



The Influence of Intellectual Capital on Product, Process and Administration Innovation in the SMEs Context.

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Abstract

There are insufficient studies in the literature that investigate the connection between human, structural and relational capital and organizational innovation in Australian SMEs. Various SMEs industries, in Australia were adapted from Business Longitudinal Database (BLD) from the Australian Bureau of Statistics (ABS). This cross-sectional study shows that relational and human capitals are positive and significant towards process innovation while relational capital is the only predictor for product innovation. The results also show that human, structural and relational capitals were the most significant predictor for administration innovation. The findings show that relational capital has the most significant relationship between the three components of intellectual capital towards innovation in Australia SMEs. SME managers acknowledged the importance in collaboration towards achieving innovation performance in their firms. In order for SMEs to have a competitive advantage, managers should focus on improving their networking and collaboration with external parties, so that the whole innovation (product, process and administration innovation) can be achieved.

Keywords: SMEs, Intellectual Capital, Innovation, Australia

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INTRODUCTION

There has been a rising credit since the 1980s, the importance of intellectual capital (IC) as a significance driver for a company especially to Small and Medium Enterprises (SMEs) (Dean & Kretschmer 2007; Kong 2010; Moingeon & Edmondson 1996; Hsu & Fang 2009; Huang & Liu 2005). Most of the SMEs throughout any country are facing similar situations that affect their viability in the market. The existence of these SMEs regardless from any state is considered to be critical for the country's economic growth (Porter & Kramer, 2006). SME is being defined by the Australian Bureau of Statistics (2014) as those businesses that hire less than 200 employees. It is also acknowledged that IC is the most important source of obtaining long-term profit in order for value creation (Drucker 1999; Grant 1996).

Australia is not new to intellectual capital and it acts as an agent towards the country's economy and productivity (Guthrie & Petty 2000; Guthrie, Petty & Ricceri 2006). Intellectual capital can be consider as the most important element for SMEs to compete with larger companies (Desouza & Awazu 2006; Coyte, Ricceri & Guthrie 2012; Hudson, Smart & Bourne 2001). With the rise of knowledge-based economy, the business environment is becoming more dynamic with extreme competition of the latest technologies being launched, making the product obsolete quickly and product life cycle changing rapidly. Therefore, knowledge is the most enduring competitive advantage for SMEs to compete and survive in the market (Hitt, Ireland and Hoskisson 2010; McEvily & Chakravarthy 2002).

Intellectual capital is the valuable knowledge that belongs to the organisation. Intellectual capital is difficult to own or control, thus analysing how intellectual capital can be sources of competitive

advantage (Coff 1997; Dean & Kretschmer 2007). Intellectual capital can be considered as an important source of value creation that is long-lasting for the company. Intellectual capital such as knowledge that is created inside the firm from knowledge-sharing, exploration and learning and finally applied to create new process that add value to the buyer and improve the firm's competitive advantage (Ahn, Lee & Lee 2006; Power & Waddell 2004). Intellectual capital does not only include knowledge, but also gears and control instruments that direct the employees to perform in desired ways to stimulate the flow of knowledge (Stewart 1997). The term knowledge is used in this study to indicate the extent to which a firm produces knowledge internally or externally and relates it to attain a competitive advantage that is innovation.

Several literatures recognised the influence of intellectual capital on innovation; however the impact may vary by country. Therefore, the main objective of this research is to provide an appropriate situation to study intellectual capital using SMEs sectors such as manufacturing, services and agricultural based in Australia. At the same time, this study contributes to gauge the influential difference between intellectual capital components towards different types of innovation. To date, there are limited studies that focus on the strategic management of process innovation and administration innovation (Keupp, Palmié & Gassmann 2011). Particularly since antecedents that promote product innovation do not necessarily spur process and administration innovation.

