions reported 10% or less for this turnover category.

The overall turnover attributed to new goods or services innovation in 2004-05 was about 7%, which is below the average value for the European Union members (EU-27) in 2004 which was about 8.6% (Eurostat (b), 2007).

TABLE 6: PROPORTION OF BUSINESSES (a), by Degree of Turnover Attributed to New Goods or Services Innovation by Industry(b)—2004-05(c)

	Less than 10%	Between 10% and 25%	Between 25% and 50%	Greater than 50%
	%	%	%	%
Mining	*61	^ 14	*25	—
Manufacturing	56	29	10	5
Electricity, gas & water supply	^ 84	11	—	5
Construction	^ 83	^ 11	—	6
Wholesale trade	^ 78	^ 14	5	3
Retail trade	^ 82	^ 14	—	4
Accommodation, cafes & restaurants	^ 54	^ 34	6	6
Transport & storage	^ 63	^ 18	^ 12	^ 7
Communication services	^ 55	^ 29	13	3
Finance & Insurance	^ 80	^ 17	1	2
Property & Business services	^ 48	^ 25	9	^ 17
Cultural & Recreational services	^ 61	^ 23	5	^ 10
Total	65	22	6	7

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Proportion related to Innovating Businesses Only

(b) Industry refers to ANZSIC division

(c) Financial year

CHAPTER 3

The 2005 Innovation Survey asks a range of questions related to business characteristics. This chapter examines innovation according to businesses' employment size, ownership structure and length of business operation.

3.1. Business size

As outlined in Appendix 1 - Methodology, the employment classes used in this study are defined according to the following ranges:

- 5-19 employees as "small" businesses
- 20-99 employees as "medium" businesses
- 100 or more as "large" businesses.

About 73% of all businesses (both innovative and non-innovative) were classed as small businesses according to the above classification. Medium sized businesses comprised about 23% and large businesses were about 4% of the businesses surveyed in the 2004 to 2005 period.

For the purpose of this study, business employment size data have been classified into six categories providing a more detailed picture of the differences between the groups. It should be noted that in the "Patterns of Innovation in Australian Businesses 2003" publication, businesses with less than five employees had been included in the business size category "5-9" employees even though the survey was designed to exclude micro-businesses (businesses with employees less than five). A decision was made to include these businesses as they were few in number. For the purpose of comparison with the 2003 publication, this study adopts the same approach, where businesses reporting less than five employees are included in the category "5-9" employees.

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

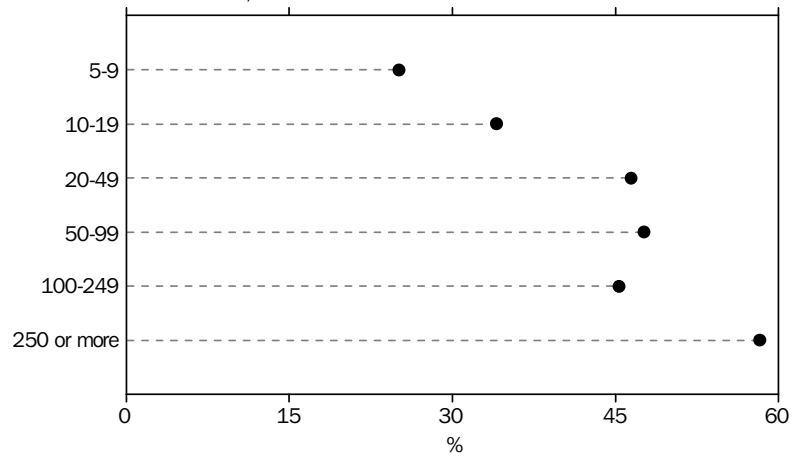
continued

3.1. Business size

continued

In the 2004 to 2005 period (Figure 9), the "100 to 249" employment size group showed a lower proportion when compared to the "20 to 49" and "50 to 99" groups identified in the previous survey. In the 2002 to 2003 calendar year period, an approximate linear relationship was identified between business size and innovation. A chi-square test result indicated that the employment size may have an influence on innovation activity of a business (see Appendix 2, Table A1). It is worth noting that the DITR "Collaboration and Other Factors Influencing Innovation Novelty in Australian Businesses" (2006) found that smaller businesses are less likely to achieve high degrees of innovation novelty than larger businesses using data from the Innovation Survey 2003 (Summary and Conclusions, page vi)

FIGURE 9: PROPORTION OF INNOVATING BUSINESSES BY EMPLOYMENT SIZE, 2004 to 2005 Calendar Years



CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size

continued

Table 7 is a breakdown of the information shown in Figure 9 by the type of innovation in each business size. The proportion of new organisational processes dominated in the majority of employment groups for innovating businesses. Large businesses reported the largest proportion of organisational innovation compared to the other businesses sizes.

