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# **Service Innovation in Australia: A Preliminary Exploration of the “Cinderella Sector”**

A paper submitted for the Technology, Innovation and Supply Chain Management Stream  
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## **Service Innovation in Australia: A Preliminary Exploration of the “Cinderella Sector”**

### **ABSTRACT**

Service innovation is of increasing importance in the Australian economy, yet it remains a largely neglected area of study. Recent studies overseas have shown that services are becoming more engaged with innovation, and that service innovation is complex and multi-dimensional. Official R&D and business innovation statistics in Australia are examined, and they reveal that service providers across all service industries in Australia are performing R&D and are actively innovating, a finding that is consonant with the overseas studies. However, innovation performance varies across and within service industries, reflecting differences in the nature and structure of those industries. A clear need for further research is identified, both to provide a clearer understanding of the nature of service innovation and to provide a basis for practical recommendations.

**Keywords:** service industries, innovation, services, R&D

### **INTRODUCTION**

In the field of contemporary operations management, there has been a growing recognition of service operations and an increasing emphasis on the integration of manufacturing and services within firms (e.g. Davis and Heineke, 2005). However, service innovation remains a relatively under-researched area compared to that of product innovation (Howells, 2006), and service organizations have until recently been widely seen as “innovation laggards” (Miles, 1993). This situation is starting to change with increasing policy interest in the role of services in national economies (e.g. OECD, 2005; Baird, 2007) and a small but burgeoning body of academic research which has focused on the distinctive nature of innovation within the service sector (e.g. Miles, 2000; Howells, 2004; Tether, 2003; Gallouj, 2002) and moved beyond the initial typologies of service innovation (e.g. Lovelock, 1984; Gadry et al, 1995; Debackere et al, 1998) and descriptions of new service development (NSD) processes (e.g. Scheuing and Johnson, 1989; Tax and Stuart, 1997). But while there has been much research activity in this area overseas, and most notably in Europe, the nature of innovation in the Australian service sector remains a neglected area of study, especially within the field of operations management. This paper is a preliminary attempt to address this knowledge gap.

But what exactly is the service sector and why is it important? It should be noted that there is no widely accepted definition of services (Daniels, 1993) and different views on what industries constitute the service sector (e.g. Elfring, 1988; Miles, 1993; Evangelista and Savona, 1999). A narrower view is that the sector is made up of those industries that predominantly produce services in

contrast to those that produce tangible goods (e.g. Australian Bureau of Statistics, 2007a, p. 509), but an older and more widely applied view is of the sector as a “residual” made up of all those industries that are not agriculture, mining and manufacturing (McLachlan et al., 2002). This approach includes the utilities (suppliers of electricity, gas and water services) and construction as well as the 14 other industries that constitute the narrower view of the sector (i.e. from the wholesale trade to personal and other services). Taking this latter broader view of the service sector, its most notable characteristics are, firstly, its diversity (i.e. it encompasses a vast array of industries, ranging from those that provide services with a high tangible component, such as building and construction, to those which dominated by the intangible, such as professional services) and, secondly, its centrality to the Australian economy. The services make up by far the largest sector in the economy, accounting for 85% of total employment and 77% of GDP (ABS, 2007b; 2007c). As such they are of critical importance for economic productivity and competitiveness in that they facilitate the creation of value in the other sectors (e.g. transport and distribution ensures that materials and goods flow between where they are produced and consumed, financial services provide the funding instruments necessary for all forms of economic activity, etc.). Their centrality has been more recently reinforced by “servitisation” (Vandermerwe and Rada, 1988), the blurring of the boundaries between manufacturing and services whereby manufacturing firms are increasingly moving beyond a focus solely on the production of goods to an approach which offers services and solutions, delivered through and with their products; reflecting and contributing to this trend, customers increasingly focus on the service value of the products they purchase. Finally, it is increasingly being recognised that services, and especially the so-called “knowledge intensive business services” (Martinez-Fernandez et al., 2004), through a range of knowledge creation/sharing and other facilitating mechanisms are key enablers of innovation in the economy (den Hertog, 2000; Miles and Boden, 2001).