LITERATURE REVIEW

Intellectual Capital Definition and Classification



There seem to be a few different views of what intellectual capital entails. Several scholars classify it as knowledge management (e.g. Darroch 2005; Klein, Crawford & Alchian 1978), intangible asset (e.g. Ahonen 2000; Brooking 1996) or knowledge asset (e.g. Bontis 2001). Intellectual capital consists of a flow of knowledge in a company and the information and knowledge that was stored in the company (Subramaniam & Youndt 2005; Bradley 1997; Bontis 2001). In spite of the confusion on what intellectual capital means, most scholars agree that intellectual capital covers three constructs, human capital, structural capital and relational capital (e.g. Bontis 1999; Edvinsson & Sullivan 1996; Kim & Kumar 2009; Mouritsen, Larsen & Bukh 2001; Zerenler, Hasiloglu & Sezgin 2008; Martín-de-Castro, Delgado-Verde, López-Sáez & Navas-López 2011; Mention 2012). For the purpose of this study, the IC term will adapt the definition by Edvinsson and Sullivan (1996) that defines IC that consists of human capital, structural capital and relational capital.

HUMAN CAPITAL (HC)

Most definitions agree that human capital relates to the capabilities that exist in workers, such as knowledge, problem-solving skills and experience. In this study, HC refers to the knowledge, skills and abilities in a person (Coff 2002) that will focus on static approach. The qualities that employees holds can be determine as a successful strategy when employers focus on the capabilities of human resources (Dulewicz & Herbert 1999). Companies with greater HC are expected to have better entrepreneurial judgement. Employees can improve their job performance and ultimately improve the firm’s performance, provided HC is being emphasised by the firm. Wright, McMahan and McWilliams (1994), study from a Resource Based View (RBV), claim that in certain situations, sustained competitive advantage can accumulate from a pool of HC. Unlike large firms, human capital in SMEs is quite different (Desouza & Awazu 2006) due to the lack of availability of expert employees as compared to large firms (Daft & Weick 1984).

STRUCTURAL CAPITAL (SC)

Some scholars refer to structural capital as organisational capital (e.g. Bontis 1996; Petrash 1996). SC represents existing knowledge and codified experiences such as explicit knowledge that are installed in the manuals, structures, databases, systems, processes and patents (Youndt, Subramaniam & Snell 2004). SC reflects the institutionalised knowledge that is stored and owned by the firm in the form of codified, formation, protection and improvement of the fundamental outcomes from the prearranged and repetitive activities (Nelson & Winter 1982). As soon as valuable knowledge is accumulated and codified in the firm, it can be conveyed and dispersed in a new setting for future use, thus, making well-preserved knowledge vital for firms. Storing existing knowledge in a database, software, hardware, firm structure, patents and trademarks and readily obtainable for permitting employees to utilise to turn towards successful innovations (Edvinsson & Malone 1997).

RELATIONAL CAPITAL (RC)

Relational capital (RC) is defined as the firm’s set of resources and ongoing relationships that are embedded in the firms through interactions among individuals or organisations (Shipilov & Danis 2006; Kostova & Roth 2003). This study defined RC as the external collaboration activities that the firm involve with external parties such as individuals or firms. In order to achieve better performance, SMEs build their relational capital with external partners (Desouza & Awazu 2006). Previous studies have suggested that there is a significant relationship between inter-firm routines and processes that acts as a foundation of competitive advantage (Dyer & Singh 1998). An organisation’s RC draws on the tangible links between organisational staff and external individuals or firms outside the organisation (Burt 1997). RC represents the exchange of information and the networks

between the firms and the external parties. A firm can gain support from its suppliers, clients or other external partner’s in terms of important information and knowledge. Firm that has a good networking with customers, suppliers, government agencies, competitors and universities will allow the firms to combine information and knowledge in a unique way in order to contribute towards innovations.

ORGANISATIONAL INNOVATION

The term innovation in the organisational context was developed in the 1930’s by Joseph Schumpeter in his economic theories. Schumpeter initiated the concept of innovation that involved the process of amendment in order to create new, creative and better ideas and challenge the old principles, norms and procedures (Schumpeter 1934; Schumpeter 1949).

