

บทความวิจัย

การสร้างความรู้ความเข้าใจใน SMEs ของไทย: บทบาทของสิ่งแวดล้อมในตลาด

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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาถึงผลกระทบของปัจจัยแวดล้อมด้านตลาดต่อการสร้างองค์ความรู้ใน SMEs ไทย แบบสอบถามจำนวน 464 ฉบับแจกจ่ายให้กับ SMEs ไทยที่ลงทะเบียนภายใต้สำนักงานนวัตกรรมแห่งชาติ (NIA) และส่งกลับ 217 ฉบับ การสร้างแบบจำลองสมการโครงสร้าง (SEM) ใช้ในการกำหนดผลกระทบของสภาพแวดล้อมของตลาด (การปฏิสัมพันธ์ลูกค้าการปฏิสัมพันธ์คู่แข่งและการวางแผนผู้จัดจำหน่าย) ในการสร้างองค์ความรู้ ผลการวิจัยพบว่าสภาพแวดล้อมทางการตลาดมีผลต่อการสร้างความรู้ นอกจากนี้ผลการวิจัยพบว่าการปฏิสัมพันธ์ลูกค้าเป็นปัจจัยที่มีอิทธิพลมากที่สุดในการสร้างองค์ความรู้ การศึกษานี้เป็นการวิเคราะห์เชิงประจักษ์ถึงความสำคัญของสภาพแวดล้อมของตลาดในกระบวนการสร้างองค์ความรู้ใน SMEs และผลกระทบต่อผลลัพธ์ความรู้ที่เป็นนวัตกรรมของบริษัท

คำสำคัญ: สภาพแวดล้อมทางการตลาด, การสร้างความรู้, SMEs, สำนักงานนวัตกรรมแห่งชาติ (NIA)

Research

Knowledge Creation in Thai SMEs: The Role of Market Environment

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Abstract

The purpose of this research is to investigate the impact of market environment factors on knowledge creation in Thai SMEs. 464 questionnaires were distributed to the Thai SMEs registered under National Innovation Agency (NIA) and 217 were returned. Structural Equation Modelling (SEM) is used to determine the effect of market environment (customer orientation, competitor orientation and supplier orientation) on knowledge creation. The results indicated that the market environment has an impact on knowledge creation. Furthermore, the findings suggest that customer orientation is the most significant influential factor on knowledge creation. This study provides an empirical analysis on the importance of market environment on knowledge creation process in SMEs and its impact on companies' innovative knowledge outcomes.

Keywords: Market environment, knowledge creation, SMEs, National Innovation Agency (NIA).



Introduction

Innovation is as an instrument for seeking interest and opportunity from various changes to create different business and services from competitors (Drucker, 1985). It is a result of knowledge acquisition, sharing and assimilation through knowledge creation. It is extremely dependent on the availability of knowledge and its complexity created by the explosion of richness and reach of knowledge has to be identified and managed to ensure successful innovation (Adams and Lamont, 2003; Cardinal and Allessandri, 2001). Therefore, knowledge becomes a key for the successful innovative output.

Knowledge-based view (KBV), one of the existing theories of the firm which is an outgrowth of resource based view (RBV), views an organization as a knowledge-integrating institution of internal and external knowledge (Grant, 1996). Dorri and Talebnejod (2008) stated that the necessity of knowledge creation can be accessed from the internal and external dimension. Nonaka and Toyama (2003) viewed a knowledge creation is dialectic process both within organization and market operating environment. They proposed a model of knowledge creation so called dialectic model (Takeuchi and Nonaka, 2004). This model assumes that knowledge creation is a synthesizing process or an integration between organizational knowledge and market environment (Day, 1994; Kohli and Jaworski, 1990; Narver and Slater, 1990; Ayuso, Rodriguez, Garcia-Castro and Arino, 2011).

A study conducted by Hasgall and Shoham (2008) found that an organization needs a capability to update its organizational

knowledge from its external turbulent environmental renewal of organizational asset stock enables an organization to deliver a constant stream of new and innovative products and services to customers. Market environment has become the major asset of modern businesses and the key to retain their competitiveness. Thus, the main objective of this study is to examine the market environment on knowledge creation and second to investigate the impact of the market environment's dimensions on knowledge creation in Thai SMEs.