Although still in its infancy, there has been considerable recent scholarly activity in the area of service innovation. An emergent view is that, given the distinctive features of services (e.g. their intangibility, perishability, heterogeneity of output, simultaneity of production and consumption, etc.), the manufacturing-based new product development models and concepts (Brown and Eisenhardt, 1995;

Schilling and Hill, 1998) cannot simply be applied to service innovation, although there may be some common success factors (Johns and Storey, 1998; Fitzsimmons and Fitzsimmons, 2000). Evangelista (2006), for example, notes seven features that differentiate innovation in services from that in manufactured goods: (i) the inseparability of production and consumption means that service innovation is more of an interactive process with customers, (ii) customisation of service delivery plays a more prominent role, (iii), information and communication technologies increasingly play a central role in service innovation and delivery, (iv) there are limitations to the appropriability of the results of service innovation with some services having the attributes of public goods, (v) human resources play a predominant role in the organization and delivery of services, (vi) organizational change is an important aspect of service innovation, and (vii) non-technological knowledge, know-how and capabilities play a more important role in service innovation. In similar vein, Howells (2006) has argued for a broader conceptualisation of innovation in services to encompass changes in disembodied non-technological processes, organizational arrangements and markets. Thus Howells and Tether (2004) propose that there are eight dimensions to service innovation: the introduction of new products and services, methods of service production, and methods of service delivery, as well as changes in the use of technology, personnel skills deployed, organizational structures, customer relationships, and interorganizational relationships. This conceptualisation is consonant with Gallouj and Weinstein's (1997) integrative approach in which a service or a product can be described in terms of four sets of elements: (a) the outcome characteristics of the good or service, (b) the provider's competencies, (c) the provider's technical characteristics, and (d) the competencies of the client or customer. Innovation in goods and services, according to this approach, includes any change affecting one or more of these sets of characteristics (de Vries, 2006).

Clearly, then, service innovation is a complex and multi-dimensional phenomenon which has been aptly defined by Van Ark et al. (2003) as:

“A new or considerably changed service concept, client interaction channel, service delivery system or technological concept that individually, but most likely in combination,

leads to one or more (re)new(ed) service functions that are new to the firm and do change the services or goods offered on the market and do require structurally new technological, human or organisational capabilities of the service organisation.”

Note that what is distinctive about service innovation are the organizational, interorganizational and human resource dimensions due to the high level of the intangible and knowledge components of services and service delivery. As Sundo (1998), among others, has argued, innovation in services has traditionally involved changes in behaviour more than changes in technology due to the inter-personal interaction between customer and provider which often constitutes the core of service (i.e. the service “product” is inseparable from the process of delivery).

In this paper I seek to add to our knowledge of service innovation in Australia by reviewing selected official statistics on R&D and innovation within Australian businesses. As noted above, with a few exceptions (e.g. Alam, 2002; Alam and Perry, 2002; Atuahene-Gima, 1996), service innovation has not so far been extensively studied in Australia. The approach taken here is exploratory, and is as much concerned with identifying key questions as with clarifying the nature of innovation in this extremely important part of our economy.

## **R&D IN AUSTRALIAN SERVICE INDUSTRIES**

Systematic research and experimental development (R&D) has long been seen as an important component and indicator of innovation activity within firms (e.g. Rothwell and Zegveld, 1985; Rothwell, 1992). While the centrality of technology-oriented R&D to business innovation has recently been challenged (e.g. Smith, 2005; Business Council of Australia, 2006), an emerging trend observed overseas has been the increasing role and significance of R&D within the service sector. The services are becoming more research intensive and there has been rapid growth in service firm R&D activity in most advanced industrial economies (Howells, 2000, 2006). Can the same trend be observed in Australia?