TABLE 7: PROPORTION OF INNOVATING BUSINESSES BY TYPE OF INNOVATION AND EMPLOYMENT SIZE—2004 to 2005(a)

	<i>Goods or services</i>	<i>Operational process</i>	<i>Organisational process</i>
	%	%	%
5–9	14	13	18
10–19	19	23	25
20–49	29	35	37
50–99	32	34	^ 31
100–249	26	24	^ 37
250 or more	^ 32	^ 46	^ 43
Total	19	22	25

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Calendar years

As noted at the beginning of this chapter, about 73% of all businesses in the 2004 to 2005 calendar years were classed as small businesses. However, as shown in Figure 9 and Table 7, the proportion of small businesses engaged in innovation is lower compared to the proportions for large businesses.

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size

continued

Table 8 provides a summary of the estimated total number of businesses and the proportions of innovating businesses under each employment size group. Out of about 2,700 estimated total businesses with "250 or more" employees, 58% of these businesses were innovating. The medium businesses ("20 to 49" and "50 to 99" employees) had 46% and 48% of businesses respectively innovating. The total estimated number of businesses under these categories was about 26,000 and 6,300 respectively. The businesses with "5 to 9" employees and "10 to 19" employees had 65,300 and 38,100 total estimated number of businesses. Only 25% and 34% respectively of them were involved in innovation.

TABLE 8: ESTIMATED TOTAL NUMBER AND PROPORTION OF INNOVATING BUSINESSES (a), by Employment Size—2004 to 2005(b)

Employment size	Total estimated businesses	% of innovating businesses
	no.	%
5-9	65 300	25
10-19	38 100	34
20-49	26 000	46
50-99	6 300	^ 48
100-249	2 900	^ 45
250 or more	2 700	^ 58
Total	141 300	34

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Total number of businesses rounded to the nearest 100

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size *continued*

Table 9 shows the proportions of innovating businesses according to the employment sizes small, medium and large, across industry divisions. The Electricity, gas and water, Finance and insurance and Communication services divisions recorded over 70% of innovating businesses with 100 or more employees (large businesses). The total numbers of estimated businesses in each of these industries in the large business category were about 70, 300 and 50 respectively. Retail trade had the lowest proportion (about 20%) of innovating businesses in the large business category which had about 900 estimated large businesses. The proportion of small businesses (employees less than 19) which were innovative ranged from 24% (in Property and business services) to 39% (Wholesale trade). In Retail trade, medium size businesses (between 20 and 99 employees) recorded the highest proportion of businesses undertaking innovation out of about 4,000 total estimated businesses.

TABLE 9: PROPORTION OF INNOVATING BUSINESSES BY EMPLOYMENT SIZE BY INDUSTRY (a)—2004 to 2005 (b)

	<i>Small businesses</i>	<i>Medium businesses</i>	<i>Large businesses</i>
	%	%	%
Mining	^ 26	^ 27	57
Manufacturing	36	50	64
Electricity, gas & water supply	^ 30	^ 39	75
Construction	28	^ 38	*—
Wholesale trade	^ 39	^ 51	^ 56
Retail trade	25	*46	^ 20
Accommodation, cafes & restaurants	^ 33	^ 39	*47
Transport & storage	28	^ 46	^ 42
Communication services	^ 26	^ 39	^ 70
Finance & Insurance	32	^ 49	^ 74
Property & Business services	24	^ 53	^ 59
Cultural & Recreational services	30	^ 41	^ 43
Total	28	47	51

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Industry refers to ANZSIC division

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size *continued*

Table 10 shows innovating businesses in each state by employment size. The Australian Capital Territory recorded the highest proportion of innovative large businesses (about 77%). In New South Wales, out of about 1,910 large businesses, about 60% were innovative. Queensland recorded about 63% innovating businesses out of about 750 large businesses, whereas Victoria recorded an innovation proportion of 43% from 1,800 estimated large businesses. The total number of small businesses was greater than the total number of medium and large businesses. However, the proportion of innovating businesses ranged between 24% and 36% in all States and Territories. Victoria, South Australia, Western Australia and the Northern Territory had higher proportions of medium sized businesses undertaking innovation compared to the other business sizes. Tasmania had less than 50% innovating businesses in all business sizes.

TABLE 10: DISTRIBUTION OF INNOVATING BUSINESSES BY EMPLOYMENT SIZE BY STATE/TERRITORY (a)—2004 to 2005 (b)

State/Territory	SMALL BUSINESSES		MEDIUM BUSINESSES		LARGE BUSINESSES	
	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses
	no.	%	no.	%	no.	%
NSW	38 210	27	9 480	^ 42	1 910	^ 60
Vic	25 550	29	8 410	^ 50	1 800	^ 43
Qld	18 980	29	6 630	^ 44	750	^ 63
SA	6 050	^ 36	2 700	^ 50	360	^ 43
WA	9 690	^ 30	3 750	^ 56	560	^ 36
Tas	1 980	^ 25	610	* 44	90	^ 48
NT	1 050	^ 27	240	* 53	30	^ 57
ACT	1 910	^ 24	450	* 38	70	^ 77
Total	103 420	28	32 270	47	5 570	52

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Total number of businesses is rounded to the nearest 10

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size

continued

Table 11 shows how goods or services innovation novelty varies across the business sizes. "New to business" innovation in goods or services was the largest compared to other innovation novelties by business sizes. Table 7 showed that innovation proportions were more than double for larger businesses compared to small businesses. However, in terms of innovation novelty, businesses in the "5 to 9" employees category and the "250+" employees category showed similar proportions in each innovation novelty especially "New to the world" and "New to Australia". The "10 to 19" employees category also showed reasonably similar proportions to these business sizes.