Innovation arises in various forms and can consist of, but is not limited to, products, services, operations and organisational issues (OECD 2005). Similar to Yamin, Mavondo, Gunasekaran and Sarros (1997) and Salavou, Baltas and Lioukas (2004) conceptualization of organisational innovations, this study adapts innovations in terms of innovation in product, process and administrative innovation.

Australian Bureau of Statistics (ABS) and Oslo Manual (OECD 2005) defined product, process and administrative innovation as follows. Product innovation can be defined as the introduction of new product or service that has experience compelling improvements in terms of specifications, components and materials. While, process innovation can be defined as significantly enhanced techniques, equipment and/or software used for producing or delivering goods or services. Lastly, administration innovation is appropriately developed strategies, structures or routines in a firm which aim to improve performance.

Conceptual Background and Research Hypotheses

INTELLECTUAL CAPITAL AND RESOURCE BASED VIEW (RBV)

In the Resource Based View (RBV), firms are understood to have various combinations of resources and routines that can contribute to competitive advantage. IC is the foundation that can generate competitive advantage and encourage innovation for firms (Kong 2010). RBV perspective is not gained through positioning activities and product market settings (Wernerfelt 1984; Grant 1996). In the RBV context, the outcome is gained through unique resources and the combination of knowledge to create innovation and product development (Danneels 2002). According to (Nonaka 1994) there are two types of knowledge: tacit and explicit. Tacit knowledge cannot be easily described or transferred. While explicit knowledge is easy to imitate and share. But, once the knowledge is transferred, it is difficult for the original owner of the knowledge to declare the ownership (Edvinsson & Sullivan 1996).

This study applies the Resource Based View (RBV), that a company’s intangible assets such as human, structural and relational capitals are integrated more likely to give impact to firms’ innovation (Barney 1991).

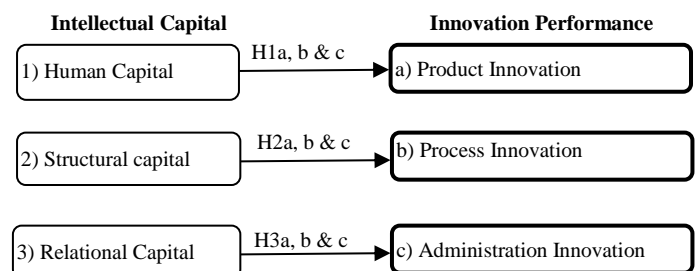


Figure 1: Conceptual Framework

Development of Hypotheses



HUMAN CAPITAL AND INNOVATION PERFORMANCE

Dealing with employees in larger firms is unlike dealing with employees in SMEs, this is because SMEs face several limitations such as lack of experience and specialised employees that are not a major concern in larger firms. According to Creelman (2004), SMEs have smaller amount of resources to offer to their employees, therefore they need to be primarily considerate of human capital.

Knowledge resources can assist the deployment of an innovation by responding to customer needs, improving product quality and design and frequently launch products (Thornhill 2006). HC improves business investigation that will contribute to new patents (Allen, Link & Rosenbaum 2007). The combination of market and technology knowledge that employees have will contribute to the development of new ideas (Amabile 1999 ; Khan & Kamaruddin 2016). Knowledge and skills of employees are basic requirements for generating new and creative ideas in a firm (O Reilly & Tushman 2004).

Therefore, it is important for SMEs to sustain competitive advantage by having a group of talented employees (Bartlett & Ghoshal 2002; Khan & Kamaruddin 2016). The success of SMEs depends on their ability to obtain and develop knowledge from the talented staff in order to improve organisational innovation.

Thus, we expect human capital to improve and strengthen the principal knowledge and thereby influence product, process and administration innovation.

Hypothesis 1 (H1): Human Capital has a positive and significant relationship with (a) Product Innovation, (b) Process Innovation and (c) Administration Innovation.

