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The Impact of Environmental Dynamism on Knowledge Absorptive Capacity-Innovation Performance Relationship Amongst Manufacturing SMEs in Malaysia

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ABSTRACT

This study examines the absorptive capacity construct at the organization level: its influence on the innovation performance. The primary question this study sought to answer was: How does absorptive capacity affect innovation performance? More specifically, the study examines the relationships of absorptive capacity dimensions and innovation performance. Also, the role of environmental dynamism, as a moderator on absorptive capacity-innovation performance relationship was also investigated. Absorptive capacity is defined as a firm's capability to complete the entire process from acquiring, disseminating and exploiting knowledge for commercial ends. This study focuses on three dimensions only; knowledge acquisition, knowledge dissemination and knowledge exploitation. The innovation performance concentrates on incremental innovation which includes product, service, method of production, market, sources of supply and ways of organizing.

The study used a survey research method and regression analysis technique to examine the hypothesized relationships among constructs using data collected from 180 manufacturing SMEs in Malaysia. It was found that absorptive capacity is positively and significantly related to firms' innovation

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performance. Nevertheless, none of the dimensions of absorptive capacity was found significant. The environmental dynamism significantly moderates the relationship between absorptive capacity and innovation performance. The results indicated that both researchers and managers need to pay more attention on SMEs capability in acquiring, disseminating and exploiting knowledge and these capabilities must be integrated in order to achieve superior innovation performance. Also Malaysian SMEs are seen to be more absorptive in more stable environment which eventually enhances the innovation performance.

Keywords: *Absorptive capacity, innovation performance, SMEs, Malaysia*

Introduction

Due to the great importance of small and medium-sized enterprises in manufacturing, which contribute 31.8 per cent to the total employment of Malaysia manufacturing sector and 30.9 per cent of total manufacturing output in 2008 (*http://www.mpc.gov.my*), it is of particular interest to identify factors which could contribute to the performance of these firms. Absorptive capacity might be one of these factors.

Absorptive capacity consists of organizational routines and processes (*e.g*. human resource practices, customer service) (Zahra & George, 2002). Key aspects of absorptive capacity are firms' acquiring, assimilating, transforming, and exploiting knowledge. Absorptive capacity can contribute to performance by creating new knowledge, by creating a better understanding on the important environment which enables firms to more accurately predict future technological advances (Cohen & Levinthal, 1990). While the analysis of the performance impact of absorptive capacity is largely confirmed in the context of radical innovation (Pennings & Harianto, 1992; Corkburn & Henderson, 1998; Ahuja & Katila, 2001; Tsai, 2001) its relationship in the context of incremental innovation has not been given much attention in existing research. While there is no exact study which support of a positive relationship between absorptive capacity and incremental innovation performance in smaller firms, other studies (Bashkaran, 2006; van Geenhuizen & Nurul, 2005) found support for knowledge per se which impacts on incremental innovation in small firms. Therefore, to draw a differentiated picture of the innovation performance impact of absorptive capacity, this study tests the performance implications in terms of incremental innovation amongst Small-Medium Enterprises (SMEs) in Malaysia.

Problem Statement

Despite the theoretical strength of the idea that knowledge creates competitive advantage for firms, research demonstrates the influence of the firms' capability in processing knowledge under dynamic environment is lacking. Knowledge-based views (KBV) believe that firm's success is not measured on how firm overcome its scarcity problem but on how firm use its ability to learn and use learning more efficiently than others (Nik Maheran & Zainuri, 2008). According to contingency theorist, Terreberry (1968) to remain viable, organizations in uncertain environments will adapt their knowledge-generating and application abilities to the changing contingencies in the environment. Thus, contingency theory argues for a challenge to the premise that the application of knowledge unconditionally results in improved performance. In this study, the authors proposed an important contingency: the strength of the relationship between absorptive capacity and the firm's performance is contingent upon a dynamic environment.

Research Objectives and Research Questions

The objective of this paper is to propose and test a model of the conditional effect of absorptive capacity on innovative performance. The authors address the following research questions: (1) what is the effect of absorptive capacity on innovation performance, (2) what are the performance implications of absorptive capacity (*i.e.* knowledge acquisition, knowledge dissemination and knowledge exploitation) under environmental dynamism. Figure 1 presents the overall research framework.