The proportion of "New to the world" innovation for goods or services was consistent across all business categories (ranging between 6% and 11%) in 2004 to 2005. Businesses in the "50 to 99" employees category recorded the highest proportion (about 20%) of "New to Australia" goods or services. A chi-square test indicated that the business size may have an influence on the degree of novelty in goods or services innovation (see Appendix 2, Table A1).

TABLE 11: NOVELTY OF GOODS OR SERVICES INNOVATION FOR BUSINESSES, by Employment Size—2002 to 2003 and 2004 to 2005 (a)

	<i>New to business</i>	<i>New to industry</i>	<i>New to Australia</i>	<i>New to the world</i>
	%	%	%	%
2004 TO 2005				
5-9	^ 80	6	7	7
10-19	^ 74	5	14	8
20-49	^ 73	^ 12	6	9
50-99	^ 60	^ 14	^ 20	6
100-249	^ 67	13	14	6
250 or more	^ 63	8	18	11
<i>Total</i>	74	8	10	8
2002 TO 2003				
5-9	^ 60	19	11	10
10-19	^ 63	10	^ 16	^ 11
20-49	^ 39	^ 22	^ 26	13
50-99	^ 58	^ 20	^ 16	6
100-249	^ 38	17	^ 37	8
250 or more	^ 40	^ 23	^ 26	11
<i>Total</i>	55	16	18	11

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size *continued*

Table 11 also shows the proportion of the novelty of goods or services innovation by employment size for the 2002 to 2003 calendar years. Compared with the 2004 to 2005 calendar years, the novelty data has proportions of "New to the business" that were lower, ranging from about 38% to 63%. In contrast, the remaining novelties in innovation for goods or services recorded higher proportions compared to those in the 2004 to 2005 calendar years.

Table 12 shows the proportion of novelty of innovation in operational process for each business size category. Similar to the novelty of goods or service innovation, "New to the business" novelty in operational processes was higher than the other types of innovation novelty for operational processes. The proportion of "New to the world" operational processes innovation was negligible (less than 1%) for some business size categories. The highest proportion of "New to the world" operation processes innovation reported was about 4% in the "100 to 249 employees" category in 2004 to 2005. A chi-square test revealed that the business size may have an influence on the degree of novelty in process innovation (see Appendix 2, Table A1).

TABLE 12: NOVELTY OF OPERATIONAL PROCESS INNOVATION FOR BUSINESSES, by Employment Size(a)—2002 to 2003 and 2004 to 2005(b)

	<i>New to business</i>	<i>New to industry</i>	<i>New to Australia</i>	<i>New to the world</i>
	%	%	%	%
2004 TO 2005				
5-9	87	10	2	1
10-19	92	5	2	1
20-49	85	12	3	—
50-99	[^] 82	8	[^] 10	1
100-249	81	7	8	4
250 or more	80	8	9	3
<i>Total</i>	87	9	3	1
2002 TO 2003				
5-9	80	16	1	3
10-19	82	13	4	1
20-49	[^] 69	[^] 22	5	4
50-99	[^] 60	[^] 30	7	3
100-249	[^] 58	16	[^] 24	2
250 or more	65	15	16	4
<i>Total</i>	75	17	5	3

[^] estimate has a relative standard error of 10% to less than 25% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Proportion of businesses with 'New to the world' operational process less than 1% have not been included in the table

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.1. Business size *continued*

In contrast to the data shown in Table 12 for 2004 to 2005, "New to business" novelty in the 2002 to 2003 period showed a large variation in proportions, ranging from 58% to 82%. "New to the world" operational processes innovation ranged from 1% to 4%. In contrast to the 2004 to 2005 period, "New to the industry" operational processes innovation reported higher proportions ranging from 13% to 30% in the 2002 to 2003 period. The highest proportion of "New to the world" innovation was identified in the "20-49" and "250 or more" employee businesses.

Table 13 summarises how turnover is attributed to new goods or services innovation in each size of business. It was noted that turnover "Greater than 50%" for large businesses was negligible or zero percent. In contrast, 12% of small businesses (between 5 and 19 employees) had turnover Greater than 50% attributed to new goods or services innovation. Medium businesses (between 20 and 99 employees) had similar proportions of turnover attributed to new goods or services innovation as those for large businesses.

TABLE 13: PROPORTION OF BUSINESSES (a), by Share of Turnover Attributed to New Goods or Services Innovation by Size of Business — 2004-05 (b)

	SHARE OF TURNOVER ATTRIBUTED TO NEW GOODS OR SERVICES			
	10% or less	Greater than 10% to 25%	Greater than 25% to 50%	Greater than 50%
	%	%	%	%
Small (5 to 19 employees)	59	24	5	12
Medium (20 to 99 employees)	73	19	7	1
Large (100 + employees)	77	17	5	—

— nil or rounded to zero (including null cells)

(a) Proportion related to Innovating Businesses Only

(b) Financial year

3.2 Foreign ownership

The question on foreign ownership in the 2005 Innovation Survey asked businesses to report the percentage of ordinary shares or voting stock held by non-residents of Australia as at 31 December 2005. The total number of businesses with "No foreign ownership" (wholly Australian owned) employing five or more persons has increased since 2003 by about 4% from about 128,500 to about 133,300 in 2004 & 2005 calendar years. The total proportion of businesses with "No foreign ownership" was about 94% while businesses with foreign ownership "Greater than 50%" was about 4% from the total estimated number of businesses.

