

BUILDING INNOVATION CAPACITY: THE ROLE OF HUMAN CAPITAL FORMATION IN ENTERPRISES

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Abstract

This paper describes 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. Thus the ability of enterprises to innovate depends on the effective management of human resources and, in particular, the learning and development practices that enable enterprises to increase the skills of workers to innovate (human capital formation). Studies in Denmark and Spain have shown that better human resource management and learning and development practices increase enterprise innovation. However, these studies have not established exactly what practices enterprises need to put in place to improve their "innovation capacity".

Introduction

The purpose of this paper is to present the concept underlying a new research project that will examine the direct relationship between HRM, learning and development and the development of innovative capacity at the enterprise level. Although much recent research has suggested a strong connection between these elements, no research has yet been carried out which seeks to measure the relationship directly. This project will use both survey and case study method to examine the nature and strength of this relationship in enterprises. The result will be a final report that provides a model of the relationship of HRM and L&D and innovation in enterprises along with a set of managerial guidelines for use by enterprises to improve their capacity to develop greater innovative capacity. As the Australian economy moves from recession to into another period of strong growth with the receding of the Global Financial Crisis, it is more important than ever that Australia diversify its economic base. The development of innovative capacity in enterprises in major export sectors will be critical to future security of the overall Australian economy.

“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). To harness this process for business enterprise and economic development requires an appreciation of the factors that produce knowledge and creativity. However, innovation as a process is complex and poorly understood, because it is deeply rooted in the uncertainty of the future world, from which emerge new products, processes, movements, organisations and sources of raw material. All that is known is that innovation brings change and something ‘new’ emerges, which cannot be precisely modelled, and as such a framework of analysis that guides the researcher through the complexity of innovation is the best approach.

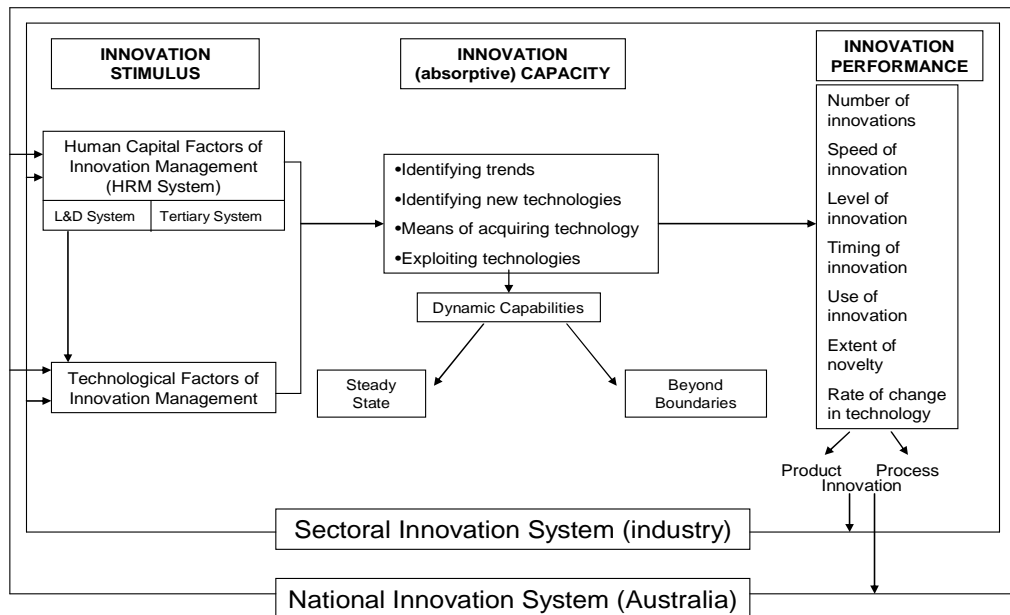
Innovation has long been regarded as essential for enterprises and national economies to thrive in globalised and increasingly competitive markets (DTI, 2003). However, the historically poor innovation performance of Australia in relation to other developed economies has concentrated the efforts of Australian researchers and policy-makers in addressing this issue. In this context, in 2008 the new Federal Rudd Labor 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, 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 in order for the country to meet the twin global challenges of shifting from debt-driven consumerism and from high-carbon emissions production into sustainable development (Stiglitz, 2009). 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 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 and 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 to induce innovation. The focus of this literature review is on the role of these human capital formation factors in the management of innovation. Despite all that has been written on the importance of human capital factors in innovation, most of the literature is prescriptive. A range of studies have suggested that human factors within the enterprise are critical to innovation (Kanter, 1983, Gupta and 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 and Foss, 2003) and Spain (Jiménez-Jiménez and Sanz-Valle, 2008) have shown that better 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”.