STRUCTURAL CAPITAL AND INNOVATION PERFORMANCE

In the business setting, knowledge would be the tools to stimulate wealth creation. Thus, it is important for companies to constantly update their knowledge, and at the same time, strengthen the structural capital in the company to ensure that the knowledge and information can be stored accordingly. When the product life-cycle is in the declining phase, firms need to be able to use their knowledge stock in order to progress quickly and create the business actions to meet the changing desires of the clients. This is supported by a study conducted in the chemical firms that found that structural capital exerts significantly positive impact on innovation adoption (Dost, Dost, Badir, Badir, Ali, Ali, Tariq & Tariq 2016; Khan 2016).

Personal knowledge belongs to the individual, however it can be restored in the firm in the form of manual and database for future use and reference (Gao, Li & Nakamori 2003). The knowledge can still be easily accessed in the firm, even though the employees that owned the knowledge have left the firm. Current knowledge and codified experience exists in the structures and processes of storing, utilising and retrieving the knowledge.

It is supported in the study by Subramaniam and Youndt (2005) and Wu, Lin and Hsu (2007) that structural capital has positive impact on incremental innovation. Structural capital is considered as an important source or organisational memory (Leenders & Voermans 2007). Several researchers emphasised that having the right and latest knowledge, that is consistent and easily reachable internal knowledge affects innovation positively (Aramburu & Sáenz 2011; Bharadwaj 2000; Khan 2016; Khan, Kamaruddin & Buyung 2017). The above justification leads to the following hypothesis.

Hypothesis 2 (H2): Structural Capital has a positive but insignificant relationship with a) Product Innovation, (b) Process Innovation and (c) Administration Innovation.

RELATIONAL CAPITAL AND INNOVATION PERFORMANCE

Relational capital is the distribution of resources through networking structure. Collaborations, joint ventures and strategic alliances are examples of actions which allowed SMEs to gain the latest important information, knowledge or support from its customers, suppliers or other external partners (Gulati, Nohria & Zaheer 2006).

Several literatures supported that high levels of collaboration and communication between firms has a significant influence towards the firm's innovativeness (e.g. Baum, Calabrese & Silverman 2000; Rogers 2004; Arndt & Sternberg 2000).

Research conducted on the French SMEs on the connection between collaboration and innovation found that over time, because of the complexity of the technological process, SMEs need to depend on relational capital (Bougrain & Haudeville 2002). Analysis of the effects of relational capital on innovation gave mixed results. Several studies have acknowledged either positive (e.g. Baum, Calabrese and Silverman 2000; Stuart 2000; Nieto & Santamaría 2010) or insignificant (e.g. Love & Roper 2001; Cabello-Medina, López-Cabrales & Valle-Cabrera 2011) effects of collaboration on the innovation performance.

The relevance of this hypothesis is based on the potential for the justification of the influence of relational capital in terms of collaboration activities and the flow of knowledge through firms on the product, process and administration innovation. This could affect firms' way of doing business, including collaboration and the use of new knowledge sources, in order to improve their organisational innovation. Hence, this study expects that relational capital will generate knowledge and thereby support the influence on product, process and administration innovation.

Hypothesis 3 (H3): Relational Capital has a positive and significant relationship with (a) Product Innovation, (b) Process Innovation and (c) Administration Innovation.

The remainder of this paper is concerned with the testing of the hypotheses and drawing conclusions with respect to the research questions.