Literature Review

Overview of Knowledge Creation

Knowledge theories identified two major types of knowledge: tacit and explicit (Polanyi, 1967). Knowledge creation is a synthesizing process through which an organization interacts with individuals and the environment. This interaction makes the knowledge process to occur as dynamic and inter-linked interaction from an individual-to-societal level (Nonaka and Toyama, 2003). The synthesizing process of knowledge creation has been described in Nonaka's SECI model of knowledge conversion and the spiralling process of knowledge creation (Nonaka and Takeuchi, 1995).

According to the knowledge-based view of the firm, tacit knowledge that the organization develops inside the organization generates long lasting advantages because that knowledge is difficult to imitate (McEvily and Chakravarthy, 2002). The firm absorbs organizational knowledge and the market environment, combines them with pre-acquired

knowledge, and creates new one (Cohen and Levinthal, 1990). Therefore, we argue that new knowledge creation is created through a synthesizing process between organizational knowledge and market environment.

Knowledge Creation (KC)

An organization can develop value and potential to sustain competitive advantage by creating new knowledge (Bryant, 2005; Spender, 1996). Spender (1996) emphasizes the importance of knowledge creation in KBV by holding that there are two predominant goals of organization which are the generation and application of knowledge. Tsoukas and Mylonopoulos (2004) noted that an organization that has the ability to create knowledge develops a capability that is dynamic and unique and that potentially underpins continuous organizational learning.

There are not many literatures discussing about the dimensions of knowledge creation. Most of the literatures discussed knowledge creation in the form its tacitness and explicitness. However some authors have emphasized different dimensions of knowledge creation. Schumpeter (1934) suggested knowledge creation is translated namely new products and services, new method of production, new markets. Miller and Friesen (1983) focused on four dimensions: new products and services, new method of production, risk taking by key executives and seeking solution. While Capon, Farley, Hulbert, and Lehmann (1992) suggested three dimensions: market, strategic tendency to pioneer and technological advancement.

Wang and Ahmed (2004) suggested three dimensions of four knowledge creation;

products and services, process, market and strategy. However, strategy dimension of knowledge creation is still debatable among researchers (Wang and Ahmed, 2004). This study will use Wang and Ahmad approach (2004) with the exclusion of strategy dimension because majority of empirical research do not consider strategy outcome as a component factor of organizational innovativeness (Wang and Ahmed, 2004).

Product Outcome (PO)

Knowledge creation is crucial to new product and service outcome (Yang, 2007). Innovative products and services present an opportunity for business expansion and success (Henard and Szymanski, 2001). Knowledge creation in products and services allow companies to establish dominant position in the competitive marketplace, and afford new entrants an opportunity to gain a foothold in the market (Danneels and Kleinschmidt, 2001).

Product developed from new knowledge is most often referred to as perceived newness, novelty, originality or uniqueness of products (Henard and Szymanski, 2001). New product development is dependent on the organization's ability to apply knowledge and information towards the discovery of new products and services (Tannenbaum and Nash, 2002). The new product development and knowledge management process are of utmost importance, since products that do not adapt to changes in the market environment cease to exist (Goldenberg, Lehmann, and Mazursky, 2001). Madhavan and Grover (1998) stated that the central theme for the new product and

service development process is the creation of new knowledge.

Process Outcome (PRO)

The discovery of new knowledge can lead to process innovativeness which captures the introduction of new production methods, new management approaches and new technology that can be used to improve production and management process (Wang and Ahmed, 2004). Process innovativeness work is mainly driven by the needs of production and can be said to

be primarily efficiency-driven (Bergfors and Larsson, 2009). As a result, an organization can exploit their resources and recombine its resources for optimizing the competitive advantage in production. Besides the implementation of new approach, process innovativeness also can lead to the reduction of production costs, higher production yields, improvement of production volumes and product recoveries and environment-friendly production (Larger, 2002).

Market Outcome (MO)

Market outcome refers to the discovery of new market segment which is related to market research, advertising and promotion (Andrews and Smith, 1996). The main reasons for a company to enter a new market segment or focus on a particular group of customers are to identifying new market opportunities and to fulfill a market gap by monitoring market trends. For some companies, this means that they can enter a market or identify a new market segment and launch products with cutting-edge technological content.

Companies in the market focus offered fewer products than those in market leader

group at a lower cost (Porter, 1980). They outperformed their competitors in terms of innovation efficiency, quality and rapid response to the market needs (Hsu, 2011). In other words, it can be described as appealing to the unique preferences and needs of a narrow, well defined group of buyers better than potential rivals (Thompson, Strickland and Gamble, 2010). Entering new market segment will increase company's competitiveness through growth possibilities, value creation and perceived value, profits, increased sales, prices and market shares, better protection from competition, customer retention/loyalty and higher purchase frequency (Toften and Hammervoll, 2013).