The framework shown in Figure 1 presents a macro-perspective of the complete innovation process that operates within an enterprise. Innovation research for a long time concentrated on the technological factors that enhanced innovation, identifying all the “hard” elements of the innovation process such as research and development (R&D), physical sciences education, engineering and design (see Tidd et al., 2009). 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 perspective on innovation. A basic macro framework of innovation including both human capital and technological factors was developed by Prajogo and Ahmed (2006) known as the Stimulus-Capacity-Performance (SCP) approach. In the framework, human and technological capital are the stimulus factors which develop innovation capacity which, in turn, results in innovation performance. This SCP approach forms the basis for the framework set out in Figure 1. 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 the link between the stimulus factors implemented at the enterprise level develop the “innovation capacity” of the enterprise and it is this innovation capacity that produces the final innovation outcomes. 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 and Ahmed, 2006:502). This innovation capacity perspective was first labelled “absorptive capacity” by Cohen and Levinthal (1989), recognising 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 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 (i.e. dynamic) that provides the capabilities for innovative performance Tidd *et al.* (2009) identify two dynamic capabilities - steady state (or “doing what we do but better”) and beyond boundaries (or “doing differently”), with the aim of enabling enterprises to develop an ambidextrous capability for managing both forms of innovation.

Figure 1: Macro Framework of Innovation



Innovation capacity as set out in Figure 1 is the ability of enterprises to identify trends and new technologies, as well as acquiring and exploiting this knowledge and information (Tidd *et al.*, 2009). This 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). In Figure 1, the human capital factors are underpinned by the internal L&D system within an enterprise and the external tertiary (VET and Higher Education) education system. The L&D system enables the effective absorption of information, knowledge and ideas. It is the learnt ability to recognise and use stimuli which creates innovative capacity. An emerging range of literature is examining the new forms of L&D that are needed to support innovation-based learning enterprises. Previous studies of innovation 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 *et al.*, 2007). There have also been some studies in Australia on the role of universities in their role of supporting innovative entrepreneurship and business development (Garlick, 1998). However, these studies usually examine how the public tertiary system can support enterprises’ L&D systems, 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 and their interaction with the HRM practices of the enterprise.

Literature Review

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 and Mathews, 2008; Birkinshaw, Hamel and Mol,

2008). Many of the studies undertaken by innovation scholars have not focused clearly on the role of HRM (de Leede and Loosie, 2005) despite the fact that HRM researchers have identified an increasingly strategic position for HRM in enterprises. However, in recent years a number of studies have been undertaken that have highlighted the role of HRM in innovation. One such study is that of De Leede and Loosie (2005) who built on Guest's (1987) original framework for HRM processes leading to human resource and organisational outcomes, but also combined this with Tidd *et al's.* (1997) four stages of the innovation process. The model begins with the formulation of an business strategy that is clearly based on innovation and the building of innovation capacity. In an adaptation of Guest's (1987) model, this results in an HRM strategy that is also based on innovation which leads to a range of HRM practices that are used at every one of the four innovation stages - signal processing, strategy, resourcing and implementation. Finally, the use of HRM practices to shape the innovation strategy of the enterprise leads to a series of human resource outcomes including learning, creativity, commitment and competence which underwrite innovation success for the enterprise. This model is a useful starting point for considering the role of HRM in innovation. The model brings together recent theories on the workings of HRM in enterprises and relates them to the major stages of the innovation process at the enterprise level.

HRM and innovation

Recently studies by HRM scholars have attempted to map innovation performance against HRM practices. Jiménez-Jiménez and Sanz-Valle (2005)'s empirical study of a range of Spanish enterprises examines how an enterprise configures HRM strategy for innovation performance. This study is based both on the Schuler and Jackson (1987) categorisation of HRM strategy with Porter's strategic types, and also 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. Whilst 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.

As noted at the beginning of this review, 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" (or capability) for innovation which is in turn is associated strongly with actual innovation performance. Lau and Ngo (2004)'s study of Hong Kong firms is typical of these studies. Lau and Ngo examined the impact of specific HRM practices - training, team development and performance related pay. They theorised the existence of a developmental culture that leads to higher levels of innovation performance. Lau and Ngo noted only training as being linked directly to innovation performance, and that this relationship was rather weak. Rather, Lau and Ngo concluded that HRM practices are strongly linked 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 which aims to trace the relationship between technical and organisational innovation at the enterprise level. Laursen and Foss (2003) analysed the 1996 DISKO dataset to explore the links between innovation and HRM. This study linked the level of enterprise innovation to the extent to which enterprises bundled their HRM/high performance work systems practices, reflecting the bundling theory of high performance work systems discussed earlier. Laursen and Foss found a strong relationship between enterprise level innovation and two forms of bundling of HRM and high performance work systems practices. The first bundled system consisted 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 related to training which is discussed separately below. Thus, the study showed that HRM practices, when implemented together in a bundled fashion, have a strong stimulus effect on innovation in the sample manufacturing firms. The DISKO research established that bundles of HRM practices link to innovation performance rather than individual practices. 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.