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.2 Foreign ownership *continued*

Table 14 shows the proportions of innovating businesses with various degrees of foreign ownership as at December 2005. A chi-square test indicated that the degree of foreign ownership may have an influence on the type of innovation (see Appendix 2, Table A1).

TABLE 14: PROPORTION OF INNOVATING BUSINESSES, by Type of Innovation and Degree of Foreign Ownership—2004 to 2005(a)

	<i>Goods or services</i>	<i>Operational process</i>	<i>Organisational process</i>	<i>Any innovation</i>
	%	%	%	%
No foreign ownership	19	21	24	32
Between 1% and 9%	9	*29	*37	*41
Between 10% and 50%	^28	^35	^52	^59
Greater than 50%	32	^32	^47	^56
Total	19	22	25	33

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.2 Foreign ownership *continued*

Table 15 summarises the proportions of innovating businesses by foreign ownership category by State/Territory.

Businesses with "No foreign ownership" outnumbered other ownership categories in all States and Territories. The proportion of innovating businesses with "No foreign ownership" ranged between 27% (in the Australian Capital Territory) and 40% (in South Australia). New South Wales and Victoria had a larger number of the estimated total of businesses with "Greater than 50%" foreign ownership and more than 60% of them were innovators. Queensland also showed a similar trend, that is, out of a total 430 businesses with "Greater than 50%" foreign ownership, about 58% were innovators. Western Australia had a total of 580 businesses with "Greater than 50%" foreign ownership and about 16% of them were innovators.

In New South Wales, 68% of the businesses (out of 580 businesses) were innovators in the "Between 10% and 50%" foreign ownership category. Queensland recorded 94% of innovating businesses out of 60 businesses in the "Between 1% and 9%" foreign ownership category.

TABLE 15: DEGREE OF FOREIGN OWNERSHIP OF INNOVATING BUSINESSES (a), by State/Territory(a)—2004 to 2005(b)

	NO FOREIGN OWNERSHIP		BETWEEN 1% AND 9%		BETWEEN 10% AND 50%		GREATER THAN 50%	
	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses
	no.	%	no.	%	no.	%	no.	%
NSW	45 910	29	530	**40	580	*68	2 580	^60
Vic	33 170	33	160	*18	310	*31	2 130	^62
Qld	25 760	33	60	^94	110	*66	430	*58
SA	8 840	^40	np	np	np	np	160	^49
WA	13 270	^38	70	*53	90	*73	580	*16
Tas	2 630	^30	np	np	np	np	20	^39
NT	1 300	^32	np	np	np	np	np	np
ACT	2 400	^27	np	np	np	np	np	np
Total	133 280	32	870	*41	1 150	^59	5 940	^56

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

** estimate has a relative standard error greater than 50% and is considered too unreliable for general use

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Total number of estimated businesses is rounded to the nearest 10

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.2 Foreign ownership

continued

Table 16 shows the levels of foreign ownership for innovating businesses by ANZSIC division. All industries recorded more than 50% in the "No foreign ownership" category. The communication services industry recorded the highest proportion (about 23%) of "Greater than 50%" foreign ownership across all industries.

TABLE 16: PROPORTION OF INNOVATING BUSINESSES, by Degree of Foreign Ownership by Industry(a)(b)(c)—2004 to 2005(d)

	No foreign ownership	Between 1% and 9%	Between 10% and 50%	Greater than 50%
	%	%	%	%
Mining	^ 53	^ 12	^ 18	^ 17
Manufacturing	89	—	—	8
Electricity, gas & water supply	85	—	—	9
Construction	99	—	—	—
Wholesale trade	83	1	2	14
Retail trade	95	—	—	5
Accommodation, cafes & restaurants	95	—	—	3
Transport & storage	^ 83	—	—	^ 14
Communication services	^ 73	2	2	23
Finance & Insurance	86	—	—	10
Property & Business services	91	1	2	6
Cultural & Recreational services	95	—	—	4
Total	91	1	1	7

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Industry refers to ANZSIC division

(b) Proportion of innovating businesses less than 1% are not included

(c) Sample size of businesses surveyed less than 5 are not included due to confidentiality

(d) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.2 Foreign ownership continued

Table 17 shows the degree of novelty of goods or services for innovating businesses by foreign ownership category. "New to the business" novelty was the highest novelty in all ownership groups. "New to Australia" novelty recorded the highest proportion (about 28%) in the "Between 1% and 9%" foreign ownership group. In the 2002 to 2003 period, the "Between 10% and 50%" foreign ownership group had the highest proportion of innovators (about 43%).