[INSERT TABLE 1 HERE]

The most recent Australian Bureau of Statistics (ABS) data on Business Expenditure on R&D (BERD) in Australia, covering the three fiscal years from 2003 to 2006, is summarised in **Table 1**. This table shows that, overall, BERD in Australia increased by 28.5% over the three-year period (an average annual growth rate of 13.4% in current price terms). The ratio of BERD to GDP in Australia is now around 1% (ABS, 2007d), bringing the country more into line with other OECD countries such as the Netherlands, Canada and the UK (OECD, 2007). Mining's share of BERD (the ABS data did not include agriculture, forestry and fishing BERD until the 2006 survey, and was excluded from this analysis to ensure comparability across the time series) increased from 13.2% to 16.9%, no doubt reflecting increased activity in this sector as a result of the current "resources boom", while manufacturing's share had decreased from 43.4% to 38.9% (possibly reflecting the relative decline in the importance of this sector in the economy), and that of services had increased from 43.4% to 44.2%. What is notable though is that nearly one-half of all BERD in Australia is now conducted in the service sector and expenditure in this sector exceeds that in manufacturing, which is indeed in alignment with documented trends overseas.

Looking at the change in BERD across industries and sectors over this period, it can be seen that there was considerable variability in growth rates: mining BERD increased by 64%, reflecting an expanding sector operating at capacity, while that of manufacturing grew by only 15.2%, reflecting a declining sector in the economy. Total service BERD increased by 31%, but the service sector also reveals considerable diversity in BERD growth rates (but note that some caution is required here because some of the recorded change may reflect changes in reporting practices rather than real changes in expenditure patterns by businesses). Five service industries had notable growth (i.e. more than twice the national increase rate) in their R&D expenditures. Firstly, the BERD of personal and other services increased by a massive 220%, albeit off a low base. This is an extremely diverse industry (i.e. including laundries, funerals, hairdressing, interest groups, and public order and safety service providers), and more detailed studies are required to determine where and how this growth in R&D expenditure is occurring. Secondly, transport and storage BERD increased by 163% over the period,

an increase that was probably associated with developments in logistics and supply chain management capabilities. The BERD increase in this industry was possibly also related to the “resources boom” and growing international trade with consequent pressures on the nation’s transport infrastructure stimulating firms to perform more research in order to address the resulting problems. Thirdly, the BERD of health and community services increased by 114%, reflecting another area of the economy where there are great pressures on service delivery systems to operate more effectively and efficiently as well as a growing consumer demand for the services provided. Fourthly, BERD in the communication industry increased by 65%, which is associated with the proliferation of new telecommunications services such as those provided with the “third generation” (3G) mobile phone networks. Fifthly, the construction industry saw an increase of 61% in its BERD, reflecting the development of new building methods and related services (e.g. concreting, bricklaying, roofing, plumbing and electrical) associated with the introduction of new construction products and materials.

Also of interest in this data is that the two service industries with the largest BERD, property and business services with 17.1% of total BERD and finance and insurance with 9% (together these two industries accounted for 59.3% of service sector BERD) had somewhat lower expenditure increases over the period (13.9% and 25.2% respectively). The R&D performance of the property and business service industry is of some concern, as it includes such “knowledge intensive” services as scientific, technical, computer, legal and accounting, marketing and business management which are seen as playing a crucial role in innovation and economic development. The decline in the R&D expenditure of the utilities is another area of concern (this fell by 13.6% over the period), and both of these findings warrant further investigation if only to determine whether the aggregate industry statistics actually reflect real changes in R&D expenditure within firms.