RESEARCH METHOD

DATA COLLECTION – BUSINESS LONGITUDINAL SURVEY

This study used secondary data from Business Longitudinal Database (BLD) that was obtained from the Australian Bureau of Statistics (ABS) to conduct statistical analysis. For the purpose of this research, Panel 3 has been used since it contains the latest data that is in the year 2011. This is a cross-sectional study that used data in the year 2011. The data was originally collected by ABS using questionnaires. The use of a survey method to measure intellectual capital and innovation performance is consistent with other studies that have employed this approach (e.g. Jardón & Martos 2012; Mention & Bontis 2013). Data collection can be challenging and it is both constrained and biased by the willingness of respondents to participate, by the time and cost of collecting it, and by the interests of third parties (Aldag & Steams 1988). The BLD is similar to CIS (Current Index to Statistics) in other countries (Gronum, Verreynne & Kastle 2012), through its major advantage of complete coverage of Australian SMEs (McMahon 2001, 2000), and high response rate (Sawang & Matthews 2010). The scope of the BLD is all SMEs in Australia that includes manufacturing, agricultural and services sectors.

SELECTION OF SAMPLE

Non-employing companies together with firms that hire more than 200 employees and those missing data on a number of variables were removed from the database. Based on these criteria, 318 SMEs were selected for this study from the total of 3,075 firms in BLD Panel 3.

VARIABLES MEASUREMENT

The measurement method that depends on perception measures is consistency between manager's opinions of firm performance and objective measures has been evidenced (Venkatraman & Ramanujam 1986). The variables used in this study such as human capital, structural capital, relational capital and innovation types used subjective measures. These variables were categorical data. Therefore, all the



items in each construct had to be summed up. The cumulative is the total of the items representing both range and intensity.

Human capital consists of questions related to flexible work hours; job sharing; lack of skilled person within the business, for innovation and performance; lack of skilled person within the market for innovation and performance and lack of access to knowledge. Structural capital was represented by the questions relating to investment made in information technology, equipment and machinery in the firm. Relational capital consists of questions on the collaboration activities in R&D; buying, manufacturing, integrated supply chain, marketing/distribution and other cooperative agreement.

The dependant variable is innovation performance. It is similar to Yamin et al. (1997) study that has three components namely product, process and administrative innovations. Product innovation consists of questions pertaining to new products and new services. Process innovation comprises of item on new methods of manufacturing; new distribution methods; supporting activities for business operations and other operational processes. The final variable is administration innovation that represents items on the new knowledge management processes, new business practices for organising procedures, new methods of organising work responsibilities and decision making, significant changes in relation with others and other managerial processes.

ANALYSIS AND RESULT

STATA version 10 was used to analyse the data. The initial analysis that was used to test the hypotheses was Poisson regression analysis (PRA) and the goodness-of-fit chi-squared test checks that the data is Poisson distributed. If there is significant evidence of overdispersion, Negative binomial regression analysis (NBRA) is used. Poisson regression is commonly used to analyse count data. The main condition of Poisson distribution is that the mean equals the variance. However, in real life situations, some of the count data reflects overdispersion.

Findings

Table 1 Descriptive Statistics and Spearman's rho Correlation Coefficients

Variables	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11
1 Industry: Manufacturing	0.19	0.39	1										
2 Industry: Logistic	0.14	0.34	-0.19**	1									
3 Industry: Retail	0.05	0.22	-0.11**	-0.09**	1								
4 Industry: Services	0.36	0.48	-0.36**	-0.30**	-0.17**	1							
5 Size: Medium Firm	0.31	0.46	0.00	0.01	-0.02	0.01	1						
6 Size: Small Firm	0.32	0.47	-0.01	-0.00	0.01	-0.01	-0.46**	1					
7 Human Capital	1.31	1.41	0.01	0.02	0.01	0.04	0.06*	0.06*	1				
8 Structural Capital	1.10	1.33	0.15**	0.03	-0.06	-0.05	0.03	-0.04	0.22**	1			
9 Relational Capital	0.30	0.74	-0.04	0.04	-0.02	0.02	0.08**	0.03	0.19**	0.03	1		
10 Product Innovation	0.23	0.50	0.07**	0.09**	0.07*	0.01	0.07*	-0.02	0.18**	0.08	0.14**	1	
11 Process Innovation	0.25	0.56	0.07*	0.06*	-0.02	-0.04	0.10**	-0.03	0.19**	0.16**	0.21**	0.44**	1
12 Administration Innovation	0.35	0.80	0.03	0.15	-0.02	0.08**	0.11**	-0.00	0.24**	0.13*	0.17**	0.34**	0.51**

Industry: Primary is the baseline industry variable
 Firm size: Micro firm (0-4 employees) is the baseline size variable
 *p< 0.05, **p< 0.01, ***p< 0.001, two-tailed.