In contrast with the 2002 to 2003 period, "New to the world" novelty in the foreign ownership groups "Between 1% and 9%" and "Between 10% and 50%" both increased in the 2004 to 2005 period, while the other two categories decreased (Table 13). Although it is expected that higher levels of foreign ownership might enhance a business's ability to innovate, the proportion of "Greater than 50%" foreign ownership category showed lower levels of innovation since the 2002 to 2003 period. The estimated total number of businesses in this category has fallen from 300 to about 200 since the 2002 to 2003 period. However, the total number of estimated businesses introducing or implementing "New to the business" goods or services innovation has doubled during this period.

TABLE 17: NOVELTY OF GOODS OR SERVICES INNOVATION, by Degree of Foreign Ownership—2002 to 2003 and 2004 to 2005(a)

	No foreign ownership	Between 1% and 9%	Between 10% and 50%	Greater than 50%
	%	%	%	%
2004 TO 2005				
New to business	74	^ 45	* 71	^ 71
New to industry	9	6	^ 4	5
New to Australia	10	^ 28	7	^ 13
New to the world	7	21	^ 18	^ 11
2002 TO 2003				
New to business	56	* 75	* 30	^ 47
New to industry	17	^ 6	* 24	9
New to Australia	17	^ 13	* 43	^ 23
New to the world	10	^ 6	3	^ 21

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

(a) Calendar years

"New to business" novelty of operational process innovation also showed higher proportions in the four foreign ownership groups, ranging between 78% and 88% (Table 18). "New to the industry" novelty recorded the highest proportion (about 13%) in the "Between 10% and 50%" foreign ownership group. "New to Australia" novelty had similar proportions (about 3% and 5% respectively) in the "Between 10% and 50%" and "Greater than 50%" foreign ownership category. In the 2002 to 2003 calendar years, this was about 14% and 20%. A chi-square test result suggested that the foreign ownership could have

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.2 Foreign ownership *continued*

an influence on the degree of novelty in operational process innovation (see Appendix 2, Table A1).

"New to the world" novelty of operational processes innovation did not show any considerable movement since the 2002 to 2003 period. However, the proportion of "New to the world" novelty in the "Greater than 50%" foreign ownership category has dropped from 3% to 1% from the 2002 to 2003 period (Table 18). The estimated total numbers of businesses with "Greater than 50% foreign ownership" and who are introducing or implementing new operational processes innovation have slightly increased in "New to the business" and "New to the industry" novelties since the 2002 to 2003 calendar years.

TABLE 18:NOVELTY OF OPERATIONAL PROCESS INNOVATION , by Degree of Foreign Ownership—2002 to 2003 and 2004 to 2005(a)

	No foreign ownership	Between 1% and 9%	Between 10% and 50%	Greater than 50%
	%	%	%	%
2004 TO 2005				
New to business	88	[^] 87	[^] 78	[^] 83
New to industry	9	7	[^] 13	[^] 11
New to Australia	3	3	3	5
New to the world	—	3	[^] 6	1
2002 TO 2003				
New to business	76	*80	[^] 67	[^] 70
New to industry	18	[^] 10	[^] 13	7
New to Australia	3	[^] 7	[^] 14	[^] 20
New to the world	3	3	6	3

[^] estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

(a) Calendar years

3.3. Age of the business under current ownership

The age of the business under current ownership is used by many analysts as an indicator of the potential innovative capabilities of the business. As a result, the 2005 Innovation Survey asked a question on the age of the business under current ownership as at 31 December 2005. This section of the paper examines whether there is a relationship between the age of the businesses and innovation activity.

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.3. Age of the business under current ownership *continued*

Table 19 shows the variation in the proportion of innovation activity according to the age of the business under current ownership. The overall innovation proportion did not show a large variation and ranged between 31% ("9 years or more") and 38% ("1 year to less than 4 years"). In the 2001 to 2003 calendar year period, businesses in the "Less than 1 year" group was less than 25%. In the 2004 to 2005 period, it is about 35%, indicating that more new businesses have engaged in innovation activities especially new organisational processes since the 2003 Innovation Survey period.

TABLE 19: PROPORTION OF INNOVATING BUSINESSES BY TYPE OF INNOVATION AND AGE OF BUSINESS—2004 to 2005(a)

	Goods or services	Operational process	Organisational process	Any innovation
	%	%	%	%
Total				
Less than 1 year	^ 23	^ 21	^ 29	^ 35
Between 1 and 4 years	21	23	31	38
Between 4 and 9 years	24	23	27	36
9 years or more	17	21	22	31
Total	19	22	25	33

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

(a) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.3. Age of the business
under current ownership
continued

Table 20 summarises the estimated total number of businesses and proportions of innovating businesses in each State/Territory under each age category. Nearly half of the "1 to less than 4 years" old businesses in Queensland were undertaking innovation. Western Australia had approximately 45% of businesses innovating in each age group excluding those with "9 or more years" under current ownership.

