

From skills shortages to emerging skills growth in the technical professions: A conceptual model for organisational innovation and industry policy

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This study develops a conceptual framework for emerging skills in an effort to provide guiding principles and industry-specific initiatives to assist recruitment and retention in the technical professions within Australia's engineering, mining, health and manufacturing industries. The study addresses gaps in the literature on skills formation in order to identify emerging jobs and assist Australia's future industrial development. It does so through a two stage comparative analysis of industry and organisational strategy, with specific attention to cultural diversity and the power of language.

Keywords: Australia, emerging jobs, human capital, industry skill formation discourse and policy innovation, skills shortages, technical professions

Introduction

This study aims to develop an emerging skills conceptual framework that provides both guiding principles and industry-specific initiatives to assist recruitment and retention in the technical professions within Australia's engineering, mining, health and manufacturing industries. The study addresses gaps in the skills formation literature in order to identify emerging jobs and assist with Australia's future economic development. It does so through a two stage comparative analysis of industry and organisational strategy, with specific attention to cultural diversity and the power of language. The term *technical professions* refers to professions in the engineering, mining, health and manufacturing industries. Engineering, mining and health were selected due to their rapid expansion and major contributions to the Australian economy. Manufacturing was selected as a comparative industry sector that maintains an important economic role, but suffering in terms of employment (2.1% reduction over the past five years DEWR 2007), recruitment, retention and training. Thus there is a need to undertake an analysis of a broad range of the strategic human resources literature, permitting effective medium to long term skills based planning. Recent research shows that finding suitably trained labour has become a key factor constraining business output (Macfarlane 2005) hence there is increased attention related to Australia's *skills shortages*, a term which is retrospective and implies the need for reactive urgency to address current issues.

Research questions

This study seeks to examine the use and effects of industrial *skills shortages* and identifies key strategic, cultural and discursive factors necessary to shift discussion from existing *shortage* to *skills formation and growth*. The term *organisational innovation* refers to the dedication of processes to capitalise on opportunities and dedicate resources to assist the growth of emerging jobs. The scope of the study is restricted to professional skills as these skills are likely to require dedicated advanced education and infrastructure and require careful long-term planning if they are to be developed and retained within Australia (BCA 2006, 2007). Thus, the following seven research questions driving this study are:

1. What are the emerging skills within the technical professions?
2. What are the knowledge bases required for emerging skills?
3. What role does organisational strategy / innovation play in facilitating emerging skills?
4. What role does organisational culture / innovation play in facilitating emerging skills?
5. How will cultural diversity of the workforce facilitate emerging skills?
6. How has industry responded to the skills shortages, and emerging skills?
7. What form of industry/government skills framework will facilitate emerging skills?

Significance of study

The significance of this study is that it addresses the imperative to skill Australians for emerging jobs and the delivery of a conceptual skills framework for use by government, educational institutions and industry in planning to advance Australia's national competitive advantage. To date there is no systematic planning system to anticipate changing professional and technical needs in Australia (recently acknowledged by Universities Australia chief executive Glenn Withers in Rowbotham, Healy, and Rout 2007). Furthermore, there is sparse research in this area that has impacted on and influenced industry policy. While skills needs within the VET sector have been addressed by a consortium comprised of researchers from the Flinders University's National Institute of Labour Studies, and Melbourne University's Centre for Post-compulsory Education and Lifelong Learning (NCVER 2007), there is little research addressing the professions. In particular, there is a need for in-depth comparative studies of the technical professions to identify key challenges (and potential blockages) for organisational innovation and industry policy. This study provides the basis for inter-industry learning in order to facilitate Australia's continued development beyond that which is riding the current resources boom. In the following section a theoretical framework is developed that provides an integration of three literatures relevant to the aim of this study and illustrates the necessity for a multiple level (industry and organisational) methodology to address the study's research questions.

Theoretical framework

There are three literatures which reflect issues pertinent to the aim of this study; institutional approaches to human development, firm based innovation policy and human capital discourse. In particular, this study utilises the groundwork of several authors (Becker 1964; Becker 1993; Crouch, Finegold, and Sako 1999; Karpin 1995; O'Donnell, Garavan, and McCarthy 2001; Buchanan and Hall 2005) in developing an Innovative Skills Framework for Australian Industry.

