

# Management practices and innovation capacity in enterprises

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## **Abstract**

This paper reports on a project which seeks to identify the role of human capital formation in promoting innovation in Australian enterprises and the ways in which enterprises can improve their human resource management and learning and development practices to improve their innovation performance. There are a number of factors that affect enterprises' ability to innovate. These include internal factors such as the ability to detect technological changes in the environment, the development of core competencies from which innovation can develop and external factors such as the maturity of the market which the enterprise serves and the impact of government policy to stimulate innovation. A range of studies have suggested that human factors within the enterprise are critical to innovation. However, these studies have not established exactly what practices enterprises need to put in place to improve their "innovation capacity". This paper reports the results from the research. The research method involved a survey of over 2,500 business enterprises and 7 case studies drawn from the manufacturing, ICT and finance industries. The paper will discuss the major findings from the research.

## **Introduction**

Despite all that has been written on the importance of human capital factors in innovation, most of the research literature is prescriptive. The dilemma is that humans in their daily activity are creatures of habit and routine, yet innovation requires recognition and responsiveness to change. Oakley (2002:31) notes that '... the agents and strategic actions in focus ... are confronted with the problem of adapting habits and routines in order to make decisions in the face of novel situations'.

'Innovation can be defined as the creative application of knowledge to increase the set of techniques and products commercially available in the economy' (Courvisanos 2007:46). Harnessing this process for business enterprise and economic development requires an appreciation of the factors that produce knowledge and creativity. Innovation has long been regarded as essential for enterprises and national economies to thrive in globalised and increasingly competitive markets (Christensen & Raynor 2003; Department of Trade and Industry [UK] 2003). However, the historically poor innovation performance of Australia in relation to other developed economies has concentrated the efforts of Australian researchers and policy-makers to address this issue. In this context, in 2008 the Rudd Labour Government made innovation a policy priority early on, with the creation of the Department of Innovation, Science and Research and the commissioning of the Cutler Review of Australia's innovation performance (Cutler and Company 2008). Before the full extent of the Global Financial Crisis was realised, the Cutler Review made the strong argument that Australia's innovation performance was poor by international standards and that there was a key role for government policy in promoting innovation in enterprises. Since the Cutler

Review, the global economic downturn has served to emphasise the need for Australian industry to become more innovative to enable the country to meet the twin global challenges of shifting from debt-driven consumerism and high-carbon emissions production into sustainable development (Stiglitz 2010). Australia is still economically too trade-dependent on a few large industries which are vulnerable to the both the vagaries of the international economy (especially commodities, tourism and education) and the international pressures for ecological sustainability. The need to diversify in order to ameliorate any future economic volatility and environmental destruction places enormous pressure on Australia's innovation processes. This includes the three major types of innovation—product (new goods and services), process (new ways of doing things) and organisational (new and more productive ways of organising work in order to support product and process innovation).

There are a number of factors that affect enterprises' ability to innovate. These include internal factors such as the technical skills for developing successful in-house research and development (R&D) outcomes, the ability to detect technological changes in the environment, and the development of core competencies from which innovation can develop. External factors are not dependent on the enterprise, but instead on the life cycle position of the market which the enterprise serves, the impact of government policies to stimulate innovation, and the nature of the innovation systems that feed into the national and regional business activity. There is a significant body of research on the technological factors of innovation and how to manage these factors to better stimulate innovation in enterprises (see Ahamed & Lawrence 2005). Only since the early 1980s with the work of the Harvard Business School (notably, Kanter 1983)—rediscovering the path-breaking book by Penrose (1959)—have human capital factors been specifically identified in terms of management for inducing innovation. The focus of this paper is on the role of these human capital formation factors in the management of innovation.