TABLE 20: INNOVATING BUSINESSES BY AGE UNDER CURRENT OWNERSHIP (a), by State/Territory—2004 to 2005 (b)

	LESS THAN 1 YEAR		1 YEAR TO LESS THAN 4 YEARS		4 YEARS TO LESS THAN 9 YEARS		9 YEARS OR MORE	
	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses	Total businesses	Proportion of businesses
	no.	%	no.	%	no.	%	no.	%
NSW	2 800	^ 31	8 300	28	10 300	^ 37	28 200	30
Vic	2 500	^ 34	5 100	^ 39	7 000	^ 31	21 200	34
Qld	1 600	^ 33	5 100	^ 49	5 300	^ 33	14 400	^ 28
SA	700	*39	1 700	*40	1 600	*55	5 100	^ 36
WA	900	**44	3 000	^ 45	3 100	^ 46	7 000	^ 29
Tas	200	**88	200	*48	900	*14	1 400	^ 28
NT	np	np	np	np	100	*51	800	^ 30
ACT	np	np	np	np	800	^ 25	900	^ 38
Total	9 000	^ 35	24 200	38	29 100	36	79 000	31

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

** estimate has a relative standard error greater than 50% and is considered too unreliable for general use

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Total number of estimated businesses is rounded to the nearest 100

(b) Calendar years

CHAPTER 3 BUSINESS CHARACTERISTICS AND INNOVATION

continued

3.3. Age of the business under current ownership

continued

Table 21 shows the distribution of innovating businesses across industries by each business age category. Retail trade had the largest proportion (about 65%) of innovating businesses with current ownership "Less than 1 year". It had about 21% of businesses undertaking innovation in the "9 years or more" category. This indicates that more businesses in Retail trade are undertaking innovation in their first year of operation under current ownership. Wholesale trade, Electricity, gas and water services, and Manufacturing industry divisions recorded over 40% of innovating businesses with current ownership over nine years, indicating that these industries continue to be innovative over time.

The Finance and insurance services industry also recorded a higher proportion (about 54%) of innovating businesses with current ownership "Less than 1 year". However, the industry had innovating businesses with a proportion greater than 30% in the other age categories, indicating that the industry has established innovating businesses over a long period. The Mining industry showed the lowest proportion (about 6%) of businesses entering into the innovation field where current ownership was "Less than 1 year". However the mining industry had more established innovating businesses with more than 30% of innovating businesses each in each age group "Greater than one year" under current ownership.

TABLE 21: PROPORTION OF INNOVATING BUSINESSES BY INDUSTRY, (a), and Age of Business Under Current Ownership—2004 to 2005(b)

	Less than 1 year	1 year to less than 4 years	4 years to less than 9 years	9 years or more
	%	%	%	%
Mining	6	^ 33	^ 43	^ 32
Manufacturing	^ 36	56	40	40
Electricity, gas & water supply	^ 23	^ 60	^ 55	45
Construction	* 31	^ 20	^ 40	32
Wholesale trade	** 45	* 37	^ 35	^ 46
Retail trade	* 65	^ 39	^ 27	21
Accommodation, cafes & restaurants	* 38	^ 43	^ 35	^ 31
Transport & storage	* 35	^ 30	^ 34	35
Communication services	^ 29	^ 33	^ 47	^ 32
Finance & Insurance	^ 54	^ 44	^ 35	34
Property & Business services	^ 13	^ 35	^ 39	26
Cultural & Recreational services	** 37	^ 44	^ 40	28
Total	^ 35	38	36	31

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

* estimate has a relative standard error of 25% to 50% and should be used with caution

** estimate has a relative standard error greater than 50% and is considered too unreliable for general use

(a) Industry refers to ANZSIC division

(b) Calendar years

3.4 *Collaboration by innovating businesses*

For businesses that undertake innovation, an important characteristic is whether they undertake any form of collaboration with other businesses. Data from the 2003 and 2005 Innovation Surveys has indicated that the proportion of collaboration for innovating businesses has remained relatively constant between the 2004 to 2005 calendar year period (26% of innovating businesses undertook any form of collaboration) and the 2003 calendar year period (27% of innovating businesses were involved in collaboration).

In the 2005 Innovation Survey it was found that 26% of innovating businesses were engaged in some form of collaboration. Out of these, only about 3% were engaged in collaboration with government organisations and about 2% were engaged in collaboration with Universities and other higher education institutes. Collaboration with overseas organisation was less than 1%.

In terms of collaboration amongst innovating businesses by employment size of the business, the collaboration proportion for businesses with 100 or more persons declined by 5.3 percentage points between the two reference periods. In contrast, the collaboration proportion for innovating businesses with 20-99 persons increased by 3.9 percentage points. The proportion of collaboration for innovating businesses with 5-19 persons showed a slight decline of 0.6 of a percentage point.

Further work could be undertaken to identify the importance of collaborative activities as part of the overall innovation system.

CHAPTER 4 CONCLUSION

CHAPTER 4

As with the 2003 survey, the Innovation in Australian Business 2005 dataset contains a wealth of valuable information. This current study has replicated some of the outputs from the "Patterns of Innovation in Australian Businesses 2003" publication but using data from the new survey. Apart from highlighting change from the previous measure, the study is intended to be of interest to analysts looking to better understand connections between business characteristics thought to be of importance in explaining the innovation system in Australia.

