What Makes Small And Medium Enterprises Innovative? A Look At Knowledge Management

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ABSTRACT:

This study contributes to small medium growth-oriented companies by increasing the empirical understanding of how knowledge management practices affect their innovative capabilities. This study encourages practitioners to focus their KM initiatives especially on the three dimensions that had significant effect on innovation. The research is based on a conceptual model linking innovative capabilities, knowledge acquisition, knowledge dissemination and knowledge utilization. This study draws on empirical results from 125 Multimedia Super Corridor (MSC) companies using stratified sampling procedure. The results indicated that all three proposed knowledge management practices (knowledge acquisition, knowledge dissemination and knowledge utilization) were important for developing innovative capabilities.

Keywords: *Knowledge management, Innovative capacity, Small-medium industries*

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1. Introduction

In the era of dynamic competitive knowledge economy which emphasizes knowledge accumulation, how to speed up industrial intellect capital to utilize for innovation has been the important mission of all industry players worldwide. According to Reinhardt et al. (2003), "With knowledge as one of the most important resources today. . . management obviously should attempt to identify, generate, deploy, and develop knowledge" (p. 794). The concept of knowledge management has become an issue of concern for many organizations and managers.

The increasing complexity, turbulent and uncertainty of the environment requires organizations especially the SMEs to garner different and greater knowledge. In fact the only way for present SMEs to survive is the imperative to innovate or perish. Learning faster than your competitors may help the firms to achieve the strategic competitive advantage. According to Simard & Rice (2006), there is a need for greater efficiency, effectiveness and competitiveness which is based on innovation and knowledge especially to SMEs. Therefore, Malaysian small-medium size firms all have seen knowledge as a sustainable competitive advantage (Porter, 1990) and start to implement knowledge management (KM) to bring sustaining innovation and value creation into organizational structure.

To date, the extant literature is very limited to provide linking knowledge management with innovation (Darroch & McNaughton, 2003). The studies reported have generally failed to account for the different types of knowledge management practices (Darroch & McNaughton, 2003). The need to identify different knowledge management practices in research should be self-evident, since each practice of knowledge management probably requires different resources and core competencies in order to have any effect. In addition, most of the existing studies have derived their innovation processes from large companies' perspectives rather than SMEs. Limited research has been aimed at identifying sources of innovation and the integration of innovation processes from a knowledge-based perspective (Grant, 1996). Although a fascinating array of innovation research has been carried out in the context of R&D issues and economic factors, it only looks innovation from one single aspect: the spending on R&D (Lane et al, 2006). The gaps between knowledge/innovation, larger/smaller firm's perspectives and limited understanding on innovation processes should be filled in to map a more comprehensive picture of the proposition. Therefore, this research is aimed to bridge these gaps through the identifying sources of innovation and the integration of multiple sources of innovation to accumulate innovation capacity from a knowledge-based perspective for the SMEs.

The research areas of knowledge, knowledge management and organizational learning have become increasingly linked to one another and to the dynamic capabilities perspective. The dynamic capabilities perspective emphasizes that a firm's abilities to renew and to develop its organizational capabilities are essential for building and sustaining competitive advantage (Eisenhardt and Martin, 2000; Grant, 1996; Kogut and Zander, 1992; Nonaka, 1994; Spender, 1996; Teece et al., 1997). In the proposed framework, the abilities to acquire, assimilate and apply knowledge, which we collectively refer to as knowledge capacities, represent a particular subset of dynamic capabilities which has taken on growing interest in the management literature (Lane et al., 2006; Lichtenthaler, 2009; Lichtenthaler and Lichtenthaler, 2009; Zahra and George, 2002).The assertion that knowledge capacities can affect firm-level outcomes, including innovation, is not new. However, the majority of this research focuses on large firms and on firm-level concepts (Eisenhardt and Martin, 2000; Kogut and Zander, 1992; Nelson and Winter, 1982; Teece et al., 1997; Winter, 2003). However, even in large firms, an understanding of why or how such capacities are linked with performance is still not clear.