Conceptual Framework

Market Environment (ME)

Market environment is not explicit but rather than difficult to codify and communicate (Nonaka and Takeuchi, 1995). The prior research shows that the acquisition of market environment leads to short-term improvements in sales and profitability growth, market share, new product success, customer satisfaction and return on assets (Jaworski and Kohli, 1993; Slater and Narver, 1999). According to knowledge based view of the firm, external knowledge acquisition from market environment becomes one of the critical means for knowledge creation in order to achieve competitive advantage (Nonaka and Takeuchi, 1996; Lavie, 2006). Organizations can acquire information and knowledge from their interactions with a variety of external stakeholders (Ayuso et al, 2011).



According to the stakeholder theory (Freeman, 1984), stakeholders refer to groups and individuals who can affect or are affected by the organization's purpose which include customers, competitors, suppliers, government, NGOs and communities (Holmes and Smart, 2009). Stakeholders become important players in market environment. They are divided into primary and secondary stakeholders. The primary stakeholders are those who are directly involved in a market relationship such as customers, competitors and suppliers. Meanwhile secondary stakeholders, government, NGOs, communities and etc., refer to those who are not directly involved in a market relationship (Ayuso et al., 2011). The scope of this study only covers the role of primary stakeholders.

Customer Orientation (CO)

The voice of the customers is deployed throughout the product planning and design stages (Hauser and Clausing, 1988). It will become an input in the product design and development. Customers should be the driving force behind product development. A firm which commits itself to superior customer service and integrates customer preferences and needs into its product development strategy has the best guarantee for long-term success (Gatignon and Xuereb, 1997). Any changes in customers' demands may negatively affect the value of current marketing capabilities.

The literature suggests that the primary objective of an organization is to deliver superior customer value, which is based on knowledge gathered from customer analyses and disseminated throughout the organization

(Narver and Slater, 1990). The understanding of customer needs, preferences and market trends enables the organization to identify and develop capabilities for long term performance (Day, 1994) because the organization has information on customers' implicit needs to fulfil customers' satisfaction.

Competitor Orientation (ComO)

Competitors are defined as organizations or firms offering products or services that are close substitutes, in the sense that they serve the same customer need (Kotler, 2000). Competitors' orientation would provide a solid basis of information pertaining present and potential competitors for executive actions. It also can enhance a firm's competitive advantage by allowing it to benchmark with, learn from, imitate, and improve on the products of successful competitors (Drew, 1997). A considerable body of marketing thought suggests that competitor orientation should improve an organization's performance by enabling the organization to position its strengths against rivals' weaknesses (Slater and Narver, 1999).

Competitors' orientation can be accessed from many sources and it is available in many forms. The more traditional forms of competitors' orientation is based on assessment of competitors' goal, financial results and successes and failures, as well as competitors' assumption about a market (Porter, 1980). Besides the traditional forms, an organization can access and analyse competitors through internal employees, sale personnel. They can be a medium of supplying competitors' movement and activities in a market because they are involved directly with

substitute products or services. Thus, sufficient information on competitors will guide an organization to take appropriate actions in encountering any strategies or actions implemented by any rivals which could threaten its business operation (Sørensen, 2009).

Supplier Orientation (SO)

Supplier orientation refers to the supplier has a clear understanding of the manufacturer's needs and expectations (Gwinner, Bitner, Brown and Kumar, 2005). To remain competitive in their mainstream markets, an organization must establish a cooperative relationship with suppliers in order to reduce transaction costs associated with "buy" decision (Verbeke and Tung, 2013 and Sudharatna, 2010). The cost of materials and services become an affecting factor for an organization's cost. If an organization can reduce the cost of inputs, it will have a competitive advantage over its competitors in terms of cost leadership. Besides the cost of materials and services, the quality of materials supplied also should be taken into consideration for producing quality products (Sudharatna, 2010).

Environmental dynamism may cause obsolescence in organization's current knowledge base, eroding its competitive advantage (O'Reilly and Tushman, 2008). To avoid this damage, organizations need to carry out an explorative learning that enables them to reconfigure their capabilities base (Lavie, 2006). Thus, market environment acquisition by an organization may be considered as a key element for explorative learning development

(Lavie, 2006). Consequently, the following hypotheses are proposed.

H1. Customer orientation positively affects knowledge creation.

H2. Competitor orientation positively affects knowledge creation.

H3. Supplier orientation positively affects knowledge creation.