[INSERT TABLE 2 HERE]

We can further explore the nature of R&D in service industries by examining the types of R&D activity conducted by businesses, as shown in **Table 2**. Overall, most of BERD in Australia (62.6%) was on experimental development (defined as “systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products or

devices, to installing new processes, systems or services, or to improving substantially those already produced or installed”, ABS, 1998), nearly one-third, 32.7%, was classified as applied research (i.e. “original work undertaken to acquire new knowledge with a specific application in view”, ABS, 1998), while basic research (experimental or theoretical work undertaken to acquire new knowledge, either with a view to advancing knowledge or in the expectation of some practical discovery) accounted for only 4.7%. This distribution of expenditure is a reflection of the applied orientation of most R&D conducted within industry, with a general focus on generating revenue from the exploitation of knowledge. Most of the service industries reported that they did perform basic research (this accounted for 4.7% of total services BERD), and this activity made up higher than average levels in three industries: 13.9% of BERD in the utilities, 13.1% in the retail trade, and 11.8% in health and community services. The utilities also had a much higher expenditure on applied research (56.1% versus 35.2% for services overall) and a correspondingly lower proportion of expenditure on experimental development (30% versus 60% for services). This would suggest that R&D in this industry is very much focused on problem-solving, and building the underlying knowledge resource necessary for this, and less on the development of new services. On the other hand, the level of experimental development was highest in personal and other services (94.1%), finance and insurance (78.2%) and recreational services (71.9%), suggesting that firms in these industries are much more concerned with the development of new services for their customers than generating new knowledge.

[INSERT TABLE 3 HERE]

The general trend in the economy is that larger firms are more likely to perform R&D, and this is shown in **Table 3**. Overall, 67.1% of BERD was performed by firms of 200 or more employees, 20% was by firms of 20 – 199 and 12.9% was by firms of 0 – 19 (i.e. small to medium sized enterprises in Australia accounted for just under a third of BERD in 2005-2006). This trend was generally followed in the service industries, where 20% of BERD was by firms of 0 – 19 employees, 22.7% was by firms of 20 – 199 and 57.7% was by larger firms of 200+ employees. However, there was also considerable variation within the service sector reflecting the structures of the different industries within it. In two industries, communication services and finance and insurance, the great bulk of R&D was performed

by large firms (in both cases 91.3% of BERD was conducted by firms of 200 or more) and this is due to the structure of these industries which are dominated by large firms (e.g. banks, telecommunications companies and insurance companies). A quite different distribution is apparent in the retail trade (where 94.3% of BERD was conducted by SMEs), property and business services (78.7%) and health and community services (65.4%), and again this reflects the structure of these industries which are more fragmented with very large numbers of SMEs. This finding further reinforces the view that the service sector is very diverse in terms of R&D activity, so making generalisations across the sector about the nature of service innovation within firms can be problematic.

In sum, an analysis of published R&D data reveals trends that are similar to those reported in overseas studies and confirming the perspective that the services are becoming more research intensive and engaged with innovation. As Howells (2000, p. 16) has noted “as manufacturing has taken on more attributes of service activity so equally have services become more manufacturing-like in innovation”. However, as the foregoing discussion has indicated, this performance is patchy across the service industries in Australia in that not all of the industries appear to be highly active in R&D. But while the R&D statistics provide a rough guide to the level of investment made by service firms in innovation, these statistics are not an entirely accurate indicator of service innovation *per se*. There are two main reasons for this. Firstly, it is now widely recognised that official statistics tend to under-report the R&D activities undertaken by service firms (Salter and Tether, 2006). Secondly, industries differ in the extent to which they develop innovations through formal R&D. In science-based manufacturing industries, such as the pharmaceutical and aerospace industries, R&D is a necessary pre-requisite to the development of the materials, technologies and products. By contrast, in many service industries (e.g. accommodation, cafes and restaurants, cultural and recreational services) other informal creative activities which are generally not counted as R&D are more important in innovation (Salter and Tether, 2006; Business Council of Australia, 2006). Thus, for a more accurate picture of the level of service innovation we need to turn to surveys of innovation in Australian businesses.