2. Objectives

To summarize, the present paper contributes to the existing literature in several ways. *First*, building upon the model of Darroch (2001), we present a knowledge-based dynamic capabilities model which treats KM practices into three major components: external knowledge acquisition, intra-firm knowledge dissemination and knowledge utilization. *Second*, we expand on the empirical literature by providing insight into which KM practices contribute positively to innovative capabilities that comprise of market innovativeness, product innovativeness, process innovativeness, behaviour innovativeness, and strategic innovativeness (Wang and Ahmed, 2004). *Third*, by focusing on KM practices as recurring patterns of behaviours or routines, we create a link between individual action and firm-level routines or capabilities, showing further,

how organizational routines or practices may stimulate innovation. *Fourth*, our findings support a view of looking at innovation as product and process (Melkas et al., 2010). *Finally*, in the discussion section we link our findings to future directions in research which can further enhance our understanding of the knowledge management practiced among the small-medium organizations.

3. Knowledge Management Practices

3.1. Knowledge Acquisition

External Knowledge Acquisition refers to a firm's capability to identify and acquire externally generated knowledge that is critical to its operation (Zahra & George, 2002). Lenox and King (2004) have given an encompassing definition for knowledge acquisition: it involves the intra-organizational processes facilitating tacit and explicit knowledge creation, codification, and transfer from individual members to the organization and the entry of this knowledge into the knowledge management system, as well as the identification and absorption of information and knowledge from external sources. Knowledge acquisition is also defined as a process of transferring knowledge from other organizations (Roberts, 1998).

In this study, knowledge acquisition is defined as a set of activities of gathering knowledge from sources outside the organization and generating new knowledge from activities within the organization (Darroch, 2001; Baetz, 2003; Marquardt, 1996). The ability of knowledge acquisition is determined by the extent to which the practices have been pervasively performed by the entire organization. In addition, there are a number of external sources from which to gather knowledge, including the organization's sales/service staff, customers, relevant trade journals, competitor's products, industry analysts, consulting firms, and relevant workshops, conferences, and seminars (Marchi & Belardo, 2000; Marquardt, 1996; Stewart, 1997; Tannenbaum, 1998). Van den Bosch et al. (1999) have distinguished three types of knowledge to be included in their knowledge absorption components: knowledge related to products or services, knowledge related to production processes, and knowledge related to markets. As a determinant of knowledge management practices, external knowledge acquired from three sources will be illustrated in this study: knowledge from customers, knowledge from competitors and other external organizations, and knowledge from external training. In order to maximize knowledge acquisition from outside sources, the activities should be designed to tap all of the available knowledge domains and knowledge sources.

Innovation is partly based on finding new ways of combining production system outputs in order to increase efficiency (Schumpeter, 1934). This new combination implies a reconsideration of the firm's inputs. Therefore, a new interpretation of the existing knowledge is essential for innovation (Galunic and Rodan, 1998).

New knowledge is supposed to be assimilated by the organisation members in order to become part of the organisation as a whole (Nonaka and Takeuchi, 1995). This acquired new knowledge interacts with the previous knowledge in order to modify total knowledge stock of the firm (Van den Bosch *et al.*, 1999). Due to the existing

relationship between all embedded knowledge in different levels of the organisation (Crossan *et al*., 1999), the generated knowledge will turn into the base to establish new routines and mental models. Therefore, knowledge flows coming from outside the firm become opportunities for service industries to recombine current stock of knowledge and create new knowledge. According to this idea, new ideas about new ways of developing processes and services will emerge from this new knowledge in order to, for example, improve customisation and/or process efficiency. Hence, the following hypothesis is formulated:

> Hypothesis 1: Organizations having high levels of external knowledge acquisition are likely to exhibit higher levels of innovation.

3.2. Knowledge Dissemination

The second component of knowledge management practice is knowledge dissemination that involves the communication of the generated knowledge to all relevant departments and individuals. Successful acquisition of knowledge requires the participation of many of the organization's departments. Successful dissemination also requires significant knowledge flows and sharing to ensure that the knowledge reaches the relevant people.