A range of studies have suggested that human factors within the enterprise are critical to innovation (Kanter 1983; Gupta & Singhal 1993; Hauser 1998). Thus, the ability of enterprises to innovate depends on the effective management of human resources and, in particular, the learning and development (L&D) practices instituted by enterprises that increase both the quantity and quality of workforce innovation skills. It should be noted that the education system (from primary to secondary and then on to tertiary education) underpins any enterprise L&D system. Studies in Denmark (Laursen & Foss 2003) and Spain (Jiménez-Jiménez & Sanz-Valle 2008) show that better human resource management (HRM) practices and establishment of new L&D systems increase enterprise innovation. However, these studies have not established a theoretical structure or exactly specified the broad human capital formation practices that enterprises need to put in place to improve their 'innovation capacity'.

### **Building innovation capacity: A macro framework**

Innovation capacity is the ability of enterprises to identify trends and new technologies, as well as acquire and exploit this knowledge and information (Tidd, Bessant & Pavitt 2005). This innovation 'capacity' concept needs to be clearly distinguished from dynamic innovation 'capability'; the latter deals with the firm's specific ability to continuously transform knowledge and ideas into profitable innovations. In this context, Terziovski (2007) develops a leadership-based model, in which firms innovate across three domains—new product development, sustainable development and e-Commerce—using all aspects of the firm's capacities, including HRM. This current investigation examines the *prior* role for employees, through the HRM function, to acquire capacity to innovate in order to then be capable of working within a strategic innovation model of the type set up by Terziovski.

The process-based conception of innovation (or absorptive) capacity, linking technological and human capital stimuli, highlights the role of learning in the innovation process (Lichtenthaler 2009). For a long time innovation research concentrated on the technological factors that enhanced innovation, identifying all the 'hard' elements of the innovation process, such as R&D, physical sciences education, engineering and design (see Tidd, Bessant & Pavitt 2005, p.112). As studies on the human factors of innovation within the enterprise began to appear after Kanter (1983), the need arose to link these human factors into an overall macro-perspective of the complete innovation process that operates within an enterprise. Figure 1 presents this macro framework, based on the research literature on innovation in business enterprises.

In figure 1, the human capital factors are underpinned by the internal L&D system within an enterprise and the external tertiary (vocational education and training and higher education) education system, which supports internal L&D. The L&D system can be defined as a systematic arrangement that enables the effective absorption of information, knowledge and ideas within a specified organisational structure. Such a system brings together internal and external training, individual career development and organisational development to embed in employees a learnt ability to recognise and use stimuli, thus building innovative capacity. An emerging small range of literature is examining the new forms of L&D in Australia that are needed to support innovation-based learning enterprises. Another set of studies undertaken for NCVER have focused on the role of the external VET system in working with innovative enterprises to improve their abilities to implement product, process and organisational innovation—usually by supplying skills at the intermediate level (Dawe 2004; Curtain 2004; Garlick, Taylor & Plummer 2007). There have also been some studies in Australia on the role of universities in supporting innovative entrepreneurship and business development (Garlick 1998). However, these studies usually examine how the public tertiary system can support the L&D systems of enterprises, rather than what the enterprises can do to develop their L&D systems. The principal focus of this study is to look inside enterprises and examine their specific L&D systems, the tertiary education system that supports L&D, and their interaction with the HRM systems and practices of enterprises. A combination of these three systems delivers the complete human capital formation factors applying to enterprises, which are the basis for building innovation capacity, and no Australian study has examined the interaction of these three systems for this purpose.