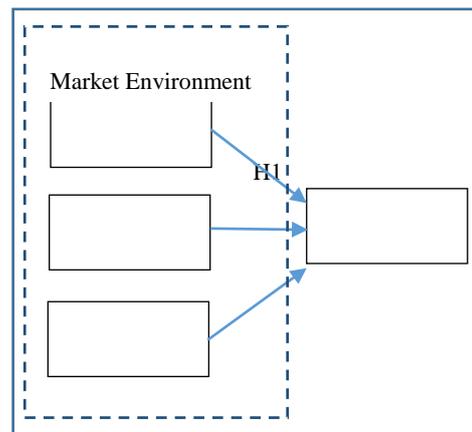


Figure 1 Research framework

Research Methodology

Instrument and measurement

The most appropriate methodology for this study is survey. The instrument used for collecting the research data was questionnaires. A corresponding Likert scale was deployed (1 for "Strongly Disagree"; 2 for "Disagree"; 3 for "Neither Agree nor Disagree"; 4 for "Agree" and 5 for "Strongly Agree"). Prior to pilot testing and main data collection, the questionnaires were pre-tested with several experts in the field and also several innovative companies who could become the prospective respondents. During the pre-testing exercise, the experts and the prospective respondents were requested to make constructive comments in various respects such as sentence structure, wordings,

format, length and language used. Based on their feedbacks, the questionnaire was refined and revised accordingly. Subsequently, the questionnaire was pilot tested with 40 innovative companies. Using the IBM SPSS version 20, the responses of these 40 companies were analysed for assessing the reliability of the measurements. The recorded Cronbach Alpha for all variables employing multi-items were well above 0.6 which suggests that the questionnaire was reliably sound (George and Mallery, 2003; Kline, 2005).

Population, sampling and data collection

The population of the study was Thai innovative companies registered under National Innovation Agency of Thailand (NIA) from 2004-2014. Those companies were chosen because of researcher's easy access to the sampling frame. A total of 464 companies was identified as targeted respondents. Those companies were divided into three categories, 119 eco-industry companies, 236 design and solution companies and 109 bio-business companies. Researchers assistants among the students were engaged to distribute the questionnaire. The duration of collection the data was three months. After the three months period was over, a total of 217 questionnaires was returned. However, 6 were found to be incomplete and 2 questionnaires were outlier for further analysis. The remaining 209 were analyzed using IBM SPSS and AMOS version 20. The statistical analyses carried out were frequency analysis; descriptive analysis focusing on median, standard deviation, variance and testing normality of distribution; and exploratory factor analysis (EFA) for

assessing unidimensionality; confirmatory factor analysis (CFA) for assessing the convergent validity and discriminant validity; and structural equation modelling (SEM) or structural model for testing the established hypotheses. Anderson and Gerbing (1988) explained that SEM is a confirmatory method providing "a comprehensive means for assessing and modifying theoretical models". Following Anderson and Gerbing (1998), the study will first develop and assess the measurement model and followed by the development and assessment of the structural model.

Findings

Respondents' characteristics

The respondents of the study were 209 companies, the majority were companies located at the central zone (74.16%) while the minority was located in west zone (0.48%). In terms of company size, the majority of respondents were small companies (58.85%) which have less than 50 employees. With regards to company categories, 44.50% was eco-industry, 34.45% was design & solution and 21.05 % was bio-technology. With regards to the respondent designation, 53.11% was R&D manager and 46.4% was company owner.

Assessment of Normality

The execution of SEM analysis requires that the observed data to be normally distributed. To meet this requirement, univariate normality was assessed using several procedures. According Gao, Mokhtarian and Johnstan (2008), univariate normality describes the distribution of only one variable in the sample. To test for univariate normality the skewness and kurtosis of each observed variable was assessed. Kline (2005) opined that

skew and kurtosis indices should not exceed an absolute value of 3 and 10 respectively. As shown in Table 1, the skewness and kurtosis

requirements fulfilled the benchmark values suggested by Kline (2005).