Figure 1 International competitive HR model (adapted from Karpin 1995)

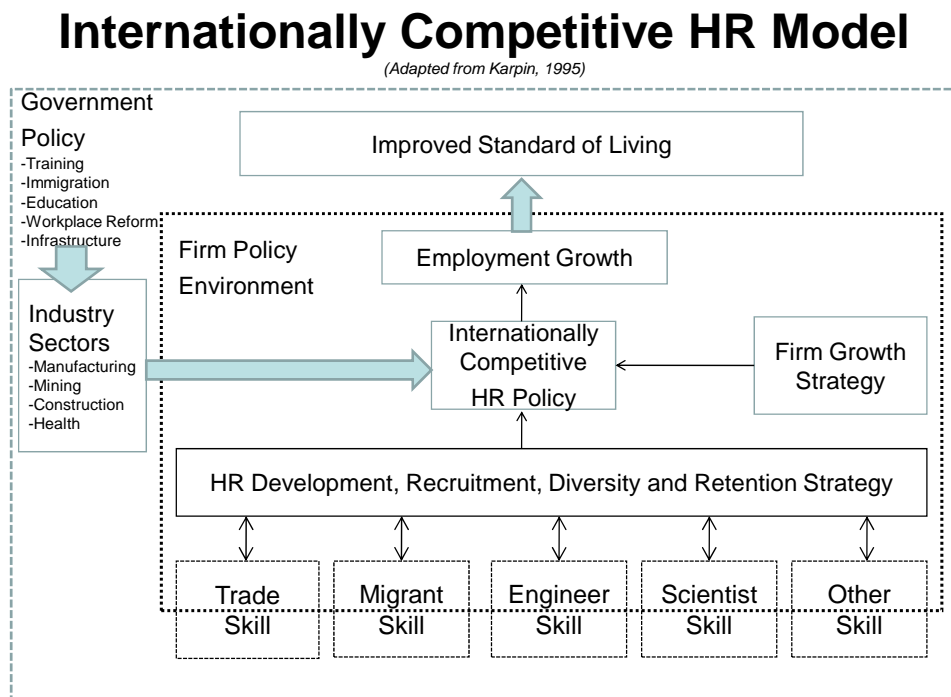
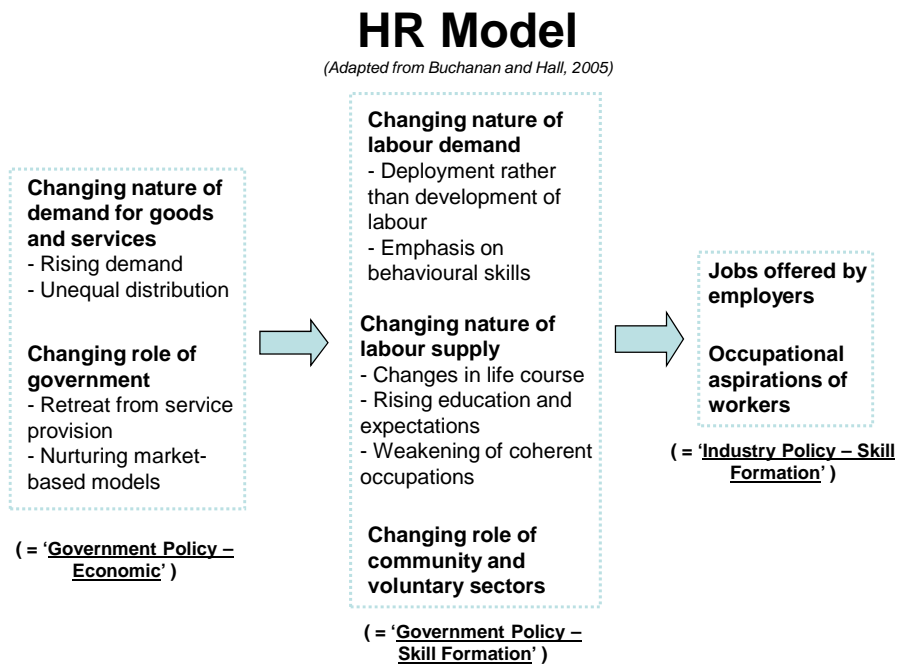