Framework and Hypotheses

The framework in Figure 1 was derived from the literature of organizational learning, knowledge management and innovation (Cohen & Levinthal, 1990; Miller & Friesen, 1998; Johannessen, Olson & Lumpkin, 2001; Zahra & George, 2002). Researchers have concluded that absorptive capacity is associated with creation of new knowledge, which is crucial for the firms' innovation (Cohen & Levinthal, 1990). Firms that are committed to learning are likely to possess state-of-the-art

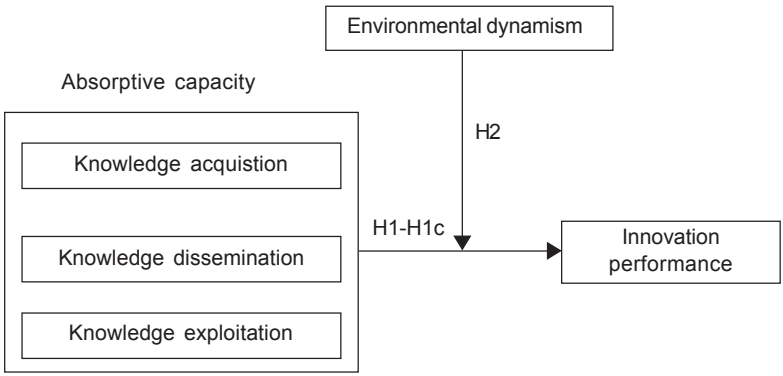

Figure 1: Research Model

technology (Gatignon & Xuereb, 1997), which leads to greater innovation capability in both products and processes.

Absorptive capacity originally originated from organizational learning theory is conceived as composed of four dimensions: acquiring, assimilating, transforming and exploiting knowledge (Zahra & George, 2002). However, this study only focused on three dimensions of absorptive capacity based on the assumption that SMEs operate in a simple and flexible manner (Noteboon, 1988).

Absorptive Capacity

Absorptive capacity refers to organization-wide routines and process of creating and using knowledge to enhance firms' capabilities (Zahra & George, 2002). This includes obtaining and sharing knowledge from a wide variety of sources, using a variety of media. Prior related knowledge and effective organizational routines and communication processes are major elements of absorptive capacity. Different firms will have different capacity to absorb new knowledge and practices; firms would generate innovative outcomes when their capabilities are used effectively (Fiol, 1996).

Despite the growing popularity of using the absorptive capacity construct under different settings, empirical research on absorptive capacity was hampered by the lack of clear definition and operationalization of the construct (Lane, Koka & Pathak, 2006). The most commonly used measure for absorptive capacity is R&D intensity (Tsai, 2001; Stock, Greis & Fischer, 2001), which is not comprehensive enough to cover the rich content domain of the construct. Zahra and

George (2002) suggest that absorptive capacity is a dynamic capability with different components embedded in specific organizational processes. They also highlight the role of social integration in their conceptual model of absorptive capacity. However, this study embraced the concept of social network indirectly as absorptive capacity needs a tool to have effective capabilities in acquiring and disseminating knowledge. In SMEs social network such as suppliers and customers play a crucial role in facilitating their dynamic capabilities (Chen, Duan, Edward & Lehaney, 2006).

This paper attempts to conceptualize absorptive capacity based on Zahra and George's (2002) definition and constructs in a manufacturing setting and to develop valid and reliable measures for the dimensions that comprise absorptive capacity. It provides theory and literature that links absorptive capacity and innovation performance, specifically incremental innovation.

Knowledge Acquisition

Knowledge acquisition is a firm's capability that enables firms to identify and capture relevant external and internal knowledge and technology (Cohen & Levinthal, 1990; Boynton, Zmud, & Jacobs, 1994). The knowledge acquired by firms is viewed as a complex concept which consists of information and skills acquired through experience, truth and belief, perspective and judgments, expectations and methodologies. Knowledge exists in individuals, groups and in organizations, in various forms. Thus, firms need effective mechanism and reliable sources to acquire relevant knowledge. Researchers have therefore begun to emphasize the importance of the social network in SME learning (*e.g.* Rae, 2002; Devins & Gold, 2004; Taylor & Thorpe, 2004). Social networks are dynamic; they offer an excellent means of systematically promoting circulation of explicit and tacit information on a given area (Julien, Lachance & Morin, 2004). Regularly combining the existing knowledge with the external knowledge would enable firms to reduce their chance of being lockout of new innovation (Ira, 2005).

