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# The Decision Support System and Innovation that Affect Firms' International Capability via Digital Marketing and Foreign Oriented operations

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**Abstract:** International marketing is important to business firms ranging from multinational enterprises to medium and small-sized firms. This study tests the multiple factors including decision support system and innovation that are expected to affect the international capability of small and medium enterprises. Digital marketing and foreign oriented operations play an important mediating role. The statistical analysis applied to test the empirical results takes the form of the Structural Equation Model. The results confirm the moderating role of decision support system and innovation oriented operations having an impact on firms' international capability. This finding highlights the crucial implications for management when it employs a decision support system and applies innovation to encourage digital marketing and foreign oriented innovations.

Key words: decision support system, digital marketing, innovation, foreign operation

## **1. INTRODUCTION**

Thailand has successfully transformed its business sector from being an importing country to a local production for export model. The growth of the country's economy was due to structural change, and has successfully from being an agricultural producer to an economy that now integrates agro-industry, manufacturing and the services sector. The transformation of the Thai economy is evidenced by the export growth rate. The change in overall GDP fell from 27% in 1970 to 12% in 1993. This statistic is derived from the growth of the manufacturing sectors which expanded from 8% from 1977 to 2003, and by the continuous growth of all industries. The policy of supporting foreign direct investment has been enforced by every national Thai government in order to develop the country's reliance on foreign multi-national business firms to invest heavily in various industrial sectors. These multi-national firms have operated for both domestic and foreign markets, and have changed the Thai economy to being dependent on an exporting economy.

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Thailand's success can be determined from its increasing export volume. Exported goods and services are obviously derived from the production processes of multi-national firms, which have been supported by the local SMEs. Consequently, many of the latter have to develop their operations to link with and benefit from the requirements of multi-national firms operating in Thailand. To be a supplier who reliably delivers materials on time, local SMEs have to link their electronic data with their customers' multi-national firm systems. Thai SMEs have increasingly had to apply modern technologies to their operations for more than three decades, in order to create a competitive advantage or at least market share. However, not all local firms have been successful with their technology development and implementation, and not many studies focused on the success of SMEs in applying technology that has had an impact on their overseas operations. Currently, such local firms are obtaining experience in doing business with foreign firms, until they reach the stage where they can operate internationally themselves.

Regarding the development of a country's economy, scholars have focused on the internationalization of that country through the prism of multi-national firms, particularly in the emerging economies. Many Thai firms have started to expand their operations into neighboring countries, for example Cambodia, Laos, Myanmar, and Vietnam. Some have expanded their operations into Europe, North America, and elsewhere like China, India, and South America. Of interest is how they can operate competitively and efficiently in the international environment. The crucial solution is for company managers to create or promote international capability so that their operations can be sustained. To achieve firms' international capability, the SMEs have to develop information technology and innovative processes for their primary activities, and support the activities of the entire organization (Rached, Bahroun, & Campagne, 2015; Singh & Teng, 2016; Thomas, Krishnamoorthy, Singh, & Venkateswaran, 2015).

The importance of information technology for the SMEs can be expressed in terms of its low cost and efficiency (Barros, Ishikiriyama, Peres, & Gomes, 2015; Chun, Kim, & Lee, 2015; Shao & Lin, 2016). Moreover, new information technology systems such as digital marketing have been preferred by business firms because they are efficient and relatively inexpensive. Digital marketing can offer benefits to business firms and digital marketing has in fact undergone continuous growth in the industrial sector (Järvinen & Karjaluoto, 2015; Killian & McManus, 2015; Tiago & Veríssimo, 2014). All business firms have acquired this technology to be internationally competitive to some degree. However, it is not only information technology that firms need to acquire to support their operations, but also innovation and this specifically refers to their products or goods and services. The level of innovation taken up by firms and its acceptance by customers will create their competitive advantage, and support their operations within the overall value chain (£obacz & G<sup>3</sup>odek, 2015; Ren, Eisingerich, & Tsai, 2015; Weerawardena & Mavondo, 2011). Thus, SMEs that can compete internationally will be able to develop innovation that leads to international capability.