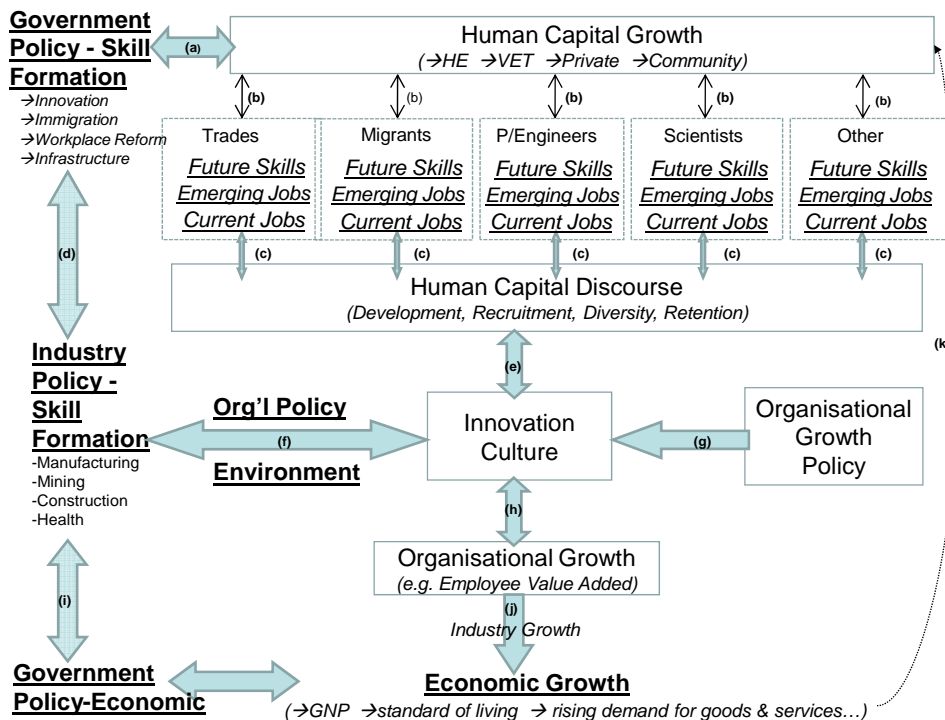
Figure 1 notes the internationally competitive HR model proposed in the Karpin report into Australian leadership and management skills (Karpin 1995). This model along with the Human Resource Model (Figure 2) proposed by Buchanan in his work addressing skills in contemporary Australian services industries, has formed the base for the innovative skill formation framework in this study.

Figure 1 HR model (adapted from Buchanan and Hall 2005)



The preliminary framework shown in Figure 3, acknowledges the complexity of the skill transfer, absorption and creation processes within an intangible resource base (Barney 1991; Barney 2001; Wernerfelt 1984) and notes the possibility that organisations in this process utilise multiple policy and discourse routines (Foss, Knudsen, and Montgomery 1994; Foss 1993; Nelson and Winter 1982). The following sections are devoted to developing this framework.

Figure 3 Preliminary Innovative Skill Formation Framework



Institutional policy level - human capital development and growth

Traditional public policy approaches to human capital development involves an emphasis on the role of social structures and organisations, or state sanctioned people centred *skills formation*, as a solution to poverty and social exclusion (Green et al. 2007). According to human capital theory (Becker 1964; Lev and Schwartz 1971), the amount of *skills formation* (education, training, learning, experience) employers and employees are willing to undertake or purchase is determined by a classic risk and reward self seeking framework (game theoretic origin). The value of human capital discourse in the organisation is often optioned against other growth policies such as diversification, technology adoption, off-shoring and labour migration.

The human capital perspective (Becker 1993) acknowledges that the pursuit of high level human skills in a society is a collective goal, in which governments have, in general, pursued *skill formation* policy in close consultation with business interpretations of what this means in practice. However, western governments have increasingly transferred this responsibility to the market where individuals and organisations have been left to make judgements about what *skills* should be undertaken or provided and through what means. The role of Government policy in this market driven environment has reduced to one of a safety net for human casualties of the economy, and limited involvement in *industry skill formation discourse* or *industry skill policy innovation*. In addition, private sector business policy which aims to maximize localised growth outcomes has at best self interest in public policy objectives. In so doing they may engage in human capital discourse (e.g. skill based development, diversity, recruitment and retention – see Figure 3) for current professional jobs, however there is little to suggest that company decisions and market forces will provide for the *emerging jobs* or *future skill formation* required for society at large. In this environment, the pursuit of the learning society as an objective of public policy should not be transferred entirely to a market of self seeking collectives. The growing demand by organisations for education systems to provide greater adaptation to the complex needs of the individual requires change from all levels of *skill formation* systems, not least of which is balancing the skill delivery and provisioning for both *current* and *emerging skills* at all stakeholder levels. Figure 3 illustrates this through the following links: Peter, please check the numbering of the three figures, I think this should be Figure1?