Knowledge Dissemination

Knowledge dissemination involves transmission of knowledge that has been analyzed (Sabherwal & Becerra-Fernandez, 2003). Effective knowledge dissemination involves not merely transmitting knowledge to

everyone but rather selectively distributing it to the appropriate individuals or groups (Daft & Huber, 1987). Effective knowledge dissemination requires knowledge being transferred quickly to avoid making the knowledge outdated (Garvin, 1993). It is also important that effective knowledge dissemination involves shared interpretation which makes it easy for knowledge to be understood (Szulanski, 1996). Knowledge is not static. Once it is accumulated it should be considered when making decision pertaining to innovative activities (Frishammar & Horte, 2005). According to Rothwell (1992), firms that are successful in innovation emphasize information sharing across functions, thus ensuring customer needs remain the focus of R & D activities.

Knowledge Exploitation

Knowledge exploitation refers to the application of knowledge (Cohen & Levinthal, 1990). Zahra and George (2002) suggest that the firm's capability to exploit knowledge is based on its routines which permit firm to refine, extend and leverage existing competencies by integrating acquired and altered knowledge into its operations. Nielsen (2006) argues that knowledge exploitation includes the activities of utilizing organizational capabilities by embedding the knowledge in a salable product or service, reproducing it, and releasing it to the market. A firms' performance is dependent on the ability to exploit its incorporated knowledge resources in order to create and deliver products and services to its customers utilizing its organizational capabilities

Absorptive capacity can be viewed as firms' fundamental learning process (Cohen & Levinthal, 1990). It is critical to develop and maintain absorptive capacity for firms' long term survival and success as absorptive capacity can reinforce, complement, or refocus the firms' knowledge base (Lane *et al*., 2006). The empirical evidence confirms the general belief that external knowledge is of prime importance to SMEs (Chen *et al*., 2006). SMEs rely on customers and suppliers knowledge to improve their business performance. However, the learning process may not come easily as it deals with external knowledge. Environment provides firms with knowledge about customers, suppliers, and competitors (Daft *et al.*, 1988). It also offers knowledge about economics, politics, social, legal and demographic which they term it as general environment. According to them general environment is less uncertain compared to task environment. Hence, this study attempts to examine the effect of environment on absorptive capacity-innovation performance relationship.

Environmental Dynamism

Environmental dynamism has been defined as environmental instability or volatility (Keats & Hitt, 1988). Dynamism relates to the rate of unpredictable change in a firm's environment (Child, 1972). "Dynamism is characterized by the rate of change and innovation in the industry as well as the uncertainty or unpredictability of the action of competitors and customers (Miller & Friesen, 1983: 222)". Dynamism indicates uncertainty that erodes the ability of executives to predict future events as well as their impact on the organization (Khandawalla, 1987).

This study follows the general axiom that "no strategy is universally superior, irrespective of the environmental context (Venkatraman, 1989: 425). Thus, the effect on firm performance is dependent on its environmental context. Whereas the direct relationship between environment and firm performance is well established in the literature (McGahan & Porter, 1997), the moderating role of the environment on absorptive capacity-performance relationship is rarely explored area. Therefore, the following research question is addressed in this section: under what condition will absorptive capacity be positively associated with innovation performance amongst SMEs?

Innovation Performance

Incremental innovation is closely aligned to express the customers' needs (Darroch & McNaughton, 2002). Most innovations are incremental and will present themselves as either line extensions or modifications of existing products (Dosi, 1988). It does not require a significant departure from existing business practices, firms are likely to enhance existing internal competencies by providing the opportunity for those within the firms to build on existing knowledge know-how (Tushman & Anderson, 1986). Incremental innovation is more suitable to be employed in entrepreneurial research as it focuses less on technological advancement (Bashkaran, 2006). Bashkaran (2006) added that incremental innovation offers substantial competitive advantages to SMEs and it can be adopted by entrepreneurs with different cultural backgrounds and skills and especially SMEs that focus on sales and marketing.