**Figure 1 Macro-level innovation framework**

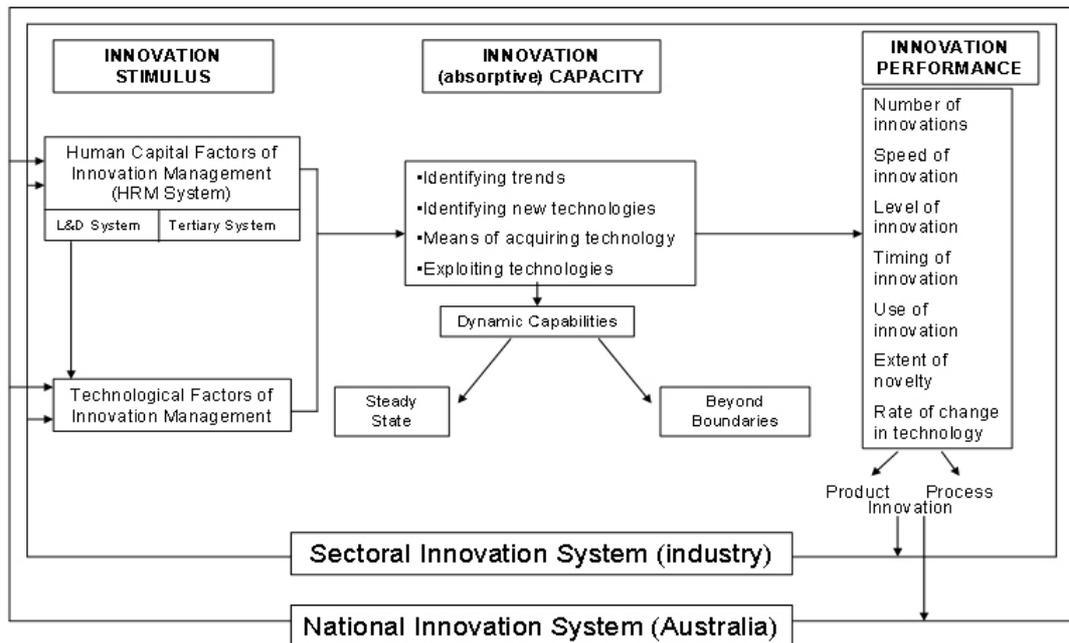


Figure 1 is an extension of the macro framework in Prajogo and Ahmed (2006) known as the Stimulus-Capacity-Performance (SCP) approach. In the framework, human capital and technological capital are the stimulus factors which develop innovation capacity. It is this innovation capacity that determines how effectively an enterprise can undertake the innovation commercialisation process, from imagining and incubating, to demonstrating, promoting and sustaining (Jolly 1997). The better built the innovation capacity, the more effectively an enterprise can conduct this innovation process, and thus, the stronger the innovation performance.

Both Prajogo and Ahmed (2006) and Jiménez-Jiménez and Sanz-Valle (2008) explain how empirical research does not show that innovation stimulus factors have any direct effect on innovation performance. Instead, both studies demonstrate that there is a link between the stimulus factors implemented at the enterprise level and the development of ‘innovation capacity’ of the enterprise. Specifically, innovation capacity is the potential of the enterprise to innovate, based on the capabilities of its employees to recognise, assimilate and apply innovation stimuli (Prajogo & Ahmed 2006, p.502). This innovation capacity perspective was first labelled ‘absorptive capacity’ by Cohen and Levinthal (1989), in recognition of the need for workers in the enterprise to absorb information and knowledge from external collaborations in R&D. Michie and Sheehan (1999) extend this absorptive capacity concept to the organisational setting in which employees operate and to their ability to absorb innovation stimuli within the enterprise. Thus, it is the extent to which all the innovation stimuli (both technological and human) are able to be absorbed within the enterprise over time (that is, dynamic) that provides the capabilities for innovative performance. Tidd, Bessant and Pavitt (2005, p.73) identify two dynamic capabilities—*steady state* (or ‘doing what we do but better’) and *beyond boundaries* (or ‘doing differently’). Steady state works on a step-by-step (or continuous) process of incremental innovation, while beyond boundaries operates at a discontinuous level that drives radical innovation. Building innovation capacity across both capabilities enables enterprises to become ambidextrous in functioning on both incremental and radical innovation at the same time.

