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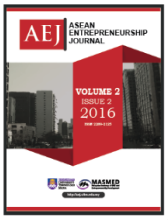

The Longitudinal Study of the Effect of Human Capital on Organisational Innovation in Australian SMEs

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ABSTRACT

For the past two decades, organizational innovation has been studied by a number of scholars. This study has examined 1,423 SMEs, of various industries, in Australia from 2009-2011 by using Business Longitudinal Database (BLD) from the Australian Bureau of Statistics (ABS). Our research finding shows that human capital (HC) has a positive and significant effect on product and process innovation after the two-year interval. Since resource-based view RBV recommended that inimitable and valuable skills would mature over time, the impact of HC on organisational innovation is clear in this longitudinal study, supporting the perspective that managers ought to stress HC for better organisational innovation. HC affects effectiveness and efficiency only if employees fully utilise their capacities and aptitudes completely for the firm's objectives as long as they remain with the firm. Thus, managers should make every effort to maintain a long-tenured workforce in order to maintain the tacit and explicit knowledge in employees.

Key Words: SMEs, Human Capital, Organisational Innovation, Australia

1. INTRODUCTION

Small and Medium Enterprises (SMEs) are an important means of job creation. It is well acknowledged that SMEs contribute between 30 to 60 percent of the Gross Domestic Product (GDP) in many countries. Regardless of country, SMEs are facing similar problems, which affect the survival and performance of their firms.

A National Federation of Independent Business study for US businesses shows that SMEs failure rates is more than 9 per cent a year when failure is defined as "discontinuance of ownership". The number dropped to less than 1 per cent a year when failure was defined as bankruptcy.

According to Australian Bureau of Statistics (ABS) (2012) Counts of Australian Business, including Entries and Exits June 2011 to June 2015, there were 2,132,412 SMEs operating in June 2011, 86.9% was still operating in June 2012, whereas in June 2013, it was 23.7%. Furthermore, in June 2014 it was 31.7% and 38.1% was in June 2015. The number of SME survival is decreasing every year. A surviving business is defined by ABS (2012) as a business which is active on the Australian Bureau of Statistics Business Register (ABSBR) at 1 June of the current year and was also active in the previous year.

According to Australian Bureau of Statistics analysis, the main reason that needs to be emphasized is that most exits are not firm failures. Switzer (2007, p. 22) has reported that, in Australia “less than 0.5 per cent of businesses exit each year due to catastrophic failure -- bankruptcy or liquidation”. In addition, Switzer also stated that, the main reason for the exits (founders quitting the business) is, some business owners find the challenges of managing the business and organizing staffs. Therefore, the tense in human capital will be the big issues to explore. Survival of SME sector is perceived to be crucial for competitive advantage and economic development (Porter & Kramer, 2006). However, SMEs are facing with dilemma in addressing the issue of how to achieve competitive advantage. In order to be in competitive advantage, firms have to be proactive and innovative. The past decades have ineffectively provided clear and reliable results, convincing ‘best practice’ solution in innovation research (Hsu & Sabherwal, 2011; Leitner, 2011; Smith, Collins, & Clark, 2005; Wu, Lin, & Hsu, 2007). According to Kraft (1990) the factors that affect product innovation drives process innovation, while the factors that affect process innovation do not go about as an inducement to product innovation.

Hence, the objective of the research is to study whether human capital is associated with different types of organisational innovation in SMEs when controlled for firm size and industry type. Therefore, the

research question is: Is human capital positive and significant predictors to the types of organizational innovation (product and process innovation)? The main contribution in this study is: there are a few quantitative studies that have been conducted in Australia (Clarke, Seng, & Whiting, 2011), especially in SMEs that used time lag study. By using SME data from different industries, this research contributes to the body of knowledge and sheds new light on human capital and organizational innovation.

2. LITERATURE REVIEW

In this section, the literature relating to the organizational innovation in SMEs is reviewed in order to identify significant constructs to outline the basis for the development of theoretical model. The resource-based view (RBV) of the firm is used to explain the manner in which SMEs develop competitive advantage.

The major problem that SMEs face is lack of resources for innovation "Managing scarce resources becomes critical to their survival" (Kim, Knotts, & Jones, 2008, p. 128). SMEs need to obtain these resources through collaboration with other firms (Hadjimanolis, 2000) or they may need to create these resources by themselves. According to Wernerfelt (1984, p. 172), resources can include "anything that might be thought of as a strength or weakness of a given firm" and so "could be defined as those [tangible and intangible assets] which are tied semi permanently to the firm" (p. 172).