The Relationship between Absorptive Capacity and Innovation Performance

Smaller firms differ in their ability to assimilate and replicate new knowledge gained from external sources. Cohen and Levinthal (1990) called such ability "absorptive capacity". They argued that an organization's ability to recognize the value of external knowledge and to assimilate and apply it effectively – is a critical part of an organization's innovative capability. Knowledge will not be able to promote innovation if it cannot be shared or distributed to the relevant people (Ju, Li & Lee, 2006). Networking plays a significant role in sharing and distributing the knowledge (Agkun *et al*., 2002). Also firms can increase innovation through application of knowledge. A few studies (Darroch & McNaughton, 2002; Ju *et al*., 2006) found a positive and significant relationship between knowledge management capabilities and innovation performance. Thus, the following hypotheses are developed:

H1 : Firms' absorptive capacity will significantly affect its' level of innovation performance

H1a: The levels of firms' knowledge acquisition will significantly affect its levels of innovation performance

H1b: The levels of firms' knowledge dissemination will significantly affect its levels of innovation performance

H1c: The levels of firms' knowledge exploitation will significantly affect its levels of innovation performance

Moderating Effect of Environmental Dynamism on Absorptive Capacity-Innovation Performance Relationship

Contingency theory states that organizational effectiveness is a function of the goodness of fit between the organization's structure and its environment. That is, there must be a good fit for organizations to effective (Pennings, 1992). The literature indicates that the impact of firms' resources and competencies on firms' performance is contingent upon environmental conditions, such as environmental dynamism (Dess & Beard, 1984; McArthur & Nystrom, 1991). As the environmental dynamism makes it difficult for firms to assimilate and anticipate environmental conditions and has an adverse influence on performance (March, 1991), firms need to identify and develop the capabilities to cope with these challenges. A few studies (Keskin, 2005; Tegarden, Sarason, Childers & Hatfield, 2005) that found firms' resources such as learning

capabilities, knowledge management are contingent upon environmental dynamism in order to enhance innovation performance. Thus this study predicted:

H2: Incremental innovation performance of SMEs would be lower when absorptive capacity is aligned with highly dynamic environment than when it is aligned with less dynamic environment

Methods

Sample

The analysis is based on data of small medium enterprises (SMEs) from Malaysia. This study follows the definition of small manufacturing firms in Malaysia, according to which small firms are defined as having staff of fewer than 150 persons and sales of under MYR 50 million (Malaysian Ringgit) (SMIDEC, 2006). Approximately around 8100 population of manufacturing SMEs from seven main categories were registered under Small Medium Industry Development Corporation (SMIDEC) in 2007. As suggested by Krejcie and Morgan (1970), 360 samples are required for population around 8000. A proportionate stratified random sampling was then conducted in this study to obtain suitable samples. First, the number of SMEs was determined based on their percentage of composition by sectors. Then, those selected were stratified based on the percentage of composition by states which then were categorized into five regions; northern region (Penang, Perak and Kedah), Eastern region (Kelantan, Terengganu and Pahang), Middle region (Selangor and Wilayah Persekutuan Kuala Lumpur), Southern region (Negeri Sembilan, Malacca and Johore) and East Malaysia (Sabah and Sarawak). The total numbers of SMEs which were selected are as follows; 86 SMEs from the Northern region, 103 SMEs from the Southern region, 101 SMEs from the Middle region, 36 SMEs from the Eastern Region and 52 SMEs from the East of Malaysia. Finally, SMEs were selected at random using Microsoft excel. Out of these samples, 180 firms' owners/managers agreed to be interviewed.

Table 1 shows the demographic information of the respondents' firms. The above table displays the percentage of respondents based on sectors. About 23 % (41 samples) were textiles, apparels and leather manufacturers, 18 % (33 samples) were from food beverage & tobacco, 18 % (33 samples) were from metal products, 14 % (25 samples) were

Table 1: Demographic Information

Items	Percentage
Industry Types	
Textiles, apparels and leather	22.8
Food beverage & tobacco	18.3
Metal products	18.3
Publishing, printing and reproducing of recorded media	13.9
Furniture	9.4
Rubber & Plastic product	8.9
Wood & Wood products	8.3
Firms' Age	
Less than 5 years	34.4
6-10 years	29.4
11-15 years	21.7
Education Level	
High school	23.3
Diploma	29.4
Bachelor Degree	40.6
Masters Degree/PhD	6.7

from publishing, printing and reproducing of recorded media, 9 % (17 samples) were furniture manufacturers, 9 % (16 samples) were rubber & plastic product manufacturers and 8 % (15 samples) were wood & wood products manufacturers.