Based on the correlation coefficients in Table 1, innovation performance constructs that are product, process and administration innovation variables were positively associated with HC and RC, except for SC which is not correlated with product innovation.

PRA was calculated to predict HC, SC and RC with different types of innovation components. The goodness-of-fit test was conducted to test whether the data for product, process and administration innovation are Poisson distribution. The test indicates that the distributions of product and process innovation are valid in the range of Poisson with the chi-square of 235.91 on 308 d.f. (p = 0.99) and 273.54 on 308 d.f. (p = 0.92) respectively. However administration innovation is not significant referring to Poisson distribution when the chi-square test shows 385.75 on 308 d.f. (p < 0.05). The p value of 0.002 falls below the standard threshold of 0.05. Thus, Poisson regression model is inappropriate, to explain the relationship between HC, SC and RC

towards administration innovation, thus negative binomial regression analysis (NBRA) is used to explain the results.

PRA in Table 2 indicates that each factor increase in RC will lead to a 28 percent [100(e0.25 - 1) = 28 %] rise in product innovation. In addition, the corresponding 95% confidence interval for the multiplicative factor for RC is (e0.08, e0.41) = (1.10, 1.51). However, the results show that, HC and SC are not statistically significant towards product innovation. Therefore hypotheses 1a and 2a are rejected whereas hypothesis 3a is supported.

Table 2: Poisson regression and Negative binomial regression: Intellectual Capital elements with Types of Innovation

Control Variables	Product Innovatio	Process Innovatio	Administration Innovation	
	n	n	PRA	NBRA
Industry :				
Manufacturing	1.11***	0.43*	0.28	0.25
Industry : Logistic	1.41***	0.57*	0.42	0.48
Industry : Retail	0.58	-0.90	-0.24	-0.18
Industry : Services	1.00**	-0.19	0.21	0.29
Medium Firm	-0.09	0.31	0.48	0.49
Small Firm	-0.31	0.20	0.47	0.42
Intellectual Capital				
Human Capital	0.11	0.18***	0.19***	0.21***
Structural Capital	0.06	0.10	0.13*	0.15*
Relational Capital	0.25**	0.29***	0.19**	0.20*
Pseudo R²	0.09	0.11	0.09	
Chi Square	66.11***	85.87***	76.47**	55.75**
Log pseudolikelihood	-201.86	-253.65	-319.27	-309.91
No. of observations	318	318	318	318

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

PRA shows that HC and RC are statistically significant with process innovation. The analysis indicates that each factor increase in HC and RC will lead to a 20 percent [100(e0.18 - 1) = 20 %] and 34 percent [100(e0.29 - 1) = 34 %] increase in process innovation in that order. In addition, the corresponding 95% confidence interval for the multiplicative factor for HC is (e0.09, e0.27) = (1.10, 1.31) and for RC is (e0.16, e0.43) = (1.17, 1.54). At the same time, the result shows that SC is insignificant towards process innovation. Thus, hypotheses 1b and 3b are supported and hypothesis 2b is rejected.

NBRA shows that HC, SC and RC result are better than the PRA. NBRA indicates that each factor increase in HC, SC and RC will lead to a 23 percent [100(e0.21 - 1) = 23 %]; 16 percent [100(e0.15 - 1) = 16 %] and 22 percent [100(e0.20 - 1) = 22 %] improvement in administration innovation accordingly. Furthermore, the HC, SC and RC corresponding confidence interval for multiplicative factors are obtained as respectively: (e0.11, e0.31) = (1.12, 1.36); (e0.03, e0.27) = (1.03, 1.31) and (e0.05, e0.36) = (1.05, 1.43). It is confirmed that administration innovation data indicates overdispersion (W=18.71, p < 0.001), thus confirming NBRA is the right analysis for this model. As a result, hypotheses 1c, 2c and 3c are accepted.