Competitors that have similar resources will be unable to contribute to superior returns. Thus, resources must be difficult to create, buy, substitute, or imitate (Barney, 1991; Lippman & Rumelt, 1982; Peteraf, 1993). Many valuable resources are protected by knowledge barriers (Miller & Shamsie, 1996). They cannot be imitated by competitors because knowledge is delicate and hard to understand because they involve talent that is hard to pin down and the connection with results are difficult to differentiate (Lippman & Rumelt, 1982).

In order to develop competitive advantage, knowledge can be the most important package of intangible resources (Hitt, Ireland, & Hoskisson, 2007; McEvily & Chakravarthy, 2002). According to Miller and Shamsie (1996) knowledge can be classified as skills: technical, creative, and collaborative. According to Lado and Wilson (1994), the protection of knowledge is not perfect, but it will normally take time, and by then, a firm may have gone to develop its skills further.

In the following section, each construct will be analyzed with the aim of developing research hypotheses.

2.1 Human capital

Several scholars (Brooking, 1996) define HC as leadership, skills, abilities and expertise, while Chang, Chen, and Lai (2008) view it as the tacit knowledge embedded in the workers. Some suggest that HC has other elements such as qualifications, attitudes, education, job-related personality traits, and intellectual agility (Bontis, Keow, & Richardson, 2000; Guthrie & Petty, 2000; Roos & Roos, 1997). Based on a review by Martín-de-Castro, Delgado-Verde, López-Sáez, and Navas-López (2011), HC can be grouped into three main clusters; behaviour, knowledge, and ability. HC is the key for firms to unlock new information and knowledge (Kang & Snell, 2009). HC is crucial to all firms (Stewart, 2007) and without HC a firm may not be able to survive in the industry or to expand long term. In this study, HC is referred as the teamwork, skills, and knowledge of the individuals in the organisation.

2.2 Organizational Innovation

Product innovation, is defined as '...the introduction of a goods or service that is new or significant improvements in technical specifications, components and materials (OECD, 2005b, p. 48). The second type of innovation is process innovation which the Oslo Manual defines as '...the implementation of a new or significantly improved production or delivery method (2005, p. 49).

Australia is facing problem in developing strategies in order to compete and survive (Terziovski, 2010). Even though SMEs face extensive resource limitation, they are often successful innovators (Gopalakrishnan, 2000). SMEs that aggressively involved in innovation strategy will enhance the survival of their firms. SMEs need to introduce innovative products, processes, business models or services that focus on niches group in order to become more competitive (Porter, 1980). Therefore, analyzing the way organizations expand their resources for innovation becomes a primary strategic issue (Teece, Pisano, & Shuen, 1997).

2.3 Conceptual Background and Research Hypotheses

In this section, a model is developed based on human capital construct discussed earlier and its impact on organizational innovation. The resource-based view (RBV) of the firm is used to explain the relationship between HC and the component of organizational innovation.

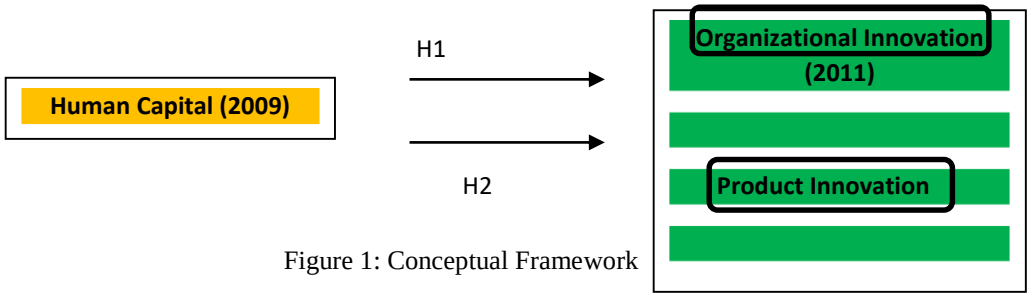

Figure 1: Conceptual Framework

2.3.1 Human capital and product innovation

Shipton, West, Dawson, Birdi, and Patterson (2006) in their longitudinal study of UK manufacturing firms found that teamwork significantly improves product innovation after a one-year time lag. Dong, He, and Karhade (2013) for different industries in Germany, show that after one and two years of investing in HC there is a significant upswing in product innovation. A longitudinal study in the Netherlands found that foreign employees produce more product and service innovations than do domestic staff (Ozgen, Nijkamp, & Poot, 2013). An empirical study in Malaysia of large manufacturers indicates that training HC was significant on product innovation (Tan & Nasurdin, 2011). These findings all show that skills intensity is crucial for product innovation. Thus:

Hypothesis 1 (H1): Human Capital has a positive and significant relationship with Product Innovation.