About 34 % (62) SMEs operated less than 5 years, while 29 % (53) of the respondents operated between 6 – 10 years. More than 36 % (65) of the respondents have been in operation for more than 11 years. Approximately more than half of the respondents (76.6 %) indicated their educational level were beyond the high school level.

Measures Description

The measurement of the absorptive capacity variable has been built on a multiple-items method which enhances confidence about the accuracy and consistency of the assessment. Whereas, innovation performance and environmental dynamism measurements were borrowed from established research. Each item was based on a 7 point Likert scale and all of the measures were perceptual-based.

Absorptive Capacity

Absorptive capacity has been measured as a multi-dimensional construct in which knowledge acquisition, knowledge dissemination, knowledge exploitation are considered as representative dimensions. The authors adapted 20 items from the instruments developed by Gold, Malhotra and Segars (2001), Akgun, Lynn and Reilly (2002) and Jantunen (2005). A principal component analysis was conducted on 20 items and it yielded 3 factors. Based on the recommendation of Hair, Anderson, Tatham, and Black (2007), research with a sample of 200 is advised to employ factor loading of 0.40. Hence, nine items were deleted. The overall reliability as assessed by Cronbach's alpha values are 0.919 for absorptive capacity, 0.881 for factor 1 (knowledge acquisition), 0.852 for factor 2 (knowledge dissemination), and 0.812 for the third factor (knowledge exploitation).

Innovation Performance

Innovation performance is measured based on incremental innovation which was developed by Johannessen *et al*. (2001). There were six items. These items measured the extent to which participants' firms fare in product innovation, service innovation, process innovation, market innovation, logistic innovation and organizational innovation compared to their competitors. A principle component analysis yielded a one single factor structure with eigenvalue greater than one. The coefficient alpha for the scale is 0.89.

Environmental Dynamism

It is a uni-dimensional measurement which was developed by Miller & Friesen (1984). Participants were asked to rate the change in the business environment in their industry for the last three years including marketing practices, product and services, competitors' action, taste and preference of customers, and process innovation. A principal component analysis with varimax rotation was conducted on the responses to the 5 items measures and it yielded one factor. The scale has a Cronbach's alpha of 0.83, which indicates acceptable reliability.

Method of Analysis

Regression analyses were employed to test the formulated hypotheses. The statistical testing procedures are as follows. First, simple and multiple

regressions were used to test the H1-H1c. Later, hierarchical regression was used to test the interaction effect of environmental dynamism on absorptive capacity-innovation performance relationship.

Results

Descriptive statistics and the correlation matrix for the independent and dependent variables are reported in Table 2.

Table 2: Descriptive Statistics and Correlation Matrix

	Variables	Mean	s.d	1	2	3	4	5
1	Knowledge acquisition	5.4441	.96490	1.00				
2	Knowledge dissemination	5.1471	.95868	.593**	1.00			
3	Knowledge exploitation	5.5765	.99292	.663**	.689**	1.00		
4	Environmental dynamism	4.7529	.89556	.281**	.363**	.372**	1.00	
5	Innovation performance	4.7010	.86249	.174*	.123	.199**	.490**	1.00

** correlation is significant at the 0.01 level (2-tailed)
* correlation is significant at the 0.05 level (2-tailed)

Table 2 reports the means, standard deviations and correlations for the independent and dependent variables used in the analysis. Skewness and kurtosis statistics of dependent variable fall well within the boundaries for normality (Shapiro & Wilk, 1972), allowing parametric tests of significance. It can be seen that the mean values of all variables fell between the ranges of 4.7 – 5.6. This indicates that there is no extreme value for the mean of all variables. With the average of standard deviation of 0.96 for knowledge acquisition, 0.95 for knowledge dissemination and 0.99 for knowledge exploitation, it indicates that statistically, the data have captured sufficient variation in the absorptive capacity.

First, firms' innovation performance was regressed against firms' absorptive capacity, knowledge acquisition, dissemination and exploitation.

Table 3 illustrates that the overall model was significant ($p = 0.013$). The Durbin-Watson statistics showed there was no auto-correlation in the result. The R square value of 0.04 shows that only 4 % of variance in innovation performance explained by absorptive capacity. Nevertheless, the results showed there is a significant and positive relationship between firms' absorptive capacity and firms' innovation performance ($B = 0.193$, $p = 0.013$). Hence, H_1 was supported. The more absorptive the SMEs are in processing knowledge, the higher their innovation performance.