Many studies support the macro framework of managing both human and technological capital formation to build innovation capacity, and also that such capacity building leads directly to stronger innovation performance.<sup>1</sup> Major books on building innovative organisations, for example, Dussauge, Hart and Ramanantsoa (1992) and Christiansen (2000), highlight the need to integrate the ‘soft’ human factors into technology management in order to deliver effective innovation performance from enterprises, which is measured by the various dynamic variables specified on the right-hand side of the framework in figure 1.

Prajogo and Ahmed (2006) identify four human capital innovation stimulus factors: leadership, people management, knowledge management and creativity management. Leadership sets the scene in determining the direction the enterprise’s HRM system will take, in that highly transformational leadership will create a more innovative business climate than highly transactional leadership. From the HRM systems perspective, the ‘leadership’ factor is not a human capital formation tool that can be implemented to build innovation capacity. The concept of building capacity in the enterprise’s workforce is as critical to successful innovation as acquiring technological knowledge and capital. To this end, the macro framework of innovation outlined in figure 1 identifies the technological and human innovation stimuli that are needed to build innovation (or absorptive) capacity. It is this capacity that enables the innovation process to traverse effectively through its stages to deliver a measurable innovation performance in product and process innovation.

### **Modern approaches to HRM**

HRM has become a touchstone of modern management practice. As the global economy became increasingly competitive in the 1980s (Best 1990), enterprises started to look to the skills and abilities of their employees as sources of future competitive advantage (Barney 1991). The example of Japan’s economic success in the 1980s was a powerful indicator to business leaders in the developed world that competitive success could be gained, at least partly, through better ways of managing employees. From this emerged the recognition that HRM is essential in creating an organisational climate or culture in which employees’ skills and abilities can be effectively utilised for building innovation capacity. This basic recognition led to the development of two strategic models of HRM in the research literature.

One set of strategic models of HRM emphasises the importance of training employees well at work in order to secure their commitment to the enterprise and thus better business outcomes (Beer et al. 1984; Walton 1985; Rainbird 1994). These models are known as ‘soft’ models of HRM, as they emphasise universal and prescriptive ways of managing employees that yield the desired outcomes for enterprises. Walton (1985) summarises this soft approach as moving ‘... from control to commitment’. Walton’s thesis is that, through better HRM practices such as careful selection and recruitment, performance management, rewards and training, enterprises could move away from an emphasis on controlling their employees to a situation in which enterprises gave employees more control and allowed them to make a greater commitment and contribution to the enterprise. This is the first place that a link to innovation can be drawn. Guest’s normative (1987) model sets out the concept of better HRM practices for better outcomes in the enterprise (figure 2). Thus, HRM practices become linked to better human resource outcomes, including commitment and flexibility. Such new practices yield organisational outcomes, including better job performance, lower turnover, and also higher levels of innovation.

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<sup>1</sup> Examples of such studies are Schroeder, Scudder and Elm (1989), Vrakking (1990), Brown and Karagozoglu (1993), Zien and Buckler (1997), Tang (1998), Ahmed (1998).

**Figure 2 A Theory of HRM**

*A theory of HRM*

HRM policies	Human resource outcomes	Organisational outcomes
Organisation/ job design		<b>High</b> Job performance
Management of change	Strategic integration	<b>High</b> Problem-solving Change Innovation
Recruitment selection/ socialisation	Commitment	
Appraisal, training, development	Flexibility/ adaptability	<b>High</b> Cost-effectiveness
Reward systems		
Communication	Quality	<b>Low</b> Turnover Absence Grievances

*Leadership/culture/strategy*

Source: Guest (1987).

The other set of strategic HRM models link HRM directly to business strategy. This strategic approach is known as the ‘hard’ approach to HRM, in contrast to the soft approach (Fombrun, Tichy & Devanna 1984; Legge 1995). In the hard approach, the role of HRM is to enable the core business strategy of the enterprise to be implemented effectively. This approach places less emphasis on the treatment of employees at work and the securing of employee commitment, but rather on treating employees as another—albeit critical—strategic resource for the enterprise on which competitive advantage could be built. This brings HRM into the strategy-formulation processes of the enterprise. It also means that, unlike the soft approach with its emphasis on universal prescription of ‘better ways of managing’, the hard approach is contingent on the circumstances of the enterprise. Schuler and Jackson (1987) show how different HRM strategies might be lined up with different business strategies. Using Porter 1980’s characterisation of the three basic business strategies of innovation, quality enhancement and cost-reduction, Schuler and Jackson show that each strategy requires different HRM practices.