## INNOVATION IN AUSTRALIAN SERVICE INDUSTRIES

Continuing research initiated in the early-1990s (but discontinued by the late-1990s), the Australian Bureau of Statistics (ABS) conducted two surveys of innovation in Australian businesses, covering the two-year periods 2002-2003 (ABS, 2006a) and 2004-2005 (ABS, 2006b, 2007e). These two surveys provided snapshots of innovation activity in Australia and revealed that: innovation was occurring throughout the economy and across all industries, innovation in goods and services was lower than both process and organizational/managerial innovation in most industries, expenditure on innovation varied markedly across industries (and was highly concentrated in a relatively small number of businesses), and total innovation expenditure by firms involved high levels of non-R&D expenditure. It was also found that the proportion of innovating businesses had increased between the first and second surveys (i.e. from 29.6% to 33.5%), and that such an increase had occurred in all industries except communication services and finance and insurance. In 2007, the ABS commenced the collection of innovation data through its annual Business Characteristics Survey, with the first of these covering the 2005-2006 fiscal year (ABS, 2007d). That survey was based on a random sample of approximately 8,800 businesses and was conducted using a mail-out questionnaire. In designing the survey instrument, a more detailed range of innovation indicators was included thereby providing “the most comprehensive range of innovation measures ever to be made available” in Australia. It should be noted that the survey addresses many (but not all) of the dimensions of service innovation discussed above. A summary of the findings from this survey is presented in **Table 4**.

[INSERT TABLE 4 HERE]

As shown in **Table 4**, 38.9% of Australian businesses indicated that they had introduced or implemented at least one type of innovation (i.e. new goods or services, new operational processes, new organizational or managerial processes, and new marketing methods) during the 2005-2006 fiscal year and a slightly higher proportion were “innovation active” (i.e. 42.4%). Confirming the findings of the earlier surveys, the proportion of innovating businesses varied widely by industry from a low of 28.5% in construction to a high of 56% in the wholesale trade. The most frequently reported types of innovation reported by Australian businesses were new or improved operational processes (20.8%)

and new or improved organizational/managerial processes (20.7%), followed closely by new or improved goods/services (19.3%). Only 14.3% of businesses had introduced a new or improved marketing method. In the service industries, 37% of firms indicated that they had introduced or implemented an innovation in 2005-2006. This is a higher proportion than is suggested by the R&D expenditure data and confirms the observation that much innovation activity in the services does not involve formal R&D (i.e. activities that would be officially counted as R&D). Again the overall figure masks considerable variation across the service industries in innovation performance. At one extreme, the wholesale trade had a very high level of innovation performance (56.9% of firms in this industry were innovating businesses), and this performance was high across all four types of innovation. This high level of innovative activity has no doubt resulted from fundamental changes during the 1990s (i.e. the adoption of productivity-enhancing technologies, increased competition which stimulated rationalisation in the industry, institutional reforms, and changes in underlying demand conditions) which contributed to marked productivity growth in this industry (Johnston et al, 2000). At the other extreme was the construction industry (only 28.5% of the firms in this industry were innovating businesses), which was the poorest performer of all industries in nearly all of the four areas of innovation. This finding is quite at odds with an earlier optimistic interpretation based on the 2003 business innovation data (ABS, 2006a) that the construction industry had embraced innovation and that “professional builders are [adept] at adopting to change, demonstrating innovation in managing both their companies and in the building process” (Australian Institute of Building, 2006). It is a finding that is also at odds with the increase in R&D expenditure over the period 2003-2004 and 2005-2006, and clearly warrants further investigation.