Sinkula et al. (1997) pointed out ways to disseminate knowledge, such as during interdepartmental meetings and through interdepartmental cooperation. Hunseok (2002) has identified three practices to share tacit knowledge: knowledge accumulation, social information collection (extra and intra-firm), and transfer of knowledge. Knowledge accumulation is defined as the extent to which employees gather information from sales and production sites, share experiences with suppliers and customers, and engage in dialogue with competitors (Nonaka, 1994). Baetz (2003) has identified three groups of practices that enhance the knowledge sharing and dissemination within the firm: the use of public forums to share best practices, the use of internal experts, and the accessing of knowledge repositories. Similarly, Darroch (2001) has identified five factors to measure knowledge dissemination: 1) readiness to disseminate market information around the organization; 2) disseminating knowledge on-the-job (using techniques such as quality circles, case notes), 3) use of mentoring and coaching to disseminate knowledge; 4) using technology (such as teleconferencing, videoconferencing and Groupware) to facilitate communication; and 4) preferring written communication to disseminate knowledge.

At the individual level, acquisition and use of knowledge requires specialization due to individuals' cognitive characteristics (Simon, 1991). Also, knowledge acquisition requires higher specialization than knowledge integration (Grant, 1996). So, environments created inside the organisations generate the conditions that either foster or diminish knowledge application and integration when creating new and improved product and services. According to Demsetz (1991), the efficiency in knowledge acquisition requires individuals to specialize in knowledge specific areas, while knowledge application requires integration of different knowledge areas.

There are factors depending on the source and receiver of knowledge that affect knowledge dissemination and transfer. For instance, lack of absorption capacity of knowledge receivers (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998) affects negatively organisational learning and innovation capabilities. Therefore, it is necessary to develop new techniques that improve knowledge communication and dissemination by providing new forms of knowledge sharer relationships (Szulanski, 1996). Both process and product Innovation require the integration of different and highly specialized knowledge (Leonard-Barton, 1992). The following hypothesis resumes this idea:

> Hypothesis 2: Organizations having high levels of internal knowledge dissemination are likely to exhibit higher levels of innovation.

3.3. Knowledge Utilization

Knowledge utilization occurs when the firms can effectively create, manage and exploit knowledge in order to gain competitive advantage. According to Zahra and George (2002), the transformation and exploitation capabilities are likely to influence firm performance through product and process innovation. The transformation capabilities help firms to develop new perceptual form and exploitation capabilities take this a step further to convert the perceptual knowledge into new product (Kogut & Zander, 1992).

Pfeffer & Sutton (1999) made a distinction between knowledge distribution, transfer, and sharing. They define Knowledge distribution as knowledge that is diffused for masses without clear defined purpose. And knowledge sharing is usually based on voluntary (Pfeffer & Sutton, 1999). On the other hand, knowledge transfer refers more to the knowledge diffusion process itself. Diffusion of organizational knowledge can help organizations to benefit their employees' complementary skills. However, capturing intra-organizational knowledge is often extremely difficult (Pfeffer & Sutton, 1999).

Responsiveness to knowledge simply means that the organization responds to the various types of knowledge it has access to – for example, if the organization acquires knowledge about customers then it responds to that knowledge. Along with responding to knowledge, the quality and timeliness of the response is included as a representation of organizational agility (Dove, 1999).

Based on their study, Darroch & McNaughton's (2003) developed three hypotheses whereby a firm with access to a greater pool of knowledge will have better-developed knowledge dissemination and responsiveness to knowledge behaviours and practices. Similarly, a firm with better-developed knowledge dissemination behaviours and practices will be more responsive to innovation. The hypothesis is therefore developed:

> Hypothesis 3: Organizations having high levels of knowledge utilization are likely to exhibit higher levels of innovation.

3.4. Innovation

Typically, most research on innovation has based on a single (or a few) innovation indicator(s) with R&D expenditures and patent counts being the most popular proxies for organization innovativeness. However, given that the innovation process is a complex phenomenon characterized by several stages ranging from basic research to the penetration of the market with a new product (Wan et al., 2000). It is important to consider a broad range of innovation indicators in order to more accurately capture the level of innovativeness in a firm (Rogers, 2003). According to Rogers (2003), one method of assessing innovation is to distinguish between the outputs of innovative activity and the inputs to innovative activity. According to Wong (2004), the input measures will always serve as the independent variables whereas the output measures will serve as the dependent variables. Output measures include the number of new products or processes that are developed by the firm in a year. Innovative organizations are assumed to develop more new products and processes than non-innovative firms. Another output measure used is the percentage of sales attributed to new products or processes. Innovative organizations will also be expected to have more of its revenue derived from new products or processes. Input measures include the percentage of annual revenue or sales used to fund research and development projects.