Some of the interesting relationships and changes include that while the overall level of innovation has increased from 30% to 34% between the two survey periods, each of the higher level innovation novelty types (new to the world, Australia or Industry) have decreased since the 2002 to 2003 period. Therefore, it follows that the estimated total number of businesses introducing or implementing the basic "New to the business" goods or services innovation and operational process innovation have increased since the 2002 to 2003 period.

The intensity of goods and services innovation as measured through importance to turnover is also of interest. About 65% of businesses introducing new or significantly improved goods or services generated "10% or less" of their turnover in the financial year 2004-05. Turnover attributed to goods or services innovation "Greater than 25 to 50%" was about 6% in 2005. The Mining and Property and business services industries reported the largest proportion of turnover attributed to goods or services innovation among all the industries (about 11% and 10% respectively). Electricity, gas and water services, Construction, Retail trade and Communication industries reported the lowest (about 4% each) in the financial year 2004-05. The overall turnover attributed to new goods or services in 2004-05 was about 7%, which is below the average value for EU-27 in 2004 which was about 8.6% (Eurostat(b), 2007).

The proportion of businesses with "No foreign ownership" was about 94% in the 2004 to 2005 period, while businesses with foreign ownership "Greater than 50%" was about 4%. The situation was very similar to that of 2002 to 2003. Although it is expected that foreign ownership enhances a business's ability to innovate (DITR, 2006), the proportion of businesses in the "Greater than 50%" foreign ownership category for the 2004 to 2005 period showed lower levels of innovation than those identified for the 2002 to 2003 calendar years.

A set of economic data is best considered in context, rather than in isolation and the overall macroeconomic environment for this period may better inform such results and associated innovation theory. Further work using data from both ABS innovation surveys would be valuable in understanding the changing relationship between novelty, innovation intensity and other factors such as foreign ownership. Regression analysis, controlling for the effect of potential explanatory variables on innovation may also shed additional light on these and other aspects of innovation activity by Australian businesses.

EXPLANATORY NOTES

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ABSBR	Australian Bureau of Statistics Business Register
ANZSIC	Australian and New Zealand Standard Industrial Classification
ATO	Australian Taxation Office
BCS	Business Characteristics Survey
BLD	Business Longitudinal Database
DITR	Australian Government Department of Industry, Tourism and Resources
EU	European Union
OECD	Organisation for Economic Co-operation and Development
PAYGW	pay-as-you-go withholding
PES	post-enumeration survey
RSE	relative standard error
SISCA	Standard Institutional Sector Classification of Australia

APPENDIX 1 METHODOLOGY

Methodology

The 2005 Innovation Survey was conducted by the ABS after incorporating the results of a review into the survey scope, questionnaire content and procedures adopted in the 2003 Innovation Survey. As a result, changes were made to the 2005 Innovation Survey. The scope of the 2005 survey was all businesses in Australia with employment recorded on the ABS Business Register of five or more employees, except those classified to the following institutional sectors or industry divisions:

- SISCA* 3000 General Government
- SISCA 6000 Rest of the World
- ANZSIC** Division A Agriculture, Forestry and Fishing
- ANZSIC Division M Government Administration and Defence
- ANZSIC Division N Education
- ANZSIC Division O Health and Community Services
- ANZSIC Division Q Personal and Other Services.
- Standard Institutional Sector Classification of Australia (SISCA)
- Australia and New Zealand Standard Industrial Classification (ANZSIC)

These institutional sectors and divisions were excluded from the innovation survey because of statistical and cost constraints. In particular, the ABS rationale was that different survey questionnaires would be required for these industries in addition to significant work being undertaken to align different types of statistical units, ie government units versus business units. Although Agriculture, Forestry and Fishing is generally seen as an innovative industry, it is predominantly made up of micro businesses (ie those with less than five employees) and innovation activity is normally conducted through Rural Research and Development Corporations. In addition, market forces do not necessarily apply for entities operating in the Government Administration and Defence, Education and Health and Community Services industries due to significant government involvement in the decision making process. The Personal and Other Services industry division was excluded due to high levels of provider burden.

The frame for the 2005 Innovation Survey was taken from the ABS Business Register (ABSBR). The ABSBR provides a comprehensive list of employing businesses, primarily based on their registration for the Australian Taxation Office's (ATO) Pay As You Go Withholding (PAYGW) tax scheme. The frame is updated quarterly to take account of the entry of new businesses, businesses which have ceased employing, changes in employment levels, changes in industry and other general business changes.

The 2005 Innovation Survey was conducted by mail and under the authority of the Census and Statistics Act (1905). It was based on a random sample of approximately 6,800 businesses which was stratified by industry, State/Territory and number of employees and with weighting factors used to construct the whole-population estimates. All businesses with 200 or more employees in scope of the survey were included in the sample, with the exception of manufacturing industries, where all businesses with 500 or more employees were included in the sample. The response rate of the 2005 survey was 93%. The conceptual definitions and guidelines of the 2005 Innovation Survey were based on the Oslo Manual (1997 and 2005 editions). Based on the framework of the Oslo Manual, the 2005 Innovation Survey was extended to include any innovative activity that was abandoned during the reference period or was incomplete at the end of the reference period. However, for this study only innovative activities completed during the reference period have been considered as the core measure of innovation.