Table 3: Relationship between Innovation Performance and Absorptive Capacity

Absorptive Capacity (AC)	R	R^2	Std error Estimate	Sig. F	Durbin-Watson
	0.191	0.036	0.84917	0.013	1.710
Independent Variables	Unstandardized Coefficient		Std. Coeff. Beta	t	Sig.
	Beta	Std. error			
AC	0.193	0.077	0.191	2.519	0.013

Dependent variable: Innovation performance

As shown in Table 4, R^2 value was 0.045 with p = 0.05, thus the three predictors account for only 5 % of firms' innovation performance. The three dimensions of absorptive capacity: knowledge acquisition (KA), knowledge dissemination (KD) and knowledge exploitation (KE) were not significantly related with innovation performance. As a consequence, $H_{1a,}$ H_{1b} and H_{1c} were not supported. SMEs are required to have the three abilities in knowledge process if they plan to achieve higher performance in innovation.

Table 4: Relationship between Innovation Performance and Absorptive Capacity's Dimensions

Absorptive Capacity (KA, KD, KE)	R	R square	Std error Estimate	Sig. F	Durbin-Watson
	0.211	0.045	0.85060	0.05	1.696
Independent Variables	Unstandardized Coefficient		Std. Coeff. Beta	t	Sig.
	Beta	Std. error			
KA	0.084	0.094	0.094	0.899	0.370
KD	-0.046	0.097	- 0.051	-0.475	0.635
KE	0.149	0.101	0.172	1.479	0.141

Dependent variable: Innovation performance

Moderating Effect of Environmental Dynamism (ED) on Absorptive Capacity-Innovation Performance (IP) Relationship

In hypothesis (H_2), it was posited that environmental dynamism would moderate the relationship between absorptive capacity (AC) and innovation performance (IP).

Table 5 shows the moderating effect of environmental dynamism on the relationship between absorptive capacity and innovation performance (ß = -0.183, $p < 0.05$). The impact of environmental dynamism (ED) was significant ($p = 0.009$). Therefore, H_2 was supported.

Table 5: Analysis of Variance for Innovation Performance Relationship

Dependent variable	Predictors	Model 1 ß	Model 2 ß	Model 3 ß
Innovation performance	Absorptive capacity (*A*)	0.191**	**0.001**	**-0.044**
	Environmental dynamism (*B*)		**0.490****	0.537**
	*A*B*			-0.183**
	R^2	0.036	0.240	0.271
	ΔR^2	0.036	0.204	0.031
	F	22.321	42.987	32.585

** $p < 0.05$

To illustrate the moderating effect of environmental dynamism on absorptive capacity-innovation performance more clearly, a graph was plotted.

Figure 2 illustrates the empirically supported interaction effects of environmental dynamism and absorptive capacity. As the Figure 2 illustrates, when environmental dynamism was low, a more gradual increase in firms' absorptive capacity was shown in order to achieve sustainable innovation performance. Next, when environmental dynamism was at moderate level, firms' absorptive capacity increased at decreasing rate between low to moderate and decreased slowly from moderate to high. On the other hand, when environmental dynamism was high, firms' innovation performance started to decrease when firms' absorptive capacity was at low then continued to decrease from low to high. Firms' innovation performance would begin to drop when firms' absorptive capacity was between moderate to high.