The idea of HRM strategy being contingent on the business strategy and the commercial circumstances of the enterprise led to the notion of ‘fit’. Here, HRM has to fit both the external, strategic posture of the enterprise and display internal organisational structural fit. The aim is for work to be designed to ensure that innovation occurs within an external strategic setting designated by the enterprise (external fit), while ensuring that individuals in the enterprise are allowed to innovate (internal fit). If successful, such an approach allows for building an ambidextrous innovative capacity, as argued by Tidd, Bessant and Pavitt (2005). Further, the notion of internal fit means HRM practices have to fit together to ensure that one practice does not invalidate another practice (Baird & Meshoulam 1988). Thus, HRM practices need to work together in self-reinforcing ‘bundles’ in order to provide maximum benefit to the enterprise (MacDuffie 1995), both for the strategic posture of the enterprise and for maximising internal creative activities.

The notion of bundling HRM practices has become very influential in formulating the current role of HRM in enterprises. Using the work of Edith Penrose, who examined the way in

which enterprises compete in terms of resources (1959), the resource-based view (RBV) of the enterprise builds on the notion of human resource 'bundles' to show that employees and their skills are the only real source of sustainable competitive advantage, when other resources such as technology are easily imitated by competitors. Hamel and Prahalad (1994) describe this as a core competence for enterprises. Thus, the RBV approach to HRM emphasises the creation of unique dynamic bundles of capabilities based on the skills and attitudes of employees (Boxall & Purcell 2008). The role of HRM is to nurture the human resource and to ensure that enterprises hold onto employees in order to build a bundle of dynamic capabilities that create sustainable competitive advantage for both steady state and beyond boundaries innovation.

More recently, attention in HRM research has switched from strategy towards the concept of 'high performance work' systems (for example, Colombo, Delmastro & Rabbiosi 2007). The emphasis on work systems as opposed to simpler HRM practices also emerged from the success of Japan in the 1980s, in this case, from the development of the Toyota Production System, which was held responsible for the remarkable levels of productivity achieved by Toyota and other Japanese manufactures in the 1990s (Womack, Jones & Roos 1990). High performance work systems blend HRM practices, work design and the use of new technology. As Bélanger (2004) put it, high performance work systems embrace three concepts: production management (greater use of flexible quality production systems); work organisation (production processes based on knowledge, cognition and teamwork); and employee relations (harnessing employee commitment). Usually in these high performance work systems the human resource manager will be given the task of implementing a performance-based pay system and ways of deploying the tacit skills of the workers.

### **The role of HRM in innovation**

There is very little empirical research attempting to forge the links between HRM and innovation at the enterprise level. The research that has focused on this aspect sees HRM as a tool for managing innovation, rather than focusing on the role of HRM in promoting innovation (Becker & Matthews 2008; Birkinshaw, Hamel & Mol 2008). Many of the studies undertaken by innovation scholars focus on innovation capability and its propensity to generate innovation performance, but do not focus specifically on the role of HRM in building innovation capacity. This restricted view exists despite deep HRM research on the strategic position of HRM in enterprises. An integrated framework bringing together the work of HRM and innovation scholars is only beginning to emerge (see for example, de Leede & Looise 2005).