Table 1 Univariate normality

Variable	skewness	kurtosis
Market Outcome (MO)	-.029	-.397
Process Outcome (PRO)	-.335	.588
Product Outcome (PO)	-.539	.158
Customer Orientation (CO)	-.596	.095
Competitor Orientation (ComO)	-.501	-.038
Supplier Orientation (SO)	-.369	.104

Validity Assessment

Validity was assessed in terms of convergent validity and discriminant validity. Convergent validity is the extent to which the scale correlates positively with other measures of the same constructs (Malhotra, 2002). Convergent validity can be evaluated by examining the *t*-value from CFA (Kaynak, 2003; Chen, Pauraj and Lado, 2004; Sila and Ebrahimpour, 2005; Kim, 2010). Following Anderson and Gerbing (1988), each item's coefficients on its underlying construct were observed. An instrument has convergent validity if the correlations between measures of the same construct using different methods are high (Crocker and Algina, 1986). In

measurement studies, each item in the scale can be considered a different method for measuring the construct (Ahire et al., 1996). A test of each item's coefficient was used to assess convergent validity. If each item's coefficient is greater than twice its standard error (*t*-value), then measures indicate high convergent validity (Krause, 1999). In other words, the *t*-value should be greater than two to achieve strong convergent validity. The *t*-value of each retained item is presented in Table 2. All *t*-values are significant, indicating high convergence validity.

Table 2 Factor loading, standard errors and t-values

Constructs	Var	Factor Loading	S.E.	t-value.
Customer Orientation				
	CO6	1.000		
	CO5	1.132	.149	7.606
	CO4	1.165	.147	7.930
	CO3	1.287	.159	8.080
	CO2	1.420	.190	7.484
	CO1	1.056	.136	7.743
Competitor Orientation				
	ComO5	1.000		
	ComO4	.977	.104	9.406
	ComO3	.966	.097	9.958
	ComO2	1.126	.114	9.887
	ComO1	1.040	.111	9.379
Supplier Orientation				
	SO5	1.000		
	SO4	.907	.084	10.764
	SO3	1.008	.090	11.194
	SO2	.807	.086	9.397
	SO1	.698	.089	7.828
Knowledge Creation				
	PO	1.000		
	PRO	1.209	.155	7.807
	MaO	.968	.121	7.999

Besides assessing the convergent validity, the study also evaluated the discriminant validity. According to Malhotra (2002) discriminant validity is the extent to which a measure does not correlate with other constructs from which it is supposed to measure. To test the discriminant validity, three approaches were used. The first approach was

to perform a chi-square difference test on all pairs of constructs via CFA (Bagozzi, Yi and Phillips, 1991; Kim, 2010). Alternatively, the second approach was to compare the Cronbach's Alpha of a construct and its correlations with other constructs (Kaynak, 2003; Kim 2010). According to the rule of thumb, discriminant validity can be achieved if

Fit Index	Fit Criteria	Measurement Model
χ^2		243.173
df		143
P-value	≥ 0.5	0.000
<i>Absolute Fit Measures</i>		
CMIN (χ^2) / DF	3	1.701
RMSEA	≤ 0.08	0.058
RMR	≤ 0.05	0.034
<i>Incremental fit measures</i>		
CFI	≥ 0.9	0.944
<i>Parsimony Fit Measures</i>		
AGFI	≥ 0.8	0.852
PNFI	≥ 0.5	0.733

the Cronbach's alpha is greater than the correlations (Sila and Ebrahimpour, 2005). The third approach proposed by Fornell and Larcker (1981) using AVE. To this effect, the discriminant validity of the construct is determined by comparing the square root of AVE of the variables with the correlation between the variables and all other variables. Second approach was used to test discriminant validity in this study. As displayed in Table 3, the Cronbach's α of the variables is well above the correlation values, hence suggesting the good discriminant validity.

Table 3 Discriminant validity assessment using Cronbach's α

Assessment of Overall Model Fit

The first thing many researchers look for upon obtaining the results of the SEM analysis is the output related to goodness-of-fit (Bowen and Guo, 2012). Hair et al. (2010) explained that the goodness-of-fit of the SEM is indicated by how well it reproduces the observed covariance matrix

among the indicator items and can be divided into following four categories, namely, (i) Chi-square measures including chi-square, degree of freedom (df) and probability, (ii) measures of absolute fit (iii) incremental fit measures. Iacobucci (2010) stated that among the SEM fit indices, the Chi Square (χ^2) is the only inferential statistic while all the others are descriptive. The author also described that only Chi Square (χ^2) provides significance or hypothesis testing while for the others only suggest "rules-of-thumb" to assess goodness-of-fit. As illustrated in Table 4, the χ^2 statistic suggests that the data do not fit the model well ($\chi^2 = 243.173$, $df = 143$, $p \text{ value} < 0.5$). However, because χ^2 is easily affected by sample size (Gerbing and Anderson, 1992). The χ^2 statistic is not always an appropriate measure of a model's goodness-of-fit. Therefore other fit indices as shown in Table 4 are used to examine the model's goodness-of-fit. Apparently, all of the recorded indices surpassed the fit criteria suggesting that the SEM model fits the data very well.