[INSERT TABLE 5 HERE]

Finally, an examination of the drivers of innovation in service firms can provide insights into the nature of service innovation. Summary data on these drivers from the 2005 survey of innovation in Australian businesses (ABS, 2006b) is presented in **Table 5**. As the table shows, nearly all firms (94.2%) across all industries reported that an important driver for innovation was to increase profitability (i.e. through improving productivity, increasing revenue, and/or reducing costs). Of interest, among the service industries profit-related drivers were somewhat lower for transport and

storage (86.6%), cultural and recreational services (87.2%, a not unexpected finding given the nature of this industry), and the utilities (88%, perhaps reflecting the traditionally more “public service” nature of these providers). Market-related drivers were also cited by 89% of all businesses, but nearly all firms (98.9%) in the communication services indicated that this was an important driver of innovation for them, specific drivers in this category being: increased responsiveness to customer needs (87.5%), increased market share (56.5%) and to establish a new market (48.9%). This industry also had the second highest proportion of firms citing increased export opportunities (18.2% versus 21.6% for manufacturing), indicating a highly competitive and growing industry with rapid technological change. The legal-related drivers showed the greatest variation, reflecting the specific conditions under which services are produced in an industry. The legal-related drivers of innovation were more prominent for the utilities (66.6% cited these, including 56.4% citing environmental responsibility and 47.2% the need to meet government regulations), transport and storage (66.1%, the top driver here being the need to improve safety or working conditions), accommodation, cafes and restaurants (64.8%; 48.4% citing working conditions and 44.3% government regulations), and construction (63%; 57% citing working conditions and 45% government regulations).

## **CONCLUSIONS**

There is a growing recognition of the importance of innovation to service providers as a source of differentiation and competitive advantage (e.g. Johnson and Gustafsson, 2003; Fevre et al., 2006), but our knowledge of the nature of service innovation remains poorly developed. This is a major knowledge gap, given the increasing competitive pressures on service firms resulting from globalisation and its associated economic change, and given the important role the services play in the economy as facilitators of innovation and other economic activities. The preliminary survey presented in this paper shows that service providers across all service industries in Australia are performing R&D and are actively innovating, and that – in alignment with overseas studies – the incidence of such activity is generally increasing. However, innovation performance varies within and across service industries. Analysis of the official statistics reveals that across the service industries there are

differences in (a) the level and nature of R&D, (b) the level and nature of innovation, and (c) the drivers of innovation. These differences reflect the different structures, competitive dynamics, types of business transacted, and markets served by the diverse service industries.

Clearly there is a need for more research on this area in Australia, drawing on what has been accomplished by scholars overseas. Two main priority areas for further research can be identified. Firstly, there is an urgent need for studies to clarify the role of services within the Australian national innovation system generally and, within the context of a blurring between economic sectors (“servitisation”), on the development of new goods and services more specifically. Secondly, further conceptual work is required – building on the seminal work of Gallouj and Weinstein (1998) and Howells and Tether (2004) – to gain a clearer understanding of the nature and dynamics of service innovation, which in turn will provide a basis for practical recommendations to service providers. This conceptual work will require not only theoretical development but also focused empirical research of two complementary types. On the one hand, case studies such as those reported by Thomke (2003) and Perry et al. (2006), can reveal the dimensions, developmental processes, benefits and success drivers of innovation in services. On the other hand, surveys using more refined categories and instruments to capture the full range of innovation activities in services (and it is encouraging to see the recently announced changes to official R&D statistics data collection; ABS, 2008) will provide a more accurate picture of the nature and level of innovation within and across all those industries that provide services in the Australian economy. Given the recent increasing interest in service innovation within business, policy and academic circles, perhaps the services should no longer be seen as the “Cinderella Sector” in Australia.

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**Table 1: Australian Business Expenditure on R&D by Industry 2003 – 2006\***