Studies by HRM scholars have attempted to map innovation performance against HRM practices. Jiménez-Jiménez and Sanz-Valle's (2005) empirical study of a range of Spanish enterprises examines how an enterprise configures HRM strategy for innovation performance. This study is based on both the Schuler and Jackson (1987) categorisation of HRM strategy and Porter's (1980) strategic types, and on the widely used Miles and Snow taxonomy of strategy (1984). These latter two 1980s studies represent opposites in the use of HRM to promote innovation. While Schuler and Jackson advocate a range of inclusive 'soft' HRM practices, Miles and Snow prefer a model that is much 'harder' in its orientation—hiring in the skills that are required, with little internal promotion and limited training programs. In a study of 350 Spanish firms, Jiménez-Jiménez and Sanz-Valle (2005) found that the Schuler and Jackson model appears to result in higher levels of innovation performance amongst the firms in the sample. This finding confirms the importance of the strategic approach to HRM and innovation, and also the use of 'soft' HRM practices to create

a stable and committed workforce willing to take risks (and learn from them) to further innovation.

Another empirical study of Spanish Firms by Perdomo-Ortiz, González-Benito and Galende (2009) examines the use of HRM practices associated with total quality management (TQM), called 'HRMtqm practices', and their impact on innovation performance of enterprises. These include team working, extensive employee training, performance management and measures to increase the motivation of employees. In particular, the authors look at the use of these practices in bundles. HRMtqm practices are very similar in nature to those associated with high performance work systems, so the study presents a useful proxy for the impact of high performance work systems on innovation performance. The authors find a direct link between the use of bundles in high performance work systems practices and innovation performance. The strongest links in the study are between the use of teamwork (work organisation) and measures to increase worker motivation. There is also a weaker, direct link between the use of training and innovation (an issue discussed in more detail below).

As noted at the beginning of this paper, there are studies which argue that the link between HRM and innovation performance is not direct, but mediated through the creation of an organisational 'capacity', leading to innovation capability, which is in turn associated strongly with actual innovation performance. Lau and Ngo's (2004) study of Hong Kong firms is typical of these studies. Lau and Ngo examine the impact of specific HRM practices—training, team development and performance-related pay. They theorise the existence of a developmental culture that leads to higher levels of innovation performance. Lau and Ngo note only training as being linked directly to innovation performance and that this relationship is rather weak and conclude that HRM practices strongly link to the creation of a developmental culture in enterprises. In essence, a developmental culture is an organisational culture in which individual development is encouraged and rewarded. Prajogo and Ahmed (2006) support this indirect view, establishing that the capacity of managing sophisticated technological and R&D knowledge from inside or outside the enterprise is the specific culture that induces innovative performances.

Possibly the most comprehensive work on HRM and innovation has been undertaken in Denmark. Since the mid-1990s, the University of Aalborg has hosted the Danish Innovation System project (DISKO), which involves a regular survey of Danish private sector enterprises that aims to trace the relationship between technical and organisational innovation at the enterprise level. Laursen and Foss (2003) analyse the 1996 dataset from the project to explore the links between innovation and HRM. This study links the level of enterprise innovation to the extent to which enterprises bundle their HRM and high performance work systems practices, reflecting the importance of the bundling theory of high performance work systems, as discussed above. Laursen and Foss find a strong relationship between enterprise-level innovation and two forms of the bundling of HRM and high performance work systems practices. The first bundled system consists of interdisciplinary workgroups, quality circles, employee suggestion schemes, planned job rotation, delegation of responsibility, integration of functions, and performance-based pay. The second bundled system relates to training, discussed below. Thus, the study shows that HRM practices, when implemented together in a bundled fashion, have a strong stimulus effect on innovation in the sample manufacturing firms. The Danish research establishes that it is bundles of HRM practices that are linked to innovation performance rather than individual practices.

Thus, research strongly suggests that HRM and innovation are linked more effectively by an inclusive 'soft' bundle of HRM practices, and that such bundles create a culture or set of

dynamic capabilities from which both steady state and beyond boundaries innovation spring, rather than enhancing innovation performance directly.