Wang and Ahmed (2004) have defined organizational innovativeness as "an organization's overall innovative capability of introducing new products to the market, or opening up new markets, through combining strategic orientation with innovative behaviour and process". (p. 304). This study uses five measures of innovative capabilities: (1) market innovativeness, (2) product innovativeness, (3) process innovativeness, (4) behaviour innovativeness, and (5) strategic innovativeness.

4. Methodology

The study utilized the results of a questionnaire which had been previously developed by several researchers (Darroch 2001, Jantunen, 2005).The target population included the MSC (multimedia Super Corridor) status companies across a large range of IT and IT-related industries. There were 500 questionnaires distributed and 125 returned survey were deemed usable for further analysis resulted in 25 percent response rate. The data were analyzed using SPSS. Cronbach alpha coefficients were calculated to test the instrument's reliability. Multiple regression were used to test the relationships between the variables as stated in the hypotheses.

5. Findings

Hair et al. (1998, p.225) describe the application of factor analysis as a means by which to analyze the interrelationships among a large number of variables and explaining these research variables in terms of their common underlying dimensions (factors/ constructs). A cut-off loading of 0.3 was used to screen out variables that were weak indicators of the constructs. Apparently, most factor loadings were well above the +0.30 level, and as such, can be considered as demonstrating a high level of significance (see Tables II & III).

The regression analysis produced equations that represent the best prediction of the dependent variable from several of the independent variables. Therefore, the objective

of the multiple regression analysis was to determine which independent variables (constructs) were important in predicting innovative capabilities. Table I shows the bi-variate correlation coefficients of factors of knowledge management and their relationships with the innovative capabilities. The correlation coefficients were all above 0.5 and were significant.

Table IV shows the multiple regression of the three factors of knowledge management regressed on the dependent variable: innovative capabilities. This regression models are run for each of the dependent variables separately as show in Table IV. The results show that knowledge acquisition ($t = 3.467$, $p = .046$) is found to have associations with innovative capabilities. The knowledge dissemination ($t = 4.145$, $p = .006$) and knowledge utilization($t = 4.378$, $p = .000$) are both found to be essential for innovative capabilities. Nearly all items in the knowledge management scale were highly correlated, raising the potential problem of multicollinearity. Therefore, before proceeding with regression analysis, the variance inflation factors (VIF) were calculated and found to be no greater than 2.50 for any variable. Another method was using a simple examination of the correlation matrices for the independent variables (Hair et al., 1998). The presence of high correlations, generally above 0.9 and above were the first sign of collinearity. Examining the correlation matrices in Table IV, the inter-correlation coefficients were found to be generally well below the recommended correlation coefficient value $r = 0.9$. Therefore, the decision to proceed with regression analysis was upheld, since the effect of multicollinearity fell within acceptable limits (Hair et al., 1998).

Table I: Correlations Among Independent And Dependent Variables (N=125)

	Knowledge acquisition	Knowledge dissemination	Knowledge utilization	Innovative capabilities
Knowledge acquisition	1.00			
Knowledge dissemination	.782**	1.00		
Knowledge utilization	.827**	.586**	1.00	
Innovative capabilities	.670**	.748**	.729**	1.00

Notes: N = 125, *p < .05; ** p <.01

Table II: Factor Analysis Results - Independent Variables

Variables	Factor Loading	Cronbach's Alpha
Knowledge Acquisition		
Organization values employees' opinions and attitudes	0.554	
Organization has well developed financial reporting systems	0.442	
Organization is sensitive to information about changes in the market place	0.467	
Human capital profile	0.512	
Organization works in partnership with other firms, customers, institutions or consulting firms	0.367	

Organization gets information from market surveys	0.413	
R&D spending & numbers of patents gained	0.535	0.82
Knowledge Dissemination		
Market information is freely disseminated	0.652	
Knowledge is disseminated on-the-job	0.433	
Use specific techniques to disseminate knowledge	0.521	
Organization uses technology to disseminate knowledge	0.495	
Organization prefers written communication	0.695	0.71
Knowledge Utilization		
Responds to customers	0.621	
Well-developed marketing function	0.472	
Responds to technology	0.325	
Responds to competitors	0.576	
Organization is flexible and opportunistic	0.461	0.68