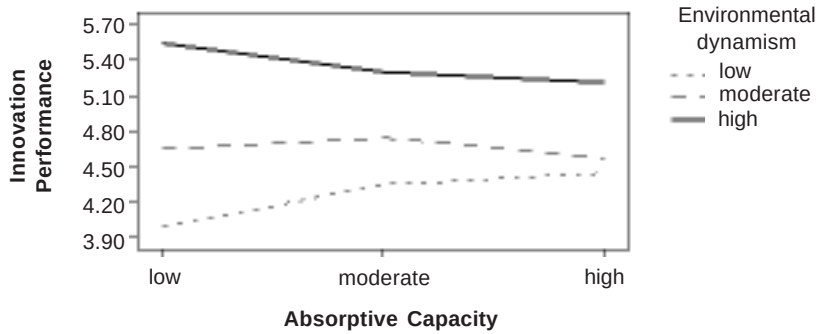

Figure 2: Moderating Effect of Environmental Dynamism on Innovation Performance

Discussion and Conclusions

This study has examined the link between absorptive capacity and innovation performance. The empirical analysis has the following contributions. First, the existence of a link between absorptive capacity and innovation performance is confirmed. The results of the study suggest that absorptive capacity directly influences innovation performance. This study supported the previous researches (Damanpour, 1991; Calantone, Cavusgil and Zhao, 2001) which suggest that learning capabilities promotes innovation within the firms. However, the relationships between dimensions of absorptive capacity (knowledge acquisition, knowledge dissemination and knowledge exploitation) and innovation performance were insignificant. These results of the study suggest that firms' innovation performance could not be improved without one of the dimensions. Firms do not innovate in isolation (De Propis, 2002), particularly SMEs which have a generic lack of resources and overall resource strategies and action plans. They depend on their social network for external knowledge, to be combined with firms' existing knowledge. This process is captured in firms' absorptive capacity. Thus, SMEs must make sure that the three capabilities must co-exist in order to increase its absorptive capacity and eventually achieve superior innovation performance.

Second, this study found that the relationship between absorptive capacity and innovation performance outcomes is contingent upon environmental conditions. It is evidenced when that R^2 value increased from 4 % to 24 % and 27 % once environmental dynamism was added to

the model. The results implied that in a highly dynamic environment, firms' absorptive capacity-innovation performance relationship would be weak, whereas firms' innovation performance would be better in less dynamic environment. SMEs in Malaysia would be more innovative when the rate of change in terms of marketing practices, new product and services, competitors' action is stable. These findings contradict Miller and Friesen's (1983) and Claycomb *et al.* (2001). Owners'/managers' of SMEs manufacturing in Malaysia must thus realize that firms' absorptive capacity work better in a stable environment. This could be true in Malaysia scenario but not in other part of the world. The rationale for the negative findings was the low dynamism, the goal of innovation could be easily achieved as the knowledge process involved employee participations (Tegarden *et al.* 2005). There is more competition for ideas among subgroups in innovative goals and less dynamic environment would result in more effective implementation of the strategy engagement process. Implementing innovative goals takes longer time at the organization level.

Limitations

The findings of this study should be treated with caution due to some inherent limitations. First, this study focused on manufacturing SMEs only. This choice enabled the authors to examine the research questions with considerable richness, thereby enhancing the study's internal validity. It also helped the authors to examine absorptive capacity in an organization where knowledge seems to be of paramount importance. However, the generalizability of the findings is potentially limited by the fact that all the respondents belong to one sector (manufacturing). Like other organizations, absorptive capacity has its unique attributes, and it remains to be seen whether this result can be generalized to other kind of organizations.

Second, this study was cross-sectional and static in nature. If this study had been conducted longitudinally, the authors may have been able to assess the temporal ordering of the research constructs. A longitudinal investigation would have provided further insights into the dynamics of the effects of absorptive capacity as well as the dynamics across various firms. This is especially true since some of the effects included in the models may take time to occur. For example, knowledge dissemination and knowledge exploitation might influence firms' performance over time but not in the short run. This study could not assess the nature of such

time lags, due to its cross-sectional nature. Nevertheless, the use of cross-sectional correlational data necessitates caution in interpreting the results and in drawing causal inferences concerning the hypothesized relationships

Finally, like most social science models, this study excludes some potentially important factors. This study only considered the absorptive capacity as affecting firms' performance. To prevent the analysis from being overwhelmingly complex, this study did not include other factors that might affect firms' performance. Even some individual attributes and firms' characteristics, which were either available or easily obtainable, were excluded to maintain focus and to test a model.

Directions for Future Research

This study has several implications for future research on organizational learning. First, it contributes to the literature in this area by developing and empirically testing a research model that relates absorptive capacity to SMEs' performance. The tests of this model did not support the relationships between knowledge acquisition and firms' innovation performance, between knowledge dissemination and innovation performance and between knowledge exploitation and innovation performance. Further investigation of these non-findings, as well as the significant findings captured in the emergent model, is needed to assess whether they can be generalized to other organizations.

Second, similar studies could be conducted at other knowledge intensive, albeit non-governmental, organizations, such as IT firms. Finally, this study suggests that a longitudinal study may be needed to examine relationship of absorptive capacity dimensions with each other. As it might capture process of knowledge that take place in firms.

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