### **The research project**

In 2009, the National Centre for Vocational Education Research funded our project to investigate the links between better human resource management practices and innovation in enterprises. The aim of the research was to elaborate a theory of human capital formation in enterprises that built innovative capacity and elicited the actual human resource management practices that will build this capacity. The project research questions were as follows:

- ✧ What is the role of human capital formation through human resource management and learning and development practices in enterprises that promote/inhibit the development of innovative capacity?
- ✧ What part does enterprise engagement with the tertiary system, both VET and higher education, play in the formation of human capital and the development of innovative capacity?
- ✧ What guidelines can be developed that can be used by managers in enterprises to promote innovative capacity through better human capital formation?
- ✧ What role is there for intermediary bodies, particularly industry skills councils, in developing innovative capacity in their industry sectors?

### *Survey methodology*

The project methodology involved three phases. The first phase was a series of interviews with experts; this helped frame questions for the national employer survey, which constituted the second phase of the research. The third phase involves a series of case studies. This paper reports results from the employer survey.

The survey covered seven main topic areas, consistent with the conceptual framework presented in figures 1 and 2: organisational characteristics, innovation practices and strategies, human resource practices, learning and development practices, human resource performance and organisational context. Development of the survey took place in late 2009 and early 2010. The target population for the survey were human resource managers in medium-to-large private enterprises (defined as those companies with 50 or more employees) across Australia. The population was limited to private sector organisations with 200 or more employees. The estimated size of this population was 5876 companies. The sample frame for the study was drawn from the Dun and Bradstreet company database. A stratified sample of 1875 organisations was drawn from this sample frame for the purposes of the study.

Data collection for the survey was conducted via a paper-based self-completion survey, with return via pre-paid envelope. Three waves of mailouts were completed, in April, May and June 2010, to maximise response rates. The Centre for Regional Innovation and Competitiveness (CRIC) at the University of Ballarat managed the survey printing and mail distribution. Overall, 142 responses were returned. A further 313 distributed surveys were returned to CRIC marked 'return to sender', while there was no response from the remaining 1420 distributed surveys. Excluding the 'return to sender' returns, which were deemed to be out of sample, this results in a final response rate of 9.09 per cent.

### **Results from the survey**

In terms of organisational characteristics, most of the organisations in the sample were large, with a median of 818 staff and a mean of 350. Most of the organisations were privately owned, with over 70 per cent being private limited companies. Over 70 per cent of the organisations were either Australian-owned or subsidiaries of an Australian parent company. The majority of organisations were involved in manufacturing, retail or construction.

Most of the organisations in the sample employed predominantly full-time, permanent staff. The use of part-time and casual staff was quite limited, with 90 per cent of the organisations employing fewer than 17.5 per cent of their workforce on a part-time basis and 75 per cent of organisations employing fewer than 15 per cent of staff casually. The level of tertiary qualifications held by staff in the sample organisations was relatively low. In 75 per cent of the organisations fewer than 40 per cent of staff held VET qualifications and, on average, only 10 per cent of staff in the sample organisation held a higher education qualification.

Very few measures of human resource practices were related to innovation capacity or innovation performance directly. The only measures that showed a relationship to innovation were measures of work organisation and flexible work practices.

Few measures of training and development were related to innovation capacity or performance. The only measures that showed any relationship were the areas covered by training and company attitudes to training. The clustering of human resource management practices into high performance work patterns has long been associated with higher organisation performance on a range of measures. In terms of innovation, the study reveals that organisations tend to use one of three possible clusters of high performance work practices—flexible working time, team-based work organisation and a combination of a larger number of practices.

### **Relationships underlying the conceptual model**

Having considered the various measures included in this study, the analysis now turns to an examination of the relationships underlying the conceptual model. In general, it would be preferable to consider each of these relationships within a single model, most often using techniques such as structural equation modelling. However, this was not possible, given the final sample size achieved in the survey. For this reason, each of the paths in the conceptual model will be addressed separately, and then implications drawn for the case studies that form the next phase of the project. The analysis is in three stages:

- ✧ the relationship between innovation capacity and innovation performance
- ✧ the relationship between innovation stimulus and innovation performance
- ✧ the relationship between innovation stimulus and innovation capacity.