2.3.2 Human capital and process innovation

A recent longitudinal study by Ozgen et al. (2013) has shown that skills and capabilities in employees do *not* have any impact on process innovation. Surveys of Turkish firms indicate that selection, incentives, training, and development have a significant effect on process innovation (Ceylan, 2013). Using time lag and data from a Canadian private firm, Walsworth and Verma (2007) say that training appears to have a significant impact on process innovation. Tan and Nasurdin (2011) found that training HC was positively related to process innovation. Therefore:

Hypothesis 2 (H2): Human Capital has a positive and significant relationship with Process Innovation.

3. RESEARCH METHOD

This section consists of: research design which includes data collection; sample selection and measurement of the variables.

3.1 Data Collection – Business Longitudinal Survey

This recently released Confidentialised Unit Record File (CURF) database from the Australian Bureau of Statistics (ABS), Business Longitudinal Database (BLD) (2013) is used in this study. The database comprises three independent Panels (samples) of SMEs. Every year for a period of five years, each panel is directly surveyed. For the purposes of this research, Panel 3 is used. Panel 3 has the most recent time frame (2007 until 2011). This sample includes 3,075 businesses stratified by business divisions and company size in accordance with ASIC[1]. Data collection in the BLD was done through self-administrated, structured questionnaires, mostly using closed questions. The major strength of this dataset is the full coverage of Australia and high response rate (>90%) (Sawang & Matthews, 2010).

3.2 Sample Selection

The BLD data used in this analysis was included in a CUFR released by the Australian Bureau of Statistics on Remote Access Data Laboratory (RADL) in December 2011. ABS (2014) defines small business as those employing less than 19 people, and a medium business as 20–199 employees. Therefore, firms with less than 200 employees were chosen for the research. Businesses matching the following criteria were removed from the database: i) Non-employing companies were removed due to the overrepresentation of personal service provider and ii) Missing data on a number of variables. Based on these criteria, 1,423 SMEs were selected for this study from the total of 3,075 firms in BLD Panel 3.

3.3 Measures of the Variables

The data from BLD used time-lag analyses which apply a two-year interval between the HC (2009) and organisational innovation (2011). The measurement method depends on perception measures of both HC and organizational innovation. The consistency between manager's opinions of performance and objective measures has been evidenced (Venkatraman & Ramanujam, 1986). Therefore, the measurement of human capital used subjective measures. Most of the variables in BLD were categorical. Therefore, all the items in each construct had to be calculated.

[1] Australian and New Zealand Standard Industrial Classification

In the following section, the items in each construct are discussed.

a. The items that measure human capital are: (1) flexible work hours; (2) job sharing; lack of skilled person within the business (3) for innovation and (4) performance; lack of skilled person within the market (5) for innovation and (6) performance; (7) lack of access to knowledge or technology. Cumulative total of seven items representing both range and intensity.
b. Organizational innovation in this research has two dimensions namely product and process innovations. Five items taken from BLD are used to measure organizational innovation.
    1. Product innovation : the items are (i) new products and (ii) new services;
    2. Process innovation : consists of four items (i) new methods of manufacturing; (ii) new distribution methods; (iii) supporting activities for business operations and (iv) other operational processes;
c. Firm size: In this study, firm size is measured in terms of the number of employees in the firm. Two dummy variables represent the effects of three different firm sizes: small and medium size firms. Micro firm (0-4 employees) is the baseline for firm size. Firm size is most widely discussed concerning its impact on innovation (Balasubramanian & Lee, 2008).
d. Industry Type: According to Kujansivu and Lönnqvist (2007) HC efficiency varied between the type of industries. Four dummy variables represent the effects of five different industries. The baseline for industry variable is primary industry. Each variable is coded 1 if an observation relates to the industry represented by the variable.