Learning and Development and Innovation

Training plays a key role in bundles of HRM practices that enhance innovation. The research into the impact of HRM on innovation provides evidence about the effect of training on innovation performance. Extensive employee training has long been linked to the bundles of HRM practices that constitute the high performance work systems approach to HRM (Macduffie and Kochan, 1995; Osterman, 1996). Training is often seen as the “litmus test” of the existence of high performance work systems and of bundles of HRM practices (Belanger *et al.*, 2004). Laursen and Foss (2003), using the DISKO dataset, identified the L&D system of an enterprise as the second HRM bundle, based entirely on internal and external training provision. This study showed that the L&D system, when internal and external training are implemented together, has a strong stimulus effect on innovation in service sector enterprises - especially information technology, retail and wholesale. The salient role of training provision in the impact of HRM on innovation performance is also borne out in the Lau and Ngo (2004) study. This study showed that training plays a key role in the developmental culture of the enterprise and was the only single HRM practice directly linked to higher levels of innovation performance. Thus, the role of training within an L&D system appears to be to develop the knowledge and skills required at an individual level to produce higher levels of innovation and to feed into the creation of organisational cultures and management capabilities that sustain innovation.

Smith *et al.* (2005) examined the impact of nationally recognised training on large Australian enterprises, taking into account the changes to the VET system in recent years, especially the development of training packages. The research revealed a major increase amongst large enterprises in the uptake of nationally recognised training due to introduction of training packages. Many groups of workers in areas such as retail, hospitality and process manufacturing, which hitherto received very little employer sponsored training, were now being offered not only training but also nationally recognised qualifications by their employers. Other enterprises re-designed their training functions to become brokers rather than deliverers of training with the emphasis on the skill of the training co-ordinators to navigate their way through the national VET system rather than devise and deliver in-house programs of training. Training packages and the development of suites of qualifications for a large numbers of formerly untrained occupations was pulling together the three elements of HRM - training, career development and organisation development - into a single L&D function within larger enterprises in Australia. This research suggest strongly that L&D has emerged as a field of practice which is quite different from the old training and development functions that used to dominate the training scene in Australian enterprises. In the new world of L&D, the emphasis is on learning opportunities that are afforded to individuals and groups in enterprises rather than on the provision of specific training initiatives. This has sometimes been referred to as a learning culture or a learning orientation in enterprises (Smith *et al.*, forthcoming). The learning culture of an enterprise is linked to better HRM outcomes in the form of reduced levels of employee turnover and higher levels of employee satisfaction (Smith *et al.*, 2008). Such a learning culture is reflected in Lau and Ngo (2004)'s notion of the developmental culture which creates the innovative capacity identified by Prajogo and Ahmed (2006) and mirrored by the concept of absorptive capacity (Cohen and Levinthal, 1990). With the DISKO data and cross-referencing to market data for the period 1993-1997, Vinding (2006) shows that absorptive capacity directly impacts on higher levels of innovation performance. Thus, learning, via the learning culture developed by L&D systems, is a critical element in the development of absorptive and innovative capacity.

The impact of L&D is not purely internal. L&D systems are distinguished from simple training by their external links to education systems, especially the tertiary sector. Early linear models of innovation envisaged enterprises, usually large firms, making significant investments in R&D departments staffed with highly trained technical experts overseeing product development (Roussel *et al.*, 1991). This model of "big science" underpinned the development in Australia of the CSIRO and large corporate R&D departments. The skills implications of this model focus on the supply of science graduates to staff the large R&D departments which comprise an elite cadre of highly trained staff driving innovation. There are few if any implications for the wider skills of the workforce of enterprises that might produce new products or processes.

New L&D systems go further in supporting innovation than the extension of training to new groups in the workforce. In fact, L&D systems are leading the integration of HRM/high performance work systems practices in enterprises that have been highlighted as a key element in both high performance working and in innovation (Smith and Smith, 2007). In some enterprises, the new L&D systems "take over" the broader HRM function and facilitate the full integration of all HRM/high performance

work systems activities under the banner of employee development. If innovation at the enterprise level depends on the development of the dynamic capabilities and competencies of the enterprise, then the development of new L&D systems under the stimulus of nationally recognised training will assist in achieving that end by extending training to more groups of workers and by facilitating the integration of HRM practices that are critical to successful innovation.