Table III: Factor Analysis Results - Dependent Variables

Variables	Factor loading	Cronbach's Alpha
Innovative Capabilities		
Behavioral innovation	0.562	
Strategic innovation	0.457	
Market innovation	0.366	
Process innovation	0.467	
Product innovation	0.361	0.61

Table IV: Multiple Regression Analysis Results

Independent Variables	B	Standardized Coefficients Beta	T	p-value
(constant)	2.580		15.083	.000
Knowledge acquisition	.467	.489	3.467	.046*
Knowledge dissemination	.578	.592	4.145	.006**
Knowledge utilization	.589	.601	4.378	.000***
F = 3.97				

Notes: N= 125; *p < .05; **p < .01; ***p = .000

6. Discussion

We have taken an initial step toward formulating a theoretical framework and empirically testing the relationships among knowledge acquisition, knowledge dissemination and knowledge utilization in the context of small-medium growth companies. Some studies have explored the relationships among these concepts, but in a partial piecemeal manner. The research provided strong support for the given hypotheses. The results have important implications in the fields of decision-making, strategic management and knowledge management. Innovation is an important

outcome of firm processes and has been shown to be critical for internalization (Roper & Love, 2002; Pla-Barber & Alegre, 2007) as well as for firm performance (Calantone et al., 2002; Hult et al., 2004). This research provides evidence that knowledge management practices enhance innovation performance and explain how this positive effect occurs.

This research has provided an examination of the effects of knowledge management on innovation in small-medium growth companies. Given that innovation performance may vary among high-tech producers and service providers, we attempted to understand this asymmetry within the context of company knowledge management. Results suggest that sustained competitive advantage in the high-tech industry requires company strategies that capitalize on knowledge management practices. Furthermore, special attention needs to be paid to knowledge acquisition, knowledge dissemination and knowledge utilization since we have found that the main effect of knowledge management on innovation performance is direct.

This study also supports new trends in the resource-based view research, according to which research should not only relate innovation with the intensity of R&D, but must also make efforts to obtain additional understanding of the whole competitive advantage creation process by considering the role of knowledge management.

7. Limitations

Overall, our results should be viewed in light of several limitations. First, the data were gathered at one point in time, so no inferences of causality can be conclusively established, nor can be discount the possibility of reverse causality. Second, this is a mono-method study. Collecting the dependent and independent variables from a single informant is likely to favour the response rate, but it gives rise to concerns about common method bias. Third, we did not control the size, the age and the ownership of companies in our analysis, which had been proven to affect the innovation level. Finally, the target population of this study was taken purely from MSC list which carried the homogeneous characteristics. This may restrict the sampling approach that lead to generalizability of the research.

8. Implications

Our study makes a contribution to the resource-based view by supporting the perspective that a company's innovation performance and competitive advantage are a function of complex inimitable resources that are embedded within the organization (Barney, 1991). Further, it shows how knowledge management provides flexibility in organizational practices. The questionnaires to examine knowledge management are highly firm-specific in the sense that there are no standard formulas for their implementation. Therefore, it is difficult to imitate and integrate into organizational routines. Knowledge acquisition, knowledge dissemination and knowledge utilization are valuable because they contribute to innovation performance. As a result, knowledge management practices may be regarded as a substantial source of sustained competitive advantages for the company.

A second related contribution of our study is providing a clear understanding of the knowledge management process. Knowledge is sought through a variety of different sources and created through different mediums. Then, the dissemination of knowledge around the organization has been the focus of most attention in the knowledge management. It has been supported by earlier studies the organizational structure of a firm and cross-functional communication will improve knowledge sharing among departments and individuals within a firm (Van Den Bosch et al., 2003; Lane and Lubatkin, 1998). Lastly, the organization will respond to the various types of knowledge it has access to. The organization can make use of this pool of knowledge when they need to address external information within a subject. This notion is consistent with, and builds on some of the earlier work in this area (Darroch & McNaughton, 2003; Loasby, 2000)

A third contribution is to the emerging knowledge-based view, which posits that knowledge constitutes the ultimate source of competitive advantage. This study provides a clearer understanding of knowledge effect on innovation performance supported by an empirical test.

Our study has also interesting implications for practice. It shows managers how to maximize the competitive advantage. Managers should consider knowledge acquisition, knowledge dissemination and knowledge utilization when formulating the firm's strategy.

9. References

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