The difference between the information obtained from a sample of businesses and the information that would have been obtained if data had been obtained from all businesses is known as the sampling error. Standard errors can be used to measure sampling error. They indicate the degree to which information may vary from the value that would have been obtained if all businesses in the population had been included in the survey. In this study, the sampling variability is measured by relative standard errors (RSEs). The RSE is a useful measure in that it provides an immediate indication of the percentage of errors

APPENDIX 1 METHODOLOGY *continued*

Methodology *continued*

likely to have occurred due to sampling variability and avoids the need to refer to the size of the estimate.

Any RSEs greater than 50% are considered by the ABS to be too unreliable for general use and they should be treated with extreme caution. They cannot be used for input into any decision making processes.

The 2005 Innovation Survey sample design was intended to produce acceptable standard errors at the one-digit ANZSIC division level, with the exception of the Manufacturing and the Property and Business Services industry divisions where acceptable standard errors for output at the two-digit sub-division level have been included in the sample design.

The survey scope includes businesses with employment of five or more people. The sample was designed to provide reasonable standard errors for the following broad business size bands:

- 5-19 (small businesses);
- 20-99 (medium businesses); and
- 100 or more (large businesses).

Although the survey scope includes businesses with five or more employees, some businesses had less than five people employed by the business by the time they completed the survey questionnaire. For practical reasons, these businesses were included in the data set and contributed to final estimates. For the purpose of analysis in this study, businesses with less than five employees are included in the "5-9 employees" category. This approach aligns with the data published in the ABS publication *Innovation in Australian Business, 2005* (ABS Cat. No. 8158.0).

Inaccuracies or non-sampling errors may occur as a result of:

- the way in which businesses report data on the survey;
- the design of the survey questionnaire; or
- ABS data processing techniques.

However, every effort was made by the ABS to reduce non-sampling error by taking the following measures:

- Careful design and testing of the questionnaires and data processing systems;
- Providing detailed instructions to providers on how to respond to questions; and
- Detailed checking of reported data to ensure that it is logical, consistent and complete.

In addition, the data input editing process was supported by a post enumeration survey (PES), which was conducted by the ABS with several data providers in different States and Territories. It was used to identify problems with the quality of reported data. Quality issues were then targeted during the output editing stage of the survey to minimise survey bias.

This study only examines the qualitative aspects of innovation in Australian businesses. A number of comparisons have been carried out with the results of the previous study. However, since the previous study reported proportions relating to innovation on a three year calendar period (noting that innovation in 2001 and 2002 were reported on a combined basis), some modelled estimates were developed to determine innovation proportions over the calendar years 2002 and 2003. These estimates enabled a comparison over two calendar year periods (2002 and 2003 and 2004 and 2005) for some selected broad categories. Statistical hypothesis testing was also used to compare the relationships between data items for some selected population groups.

APPENDIX 2 RESULTS OF THE CHI-SQUARE TESTS

A chi-square test was used to test the hypothesis of independence of chosen pairs of attributes. The statistical test was done using SAS program using a 5% significant level. A test statistic that was greater than the critical value at the 5% significance level for an appropriate number of degrees of freedom led to the rejection of the null hypothesis that attributes in question were independent. Under the hypothesis of independence this test statistic has a Chi-square asymptotic distribution.

TABLE A1, Chi-square test results

<i>Reference</i>	<i>Degrees of freedom</i>	<i>Null hypothesis</i>	<i>Estimated value of Chi-square</i>	<i>Critical value of Chi-square</i>	<i>Decision taken</i>	<i>Inference</i>
Figure 4	11	Being a goods or services innovator is independent of being in a particular industry	115	20	Reject the null hypothesis	Being in a particular industry may have an influence on being a goods or services innovator
Figure 6	11	Being an organisational process innovator is independent of being in a particular industry	43	20	Reject the null hypothesis	Being in a particular industry may have an influence on being an organisational process innovator
Table 4	33	Degree of novelty in goods or services innovation is independent of being in a particular industry	127	47	Reject the null hypothesis	Being in a particular industry may have an influence on the degree of novelty in goods or services innovation
Figure 9	5	Being an innovator is independent of being in a particular firm size	488	11	Reject the null hypothesis	Being in a particular firm size may have an influence on being an innovator
Table 11	15	Degree of novelty in goods or service innovation is independent of being in a particular firm size	61	25	Reject the null hypothesis	Being in a particular firm size may have an influence on the degree of novelty in goods or services innovation
Table 12	15	Degree of novelty in operational process innovation is independent of being in a particular firm size	75	25	Reject the null hypothesis	Being in a particular firm size may have an influence on the degree of novelty in operational process innovation
Table 18	9	Degree of novelty in goods or service innovation is independent of degree of foreign ownership type	63	17	Reject the null hypothesis	Degree of foreign ownership may have an influence on degree of novelty in goods or services innovation

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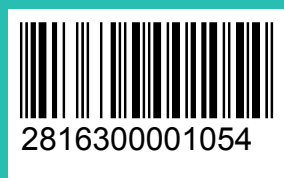
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