- a) *Human capital growth* (HE, VET, Private, Community) is affected by *skill formation* policy which includes political systems, employment/education law, industrial relations systems, economy and labour markets and the national stage of economic development whereas national skill formation adapts *human capital growth*.
- b) *Human capital growth* is affected by each individual's (trades, migrants, p/engineers, scientists, other) competencies and professional needs, learning styles, commitment to self-development, ambitions changes in life course, rising education and expectations and occupational aspirations (Metcalf and Rees 2005; Buchanan and Hall 2005) connected with a steadily shortening working life and the domination of the "Baby Boomers" generation (Richardson 2006). These developments of the labour market effect *human capital growth*.

Organisational level - human capital discourse

Successful organisations today are those that shape a distinctive organisational culture of innovation that is difficult for others to replicate. Their unique culture embraces the engagement of human capital discourse in the production/delivery process within the workplace and in the content of the output itself. Markets are also increasingly dynamic, global and competitive, with an attendant focus on organisational efficiency and labour productivity both of which are made more difficult by the rising the cost of scarce mobile resources (inter-firm labour migration) and the increasing employer tendency to fund only job facing *skill formation* (Cumiskey 2007). In this environment (labour) market deregulation and human capital policies are opposing logic. In the former, emphasis is on labour removal (commoditisation of human capital). Whereas in the latter, employees are viewed as long-term resources (rare, valuable, inimitable, organised human capital, Barney 1991; Barney 2001). In this context firms have strong incentives to move from disengagement in all institutions that require policy interaction in *skill formation discourse*, to demanding government re-engagement in solving the crisis. Crouch (1999) in a discussion about human capital discourse outlines five key governance structures for skills provision – the **market**, **hierarchy**, **state**, **association** and **community**. These governance structures are alternate responses to two issues. The first, being the public good nature of many skills means that there is often an under investment in skills formation by organisations. The second, due to poor information on the future returns from training and workplace opportunities there is often an under consumption of training at an individual level. In other words, the five governance structures are degrees of responses to the tensions between the public and private good aspects of *skills formation* at each stakeholder level of Figure 3. Of

particular interest here is the notion of **market / association** governance of *skills formation* – the idea that despite organisational (**association**) need, public goods such as *skills formation* is not being provided by the private sector at large (**market**) to service its own current job need, and more importantly little human capital discourse is being undertaken in the provision of *skills formation* for the emerging skill base. The classic examples of private sector industries suffering from lack of *skills formation* are mining, engineering, health and manufacturing (despite declining in proportion of GNP share, manufacturing is growing in absolute terms and technological complexity). The important point is that the solution to such a governance structure would involve a blurring of private and public costs and benefits, and a return to what might be considered an inflexible hierarchical system of *skill formation*. That is, a **state** and **hierarchical** governance system has greater difficulty in dealing with individual skill need (i.e. private goods), may be more remote from firm specific skills needs, but may be more suited to overcoming the public goods issues involved with future oriented (*emerging*) *skills formation*. Figure 3 illustrates these issues by the following links: Should this be Figure 2?

- c) *Human capital discourse* (development, diversity, recruitment and retention) forms the bridge between the *skill formation* on a government level and *skill formation* on an industry level. Developments on the labour market influence *human capital discourse* which influences an organisation's culture and capacity to innovate.
- d) The connection between *skill formation* on a government policy level and an industry level is based on levelling individual, organizational and community needs (Bishop 2006).

Organisational level - policy and culture of innovation

Policies directed at innovative cultures that embrace diversity aim for the generation of novelty, to affect temporary monopolies relative to their competitors and earn economic rent for a period of time (Cohen 1995; Scherer and Ross 1990). Within the strategy literature, the systems of innovation approach examines the important economic, social, political, organisational and institutional factors that influence the development, diffusion and use of innovations (Teece and Pisano 1994; Teece, Pisano, and Shuen 1997). One of the key activities of any system of innovation whether national, industry or organisational is that of competence building (Hitt and Ireland 1985; Snow and Hrebiniak 1980; Winter 1987). Competence building – or *skill formation* leading to the creation of human capital which includes the provision of education and training (e.g. through HE, VET, private and community systems), and other learning throughout an individual's working life in the form of learning-by-doing, learning-by-using and individual learning (Allen 1999). Competence building is one of the three key types of learning in any innovation culture (Hamel and Heene 1994; Prahalad and Hamel 1990). As learning is considered critical for an innovative culture and its associated values, attitudes and beliefs, then *skill formation* in the way we describe it here is indispensable for educational institutions, organisational and industry competitiveness, economic prosperity and ultimately improved living standards.