Industry/Sector	2003-2004 \$000 (%)	2005-2006 \$000 (%)	% Change
Mining	1,026,333 (13.2)	1,683,399 (16.9)	64.0
Manufacturing	3,375,340 (43.4)	3,888,742 (38.9)	15.2
Electricity, Gas, Water (utilities)	67,870 (0.9)	58,670 (0.6)	-13.6
Construction	219,971 (2.8)	353,288 (3.5)	60.6
Wholesale trade	481,033 (6.2)	702,566 (7.0)	46.0
Retail trade	56,000 (0.7)	74,416 (0.7)	32.9
Accommodation, cafes, restaurants	-	12,389 (0.1)	-
Transport & storage	44,937 (0.6)	118,094 (1.2)	162.8
Communication services	214,555 (2.8)	353,991 (3.5)	65.0
Finance & insurance	716,808 (9.2)	901,947 (9.0)	25.2
Property & business services	1,507,713 (19.4)	1,717,011 (17.1)	13.9
Education	3,749 (-)	2,297 (-)	-38.7
Health & community services	19,914 (0.3)	42,667 (0.4)	114.3
Cultural & recreational services	21,145 (0.3)	28,963 (0.3)	37.0
Personal & other services	14,586 (0.2)	46,684 (0.5)	220.1
Total	7,769,954 (100)	9,985,124 (100)	28.5

\* Excludes R&D expenditure by agriculture, forestry & fishing businesses

**Source:** Australian Bureau of Statistics (2007)

Research & Experimental Development, Business, 8104.0, 2005-06

**Table 2: Australian Business Expenditure on R&D by Type of Activity 2005 – 2006\***

Industry/Sector	Basic Research \$000 (%)	Applied Research \$000 (%)	Experimental Development \$000 (%)	Total BERD \$000 (%)
Mining	86,728 (5.2)	689,796 (41.0)	906,875 (53.9)	1,683,399 (100)
Manufacturing	173,968 (2.9)	1,023,211 (26.5)	2,691,563 (70.6)	3,888,742 (100)
Electricity, Gas, Water (utilities)	8,139 (13.9)	32,913 (56.1)	17,618 (30.0)	58,670 (100)
Construction	5,737 (1.6)	127,016 (36.0)	220,536 (62.4)	353,288 (100)
Wholesale trade	21,586 (3.1)	201,493 (28.7)	479,487 (68.2)	702,566 (100)
Retail trade	9,710 (13.1)	25,019 (33.6)	39,687 (53.3)	74,416 (100)
Accommodation, cafes, restaurants	-	1,331 (10.7)	-	12,389 (100)
Transport & storage	4,805 (4.1)	53,096 (45.0)	60,193 (51.0)	118,094 (100)
Communication services	-	132,448 (37.4)	207,002 (58.5)	353,991 (100)
Finance & insurance	14,887 (1.7)	182,138 (20.2)	704,922 (78.2)	901,947 (100)
Property & business services	119,407 (6.9)	771,702 (44.9)	825,901 (48.1)	1,717,011 (100)
Education	-	1,122 (48.8)	-	2,297 (100)
Health & community services	5,036 (11.8)	15,589 (36.5)	22,042 (51.7)	42,667 (100)
Cultural & recreational services	-	7,015 (24.2)	20,814 (71.9)	28,963 (100)
Personal & other services	-	2,039 (4.4)	43,944 (94.1)	46,684 (100)
Total	466,881 (4.7)	3,265,928 (32.7)	6,252,314 (62.6)	9,985,124 (100)

\* Excludes R&D expenditure by agriculture, forestry & fishing businesses

Source: Australian Bureau of Statistics (2007) Research & Experimental Development, Business 8104.0, 2005-06.