4. ANALYSIS AND RESULT

The purpose of this section is to report on the results from the analyses that have been conducted. Statistical analysis of the data was undertaken using STATA version 10. We conducted Poisson regression analysis (PRA) to analyse the HC relationship with organizational innovation. Poisson regression is commonly used to analyse count data.

4.1 Result of the Study

Correlation coefficients as well as means and standard deviations of the variables are displayed in Table 1.1. Organisational innovation constructs that are product and process variables are positively associated with HC.

Table 1.1 Descriptive statistics and Spearman's rho Correlation Coefficients with organisational innovation elements

	Variables	Mean	Std. Dev	1	2
1	Human Capital(2009)	1.23	1.39	1	
2	Product Innovation(2011)	0.23	0.50	0.11*	1
3	Process Innovation(2011)	0.25	0.56	0.16**	0.44**

N = 2,154

*p< 0.05, **p< 0.01, ***p< 0.001, two-tailed.

PRA was calculated to predict HC with organisational innovation components (Table1.2). The Poisson regression analysis model fits reasonably well for product and process innovation because the goodness-of-fit chi-squared test shows that it is non-significant (p > 0.05).

The results show that every item increase in HC will lead to a 14 percent [100($e_{0.13}$-1) =14 %] increase in product and 21 percent improvement [100($e_{0.19}$ -1) = 21 %] in process innovation. In addition, the corresponding 95% confidence interval for the multiplicative factor for HC is ($e_{0.06}$, $e_{0.20}$) = (1.06, 1.22) for product and ($e_{0.12}$, $e_{0.26}$) = (1.23, 1.30) for process innovation. These results support both hypotheses: H1 and H2.

Table 1.2 Poisson regression: Human capital elements (2009) with product and process innovation (2011)

Variables	Product	Process
Control Variables		
Industry: Manufacturing	1.05***	0.38*
Industry: Logistics	1.24***	0.33
Industry: Retail	1.34***	-0.14
Industry: Services	0.77***	-0.14
Medium Firm	0.29*	0.40**
Small Firm	0.11	0.09
Independent Variables		
Human capital	0.13***	0.19***
Pseudo R^2	0.05	0.04
Chi Square	71.74***	72.79***
Log pseudolikelihood	-802.10	-877.34
No. of observations	1423	1423

*p< 0.05, **p< 0.01, ***p< 0.001, two-tailed.

Overall, firm size and industry add very little to the explanatory power for HC and process innovation relationship. However, all the industry type ($p < 0.05$) and medium size firm had positive and significant impact on product innovation than primary industry.

5. DISCUSSION AND CONCLUSION

The purpose of this section is to discuss the major findings and to summarise the result of this study. The drivers of innovation differ by innovation type therefore the effects of antecedents on product and process innovation must be explained in-depth.

PRA indicates that for each improvement in HC, process innovation improves by 21 percent and product innovation by 14 percent. HC factors were considered highly important for innovation, especially for product and process innovation. It seems from the analyses that firms depend on the creativity of their employees to produce new products and improve existing processes. The analyses revealed that employees are the closest people to the operation and production process; therefore they are the most knowledgeable people in that area to create and enhance better process innovation.

This finding is consistent with several studies (Ceylan, 2013; Shipton et al., 2006). This study supports the previous research (De Winne & Sels, 2010; Mol & Birkinshaw, 2009; Prajogo & Ahmed, 2006). In other words, people focus on the process of doing their every day job in order to achieve set objectives but less in creating new product. SME managers must encourage their employees to extend their limited perceptual boundaries and make an effort in new and creative thinking. Knowledgeable employees are not sufficient. They must be willing to consider productive innovation.

One possible reason that HC predicate lesser on product innovation is that product innovation does not happen immediately. Firms may need a longer than two-year lag to detect the effect of HC on product innovation. As suggested by Zhou, Dekker, and Kleinknecht (2011), skill and experience HC can promote innovation, especially process innovation. However, firms that involve with product innovation in the current year will seldom innovate again in the following year if they are not competing in the dynamic environment. Leitner (2011) suggested that although employees can improve product innovation, they do not support the realisation of product innovation in less-innovative firms.

Managers need to make sure that they are hiring the right candidates, and on-going staff interaction and regular training help to create employees with knowledge and skills. At the same time, SMEs must try to reduce employee turnover. Managers must try to retain their skilled and experienced employees, because HC is the most important capital in any firm. The conclusion is that valuable and unique HC can promote

radical and incremental innovation through the generation of ideas for better product and process innovation.

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