Lastly, empirical findings indicate that firm size and industry type add very little to the explanatory power for IC and innovation type.

CONCLUSIONS

The antecedents of innovation performance are varied by innovation type, therefore the effects of antecedents on product, process and administration innovation must be explained particularly.

According to the results, human capital significantly predicts process and administration innovation. However, human capital impact of process and administration innovation is somehow similar with Subramaniam and Youndt (2005) who found that human capital impacts incremental innovation. Since the process and administration innovation in the firm can be considered as a gradual but consistent improvement in the operation process in the company. Hence, if the objective of the SMEs is to improve their process and administration



innovation, the SME managers should invest in human capital and recruit employees with specific knowledge, skilled and experiences. Process and administration innovation depend on the employee abilities. Employees with higher skills and knowledge will be more efficient and creative in generating new ideas to improve the working process and procedures in the firm, rather than improving product innovation.

The result is contrary to our expectations, when HC does not significantly affect product innovation. According to Khan and Kamaruddin (2016) in their two-year lag study of human capital, product and process innovation, HC needs more time to develop and the impact can be observed after a few years. However, Leitner (2011) found positive effect of HC on product innovation in highly innovative SMEs but insignificant in less innovative SMEs. There are several possible explanations for this result. Here, we can conclude that strong HC will promote to the generation of ideas in order to work more efficiently and effectively. Better HC helps to realise on product innovation for continuous product developers but it does not support the realisation of product innovation. Firms should nurture high-quality human capital rather than treat employees as costs to the business because high-quality human capital leads to superior innovation capabilities.

The result indicates that there is statistically significant relationship between structural capital and administration innovation. Structural capital is the most important factor that has a significant effect on administration innovation. Administration innovation is more internal and it is expected that SC must have significant impact on the working procedures in SMEs.

Surprisingly, we found no support for direct effect of SC on product and process innovation. The findings are contradicted with the studies that are reported by Khan et al. (2017), Leitner (2011) and Ilker Murat and Birdogan (2011), which found that SC is significant on product and process innovation. When a company emphasis is learning organisation, the better is the potential for the company to transform their capabilities. However, it does not mean that it would not be able to change its market position (Herrmann, Gassmann & Eisert 2007).

It is shown in a study by Khan (2016) that SC significantly impacts innovation after applying a time lag. The reason is that technologies and systems will be a routine in the company, but before these SC is made into a routine, the employees need to be familiarised with the technologies and systems. This finding was supported by Khan et al., (2017), through their longitudinal study of SC on product and process innovation. Study has shown that structural capital is less important in service-oriented firms compared to product-oriented firms (e.g. Kianto, Hurmelinna-Laukkanen & Ritala 2010). Structural capital that consists of outcome of knowledge and information that is apparent should be stored in the information systems, hardware, procedures and database which are actually more difficult to store or accumulate. SMEs have limited financial resources that make knowledge repositories difficult to implement. Furthermore, SMEs operate more casual means via the employees in the firms to facilitate knowledge management activities (Baptista Nunes, Annansingh, Eaglestone & Wakefield 2006). Few scholars found similar outcome in the structural capital – product innovation link such as Baptista Nunes et al., (2006) and (Hsu & Fang 2009). As stated previously, essentials of structural capital include information systems, hardware, procedures and database. Therefore, a possible reason for insignificant connection between SC with product and process innovation, is due to high expenses in implementing information system and other methods. SC will provide the necessary information for new product and process improvement however due to limited budget, SMEs may have to undercut their SC in the short run and consequently this reduces the process of new product development. However, eventually the investments made to the firm might pick-up in developing the process and product innovation.