As the central element of skill formation at an industry policy level, *innovation* and *culture* influences and is influenced by *human capital development*, *organizational growth policy* and *policy environment* and *growth*. According to central innovation theory (Dawe 2004), *innovation* and *culture* is comprised of a cluster of values which are influenced by a (Figure 3 (e)) changing nature of labour demand (Buchanan and Hall 2005) and (Figure 3 (f)) the *organizational policy environment*. As a one-directional force, organizational growth policy influences innovation and culture which results in a sustained competitive advantage (Wright, McMahan, and McWilliams 1994; Boxall 1998). Successful human capital planning, analyzing, organizing, directing and monitoring then results, as an output of innovation and culture, in organizational growth (Zula and Chermack 2008). Figure 3 illustrates this by the following links:

- i) Skill formation on an industry policy level and government policy on an economic level are connected by the industry's knowledge, skills, innovation, culture and policy base.
- j) Industry growth, with is caused by organizational growth, results in growth of the whole economy.
- k) The changing nature of demand for goods and services (rising demand and standard of living) that is caused by economic growth then acts as a driver to a new cycle of the skill formation process (Buchanan and Hall 2005).

Study implications

The theoretical overview generated the following significant key points and research gaps:

- First, there is a clear lack of knowledge on the impact of market driven *skills provisioning* on industry based emerging jobs and organisational human capital discourse that requires

addressing. More generally from an innovation culture perspective, there is limited information on the relative importance of different types of competence building for current and future organisational competitiveness.

- Second, in terms of the process of human capital discourse it is unclear whether it is possible for organisations to pursue social objectives (*skill formation*) and economic objectives simultaneously.
- Third, in terms of skills formation, there are a variety of different governance systems. As outlined, there is an implicit expectation on the part of Australian employers that a new form of hierarchical governance structure should be instituted, one that references the integration of both current and emerging skill needs of all stakeholders (Allen 1999; Cummiskey 2007).
- Fourth, with respect to the Australian public sector, there appears to be a lack of human capital skill (design, production, management and marketing expertise) to facilitate policy engagement with industry on the creation, learning and competence building required for future innovativeness and competitiveness.
- Finally, industry appears to have a limited appreciation of government policies related to training and education that may develop or sustain domestic and international competitiveness. Along similar lines innovative practices from industry seem to a degree to be constrained by a lack of activity and limited discourse between industry sectors, government and education sectors.

The methodological innovation of this study will be the inclusion of multi-tiered stakeholders (government, industry bodies and organisations) and multi-industry contexts (manufacturing, mining, engineering and health) framework.

Methodology

This study offers in-depth documentary analysis of the literature, including stakeholders from government, industry bodies and organisational levels. The proposed framework includes recommendations for government policy, educational practice and human resource management. The analysis is informed by data from industry/government surveys and reports, Senate Inquiries, Department of Employment and Workplace Relations reports, content analysis of reports both electronic and printed media, ABS data, Reserve Bank of Australia (to address RQ1).

We build our approach to theory and method on Van Maanen, Sorensen and Mitchell's (2007:1145) assertions that theory and method are the tools we use to build our representations and understandings of organisational life. We generate the study's theoretical framework with the aim to develop an empirical model that discovers, documents, explains, and predicts skills processes and structures that characterise emerging skills shortages in four disciplines (engineering, mining, health and manufacturing).

Discussion

Australia's future economy, prosperity, and well being are tied to the skills and productive capacity of its workforce (Rudd et al, 2007). This study maximises Australia's technological capability and national competitive and innovative advantage through the development of an innovative research-based skills framework for use by government, educational institutions and industry. It is envisaged that the framework will assist in the transformation of Australian industries through identification of key challenges (and potential blockages) for successful organisational innovation and industry policy. Furthermore, the framework will assist the education sector to meet graduate attribute requirements for the technical professions. This study provides a springboard for inter-industry learning in order to facilitate Australia's continued development beyond that which is riding the current resources boom. Thus, the development of an innovative national emerging skills framework provides:

- Benefits for the education sector in meeting the graduate attribute needs for the technical professions;
- Recommendations for organisational skill formation policy informed by research grounded in a theoretical framework and sensitive to the discursive power of key terms;
- Recommendations for Australian industry skill formation policy; Federal and State Government skill formation policy

Finally, this study addresses Frontier Technologies for Building and Transforming Australian Industries and businesses' ability to make more effective use of business models, systems and processes and the

promotion of an innovation culture and economy through maximising Australia's creative and technological capability.

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