**Table 3: Australian Business Expenditure on R&D by Employment Size 2005 – 2006\***

Industry/Sector	0-19 Persons \$000 (%)	20-199 Persons \$000 (%)	200+ Persons \$000 (%)	Total BERD \$000 (%)
Mining	122,650 (7.3)	225,750 (13.4)	1,334,999 (79.3)	1,683,399 (100)
Manufacturing	288,450 (7.5)	768,476 (19.8)	2,831,816 (72.8)	3,888,742 (100)
Electricity, Gas, Water (utilities)	3,498 (6.0)	-	52,009 (88.6)	5,8670 (100)
Construction	20,369 (5.8)	25,178 (7.1)	307,741 (87.1)	353,288 (100)
Wholesale trade	72,349 (10.3)	129,491 (18.4)	500,726 (71.3)	702,566 (100)
Retail trade	30,437 (40.9)	39,706 (53.4)	4,273 (5.7)	74,416 (100)
Accommodation, cafes, restaurants	-	-	-	12,389 (100)
Transport & storage	14,831 (12.6)	14,609 (12.4)	88,654 (75.1)	118,094 (100)
Communication services	19,029 (5.4)	11,834 (3.3)	323,128 (91.3)	353,991 (100)
Finance & insurance	31,560 (3.5)	46,764 (5.2)	823,623 (91.3)	901,947 (100)
Property & business services	656,593 (38.2)	696,153 (40.5)	364,265 (21.2)	1,717,011 (100)
Education	-	-	-	2,297 (100)
Health & community services	13,631 (32.0)	18,531 (43.4)	10,505 (24.6)	42,667 (100)
Cultural & recreational services	3,893 (13.4)	10,832 (37.4)	-	28,963 (100)
Personal & other services	7,318 (15.7)	3,936 (8.4)	35,430 (75.9)	46,684 (100)
Total	1,291,499 (12.9)	1,995,940 (20.0)	6,697,685 (67.1)	9,985,124 (100)

\* Excludes R&D expenditure by agriculture, forestry & fishing businesses

Source: Australian Bureau of Statistics (2007) Research & Experimental Development, Business, 8104.0, 2005-06.

**Table 4: Innovation in Australian Businesses by Industry 2005 - 2006**

Industry/Sector	Businesses Innovating	Introduced New/Improved Goods/Services	Introduced New/Improved Processes	Introduced New/Improved Organization or Management	Introduced New/Improved Marketing Methods
	%	%	%	%	%
Mining	36.3	11.3	17.4	23.1	10.6
Manufacturing	44.6	19.3	31.5	21.5	16.3
Electricity, Gas, Water (utilities)	40.8	17.9	22.8	24.1	9.5
Construction	28.5	12.2	12.5	16.1	8.3
Wholesale trade	56.9	35.1	30.5	27.1	28.4
Retail trade	41.8	22.7	20.1	18.2	17.0
Accommodation, cafes, restaurants	32.6	13.1	18.8	19.5	14.0
Transport & storage	40.8	16.8	29.8	20.3	9.6
Communication services	38.8	20.5	24.6	17.9	12.6
Finance & insurance	47.3	22.3	21.3	19.2	21.0
Property & business services	37.3	19.8	21.2	21.9	13.0
Health & community services	33.0	13.6	17.1	22.4	8.8
Cultural & recreational services	42.0	20.7	22.1	25.5	16.2
Personal & other services	44.3	24.0	15.6	26.1	18.8
Total	38.9	19.3	20.8	20.7	14.3

**Source:** Summary of IT Use and Innovation in Australian Business, 2005-06, Australian Bureau of Statistics (2007) 8166.0.

**Table 5: Drivers of Innovation in Innovating Businesses by Industry 2004 – 2005**

Industry/Sector	Profit-Related Drivers %	Market-Related Drivers %	Legal-Related Drivers %
Mining	87.0	70.0	55.3
Manufacturing	95.7	93.0	56.8
Electricity, Gas, Water (utilities)	88.0	89.6	66.6
Construction	92.3	82.9	63.0
Wholesale trade	93.3	88.5	40.6
Retail trade	97.4	83.5	51.8
Accommodation, cafes, restaurants	93.0	89.0	64.8
Transport & storage	86.6	83.9	66.1
Communication services	100.0	98.9	43.2
Finance & insurance	94.3	92.3	42.0
Property & business services	94.6	93.7	51.4
Cultural & recreational services	87.2	85.4	38.9
All Industries	94.2	88.9	53.1

**Source:** Australian Bureau of Statistics (2006) Innovation in Australian Business, 2005, Cat. No. 8158.0.