The findings show that relational capital is the only significant and positive predictor for product innovation. It also shows that, relational capital is significant for all three innovation types especially in process innovation then followed by product and administration innovation. Studies by Nieto and Santamaría (2010) in SMEs, also found that

collaboration has the most significant positive impact on product and process innovation. This is an important discovery due to its strategy consequences that relational capital must be involved in research and development activities or other collaboration activities and this will affect innovation performance. This result proposed a rational view of competitive advantage that emphasises on network sequences and processes. As stated by Brüderl and Preisdörfer (1998), small firm's survival is also reflected from successful result of external relationships. RC is the foundation that supports the creation of new and improved ideas in process, product and administration innovation.

Collaboration provides SMEs with more access to resources, matching skills, capabilities and knowledge that are not internally available (Døving & Gooderham 2008). In other words, SMEs managers need to inspire their staffs, since innovation is not an individual but a mutual achievement through collaboration with external parties. This finding is in agreement with the Dewick and Miozzo (2004) standpoint, that innovation ability in SMEs is dependent on the connections between players in networked activities. Knowledge and information that is embedded through trust can be continually used to develop employees and organisational knowledge, and consequently be exploited in innovation related activities (Hsu & Sabherwal 2011; Nahapiet & Ghoshal 1998).

RESEARCH IMPLICATIONS TO SMEs MANAGERS

Based on the conceptual model, two major implications stem from this paper: first, all three components of IC: HC, SC and RC have a significant effect on administration innovation in Australia SMEs in this cross-sectional study. RC has the strongest predictor of all the innovation type and it is the only IC element that is significantly related with product innovation. At the same time, HC and RC significantly predict process innovation.

Based on the findings, it is important for SMEs managers to develop and enhance customer – supplier – competitor relationship capability. Companies need to focus on building up the relationship between customers, suppliers, competitors and other external parties in order to supplement the firm's internal effort to develop their knowledge base. With a reliable ecosystem, it can promote to a positive outcome. It is proven from this study finding that RC impacts product, process and administration innovation. SMEs managers should foster open innovation in the companies to enhance the innovation performance. In the era of open innovation, there are more options in knowledge resources that firm can obtain through external sources (Chesbrough 2003). Through collaboration, cooperation agreements, joint venture or strategic alliances, firms are able to access more potential relevant innovation activities. According to Khan (2014), Australian SMEs should focus on networking, then built trust among the external parties before involving in collaboration activities. Since collaboration is proven in the literature to help create connection to the external parties' embedded knowledge through explicit transfer or implicit duplication of knowledge in order to generate innovation (Spanos 2012; Nieto & Santamaría 2010; Zeng, Xie & Tam 2010), it is a worthwhile investment for SMEs in building this relationship.

Simultaneously, the SME managers should also strengthen their information technology systems to smooth of the sharing and distributing of information and knowledge among networked partners. Applying structure capital to the firm may take a long time to detect the effect towards product and process innovation (Khan et al. 2017; Khan 2016). However, through structure capital, the process of sharing and distribution of information and knowledge plays an important role to enhance innovation, to be precise administration innovation. SMEs should adopt the latest technology and system software as well as introducing a new integrated system since the technology and software allows the firm to speed up and this enhances the administration process. Existing technology and software in the firm will create the firm's own routines and these routines will influence the creative and effective of administration activities.

Having identified the human capital impact on process and administration innovation in this study, SMEs managers need to



organise and implement specific human capital development program to enhance knowledge, skills and abilities of their workers. A firm that emphasis in developing the knowledge and skills of their employees will in turn create a valuable asset to the firm that will be the competitive advantages. Careful planning in assigning those employees to attend development programs is important to ensure that the program can create employees that are experts in their jobs, creative, bright, and highly skilled and in turn are able to contribute ideas and knowledge to the firm. Creative and knowledgeable employees are able to contribute to new ideas in improving the processes and administration process.

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