This study examined both innovation capacity (the capability of an organisation to innovate) and innovation performance (the actual innovation activities of an organisation). Both of these aspects of innovation were measured using two dimensions—whether the innovation was associated with a process or product and whether the innovation was incremental or radical.

In terms of *process innovation*, the study showed clear relationships between innovation capacity and innovation performance. The results show that incremental process capacity is related to higher levels of process innovation performance, while a capacity for radical process innovation shows no apparent relationship.

By comparison, in terms of *product innovation*, higher process innovation performance is linked to radical product innovation performance. This suggests that process innovation appears to lead to product innovation in some cases. Product innovation capacity, whether radical or incremental, is also linked to higher levels of product innovation performance.

So, while the capacity of an organisation to innovate in terms of new products is linked to its performance in product innovation, there is no such clear relationship between process innovation and process innovation performance.

In testing for direct relationships between innovation stimuli and innovation performance, there were few direct relationships uncovered. The only stimulus factors that appeared to have a direct impact on innovation performance were measures of knowledge exchange and learning and development. None of the other stimulus factors had a direct impact on innovation performance.

The study examined the link between the major stimulus factors—human resource practices, knowledge management and creativity and innovation capacity. In terms of human resource management, separate HR practices such as work organisation and training activities were not linked to the development of innovation capacity, although positive attitudes to training demonstrated a link to product innovation capacity. The use of flexible work practices such as flexitime and working from home also showed a weak relationship to incremental product innovation capacity.

By comparison, there were some differences in innovation capacity associated with the bundling of human resource practices into high performance work clusters. In particular, the cluster of high training, high performance work organisation and flexible work practices showed a relationship to the development of innovation capacity.

Looking at other innovation stimuli, the major influence on innovation capacity was in the areas of external organisational linkages to support creativity and support for organisational learning and training within the organisation.

When all stimuli measures were concurrently analysed against innovation capacity, the predominant relationship with all four capacity measures was to external organisational linkages. High performance work organisation and knowledge exchange practices were also associated with incremental product innovation capacity.

The model of innovation performance that informed the research project argues for a staged model of performance—the development of innovation stimuli within the organisation to generate innovation capacity and leading to organisational innovation performance. The findings of the employer survey presented in this project support this model. The survey analysis examined the relationship of both innovation stimuli and innovation capacity factors to innovation performance, and demonstrated that there was no direct effect of innovation stimuli on performance. By comparison, the innovation capacity factors indicated a clear relationship between capacity and performance.

The survey analysis then proceeded to explore the relationship between various innovation stimuli measures (people management, knowledge management and creativity management). This review considered the independent relationship of each of these factors to four innovation capacity measures. The people management practices did not show significant effects for individual practices, but the bundling of ‘high performance’ work practices (particularly around the organisation of work) demonstrated a positive relationship with higher levels of innovation capacity, particularly in product innovation. Support for

organisational training and learning and knowledge and creative linkages to external organisations were also associated with different innovation capacity factors.

In summary, the results from the employer survey suggest that the original two-stage model, which informed the research project, is correct. None of the stimulus factors was linked to changes in innovation performance. The relationship between the stimulus factors for innovation and innovation performance is mediated by the enterprise's innovation capacity. There appear to be quite strong links between a number of the stimulus factors and innovation capacity. In particular, the stimulus factors that appear to develop higher levels of innovation capacity include:

- ✧ positive attitudes and support for organisational learning and training
- ✧ the use of flexible work practices
- ✧ the bundling of high performance work practices
- ✧ linkages with external organisations, particularly with educational institutions such as universities and TAFE.

It is these factors that research suggests comprise the most important drivers of developing enterprise innovation capacity and so have a positive influence on the final innovation performance of the enterprise.

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