The role of HRM and learning and development at the enterprise level in the development of innovative capacity has not been well researched. Apart from some international studies that have addressed the issue in a rather peripheral way and work in Australia that has focused on the role of the public VET system, there has been no comprehensive exploration of the role of HRM and L&D on innovation. The purpose of this study is to focus on this area in some detail at the enterprise level, drawing together the results from recent studies that point in the direction of a strong link between HRM, L&D and innovative capacity and examine this relationship in a quantitative and qualitative way.

The research method

The research project will address the following questions:

1. What is the role of human capital formation through enterprise-based HRM and L&D practices in developing innovative capacity?
2. 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?
3. What guidelines can be developed that can be used by managers in enterprises to promote innovative capacity through better human capital formation?
4. What role is there for intermediary bodies, particularly Industry Skills Councils, in developing innovative capacity in their industry sectors?

The study will use a range of quantitative and qualitative methods to investigate the research questions. The method involves three key elements:

1. A series of interviews with experts to establish issues and inform the survey instrument design. A number of individual interviews will be held with key informants. Informants will include representatives of governments employers, unions and other VET bodies such as ISCs. The interviews will be conducted face to face where possible or, if not possible, by phone. Information from the interviews will be used to develop the survey questionnaire in line with the measures of innovation stimulus, innovation capacity and innovation performance identified in the model.
2. A survey of private sector enterprises drawn from the Dun and Bradstreet database to establish the key relationships between human capital formation and enterprise innovation capacity. There is no existing survey or any existing datasets that allow us to correlate enterprise innovation with human capital development. An employer survey is thus a necessary element in this

methodology. A mailed survey will be sent in two waves to about 3,000 organisations economy-wide with details drawn from the Dun and Bradstreet database. The survey will not be confined to the three specific industries chosen for the qualitative phases for two reasons: (1) to increase the number of respondents and (2) to provide an economy-wide basis for comparison with the three industries chosen for more intensive investigation. The survey instrument will be piloted with six enterprises to ensure serviceability, employer understanding and low response burden.

3. Nine case studies of enterprises in three industry sectors to investigate in-depth how human capital formation practices develop innovation capacity in enterprises. Nine case studies will be undertaken in three industry sectors. The cases will be selected on the basis innovation performance – thus a high, medium and low innovator in each sector. We will use the expertise of the expert interviewees to identify suitable enterprises in each sector. The case studies will allow the research team to further investigate the relationships between human capital formation and innovative capacity that emerge from the survey and assess the ways in which these relationships work in practice. This will be an opportunity to fully implement the research framework to identify innovation stimulus, capacity and performance in specific enterprises. Pattern matching across the three enterprises in each industry will assist to identifying the nature of HRM and L&D innovation in these industries and the extent of their use of the tertiary education sector to assist in this innovation process.

Conclusion

The Stimulus-Capacity-Performance (SCP) approach applied to this literature review provides a holistic framework to investigate the factors that impact on innovation in an enterprise. Within this macro framework of innovation the focus of this review has been on the role of human capital formation in assisting technological innovation to effectively move from creative ideas to significant innovative outcomes with competitive advantage which is difficult to imitate, has significant user value, and is both timely and commercially exploitable (Porter, 1980). Since employees are an enterprise's most vital resource in delivering such innovative outcomes, there needs to be careful study of *all* human capital formation factors that build innovation capacity towards innovative performance. There is much detailed research from a wide range of discipline areas on various specific aspects of building such capacity – HRM studies on organisational development and specific roles within people management, education studies on training, learning and development, science and innovation systems studies on knowledge management, psychology studies on stress and creative work behaviour, creativity ecologies studies on creativity management. However until now, there has been no study which has attempted to pull all this together into one coherent overall approach to building innovation capacity in enterprises.

The details of an innovation-based organisational strategy become the province of the micro framework for investigating the innovation stimulus measures required. A vast number of studies analyse specific innovation stimuli, but the diversity of disciplines and schools of thought carrying out these studies prevents any broad perspective of the complete human capital formation process. This is where this review, by outlining

above a representative sample of this vast literature, provides the method of incorporating all this plethora of research into one micro framework based around people, knowledge and creativity management. The crucial element in putting together a human capital formation strategy for building innovation capacity is the ability to balance on the one side, co-operative employee involvement in collective thinking of a creative ecology; and on the other side, individual self-expression in mistake-laden resource-limited control-based corporations. In essence, this is a fine balance of managing the risk and uncertainty between overload and underload that any modern enterprise needs to find in the process of forming an innovative human resource base that generates an adequately 'good' amount of stress, or "eustress" (Le Fevre *et al.*, 2003). The framework outlined in this review will be used to empirically investigate the nature of human capital formation in medium-to-large Australian enterprises in the next phase of this research project.

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