Table 4 Fit Indices of Measurement and Structural Model

Var	1	2	3	4	5	6	α
co	1.00						0.84
como	0.55	1.00					0.87
so	0.54	0.54	1.00				0.85
po	0.27	0.35	0.26	1.00			0.71
pro	0.41	0.44	0.33	0.51	1.00		0.72
mao	0.34	0.35	0.26	0.50	0.56	1.00	0.71

Structural Model

Structural Model and Hypotheses Testing

The Squared Multiple Correlation (R^2) value for the relationship between the three variables and knowledge creation was 0.49 suggesting that 49 percent of the variance in knowledge creation can be explained by the combination of social interaction ($\beta = 0.248$, $p < 0.01$), customer orientation ($\beta = 0.55$, $p < 0.01$), competitor orientation ($\beta = 0.54$, $p < 0.01$) and supplier orientation ($\beta = 0.54$, $p < 0.01$). The overall results as summarized in

Figure 2 and Table 5 indicates that all hypotheses were fully supported.

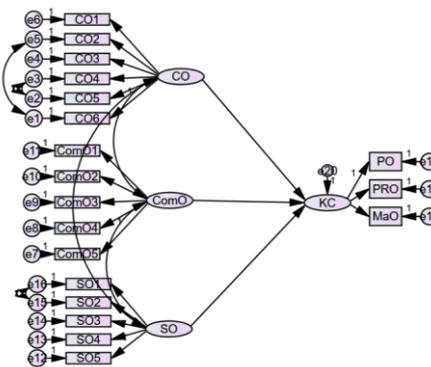


Figure 2 Structural Model

Table 5 Results of Hypotheses Testing

Hypothesis	P-value	Supported
H1: Customer orientation (CO) → Knowledge creation (KC)	< 0.01	Yes
H2: Competitor orientation (ComO) → Knowledge creation (KC)	< 0.01	Yes
H3: Supplier orientation (SO) → Knowledge creation (KC)	< 0.01	Yes

Discussion

The findings supports the knowledge base view (KBV) which stated market environment play a crucial role in knowledge creation for competitive advantage. An organization may integrate its pre-existing internal knowledge in the firm with market environment (Szulanski, 2003), as these new combinations generate new innovative knowledge (Gratton and Ghoshal, 2003). According to Nonaka and Toyama (2003), knowledge is created through the synthesis of thinking and actions of individuals. The theory of knowledge creation is based on an idealistic pragmatism which synthesizes the rational pursuit of appropriate ends. The importance of exchanging and recombining knowledge resources (broadly speaking, the know-how of the firm) has been highlighted in previous works (Nonaka and Takeuchi, 1995; Conner and Prahalad, 1996).

The finding from the study showed that all factors of market environment, customer orientation, competitor orientation and supplier orientation, have an impact on knowledge creation. Statistically, customer orientation has more influence on knowledge creation than competitor orientation and supplier orientation. This finding was in consistence with several previous studies (Kristensson, Matthing and Johansson, 2008; Rowley, Kupiec-Teahan and Leeming, 2007).

Nwokah (2009) found that there was a positive relationship between competitor orientation and knowledge creation for marketing performance. Similarly, findings from Noble, Sinha and Kumar (2002) also suggested that organizations possessing higher levels of

competitor orientation tend to exhibit superior performance. While, Mueller and Gemünden (2009) found that customer orientation and competitor orientation were statistically significant in software ventures for product development. The study in high profit Australian organization by Dawes (2000) also found that competitor orientation emerged as the strongest association with performance. He explained that this occurs because these organizations distinguish themselves from others by being very informed of competitors' moves in the market. Therefore, competitor orientation is considered an important part of market environment. The study showed that supplier orientation had a significant impact on knowledge creation. This result confirmed the previous studies (Lau, 2011; Lin, Chen and Chiu, 2010; Shamsuzzoha, Kyllonen and Helo, 2009).

Conclusion

The implications of this research can be viewed from both theoretical and practical perspectives. From the theoretical viewpoint, the study has developed an empirical based framework that depicts critical factors influencing knowledge creation. Researchers specializing on the assessment of knowledge creation can consider adopting the framework for future studies. Alternatively, the framework can be further extended by other variables such as variables which have indirect relationship in a market. From the practical viewpoint, the instrument that has been developed can be used as a diagnostic tool for continuous improvements of knowledge creation.

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