### 2. THEORY AND HYPOTHESES

Currently, international ventures have derived certain advantages from using highly developed technology which has created an opportunity for their business actions, and has led to to significant gains in knowledge and how to perform in business (Cavusgil & Knight, 2015). This new knowledge and experience encourages researchers to focus on the use of a decision support system and innovation that will enable SMEs to expand their operations internationally (Colin, Galindo, & Hernández, 2015; Marinagi, Trivellas, & Sakas, 2014; Park, 2015). However, only a few studies have focused on various factors of decision support system linked to

innovation and international operations. For this reason the study was specifically designed in such a way to fill this gap in our knowledge of firms' international capability with an emphasis on digital marketing.

#### 2.1. Decision support system and digital marketing

The rapid growth of information system technology has required businesses to support the technology that creates a decision support system at every level within the organization. These changes occur not only in high velocity technology industries, but also in basic businesses where the central roles of operations do not rely completely on advanced technology. Both business people and scholars are interested in developing and designing such a decision support system for the optimum management of their business transactions and operations (Fanti et al., 2015; Figueira et al., 2015; Swobodzinski & Jankowski, 2015). Significantly, modern business firms must apply business analysis tools to support management's decision-making. The large number of multiple data factors, or large volume data, forces all those firms to manage their data systematically and very efficiently in order to generate accurate analysis and precise decision-making (Vera-Baquero, Colomo-Palacios, & Molloy, 2014). Moreover, today's users employ a multitude of computing devices that constitute their decision support system in increasingly dispersed locations, not just one site (Maity & Dass, 2014; Vera-Baquero et al., 2014). This indicates that both firms and customers have continuously applied a decision support system for their marketing activities. This situation can be explained in terms of digital marketing in which e-commerce is an essential component. Some studies have analyzed how small and medium exporters have adapted e-commerce to their foreign markets. Results found that both exporter and non-exporter SMEs are aware of e-commerce because its media richness makes consumer decision-making possible or easier (Maity & Dass, 2014; Ueasangkomsate, 2015). Furthermore, some empirical studies have indicated the importance of decision support systems on randomized prizing in digital marketing (Wu, Li, & Xu, 2014). Accordingly, this study hypothesizes about the link between a decision support system and digital marketing.

### 2.2. Decision Support System and international operations

Although information derived from formal sources such as a decision support system will influence the decision-making process, informal information within the organization also tends to be more influential on this process in some countries (Ramli & Iskandar, 2014). However, to expand a business into foreign countries it is necessary to have an information base for effective decision-making. According to the new management environment, senior and lower level executives use the information system via a decision support system so that they have the relevant data for more precise decision-making (Dulcic, Pavlic, & Silic, 2012). An international business environment has many competitors operating in and across different countries, and these may well be very innovative firms. Therefore, reforming traditional business and its information system into an innovative environment requires the information system management team having an ambitious vision (Trad, 2015). Furthermore small and medium firms can expand their operations via virtual firms. A company can access overseas markets via the internet and virtual organizations have a flexibility from which they can benefit when operating in more than one country (Amorim & Sousa, 2014). The firms have to prepare employees to support international activities derived from these virtual organizations. We set out to investigate the relationship between decision support system with firms' foreign oriented operations.

#### 2.4. Innovation orientation and digital marketing

Recent trends in globalization have accelerated cross-border trade from small and medium firms to foreign market dimensions. These firms can gain low unit cost though effective access to foreign markets via ecommerce and it is an environment in which e-commerce has expanded hugely (Moertini, 2012). Currently, the use of information effectively is crucial for companies to create value, and remain competitive (Cristache, Ciobotar, & Kailani, 2015). Firms can use information technology to encourage their innovation to support value creation of their products and/or goods and services. In addition, they can also communicate effectively with foreign markets via digital marketing including social media and e-commerce. The innovation that firms may create from their research and development activities is necessary for international competition and sustainable growth (Akcali & Sismanoglu, 2015). The debate about the empirical results of innovation and digital marketing through e-commerce channels is considerable. In fact, the empirical findings of one study on Taiwanese manufacturing firms indicates that e-commerce and FIO have a positive effect on productivity, accompanied with an inter-industry network externality of e-commerce which also significantly supports productivity (Liu, Chen, Huang, & Yang, 2013). Some analyses have investigated business-tocustomer relations via e-commerce from a quality management perspective, and concluded that good operating practices in e-commerce can help administrators manage and maintain the quality of e-commerce services (Zuo, Huang, Fan, & Zhang, 2013).

### 2.5. International capability

Since the international business environment is one in which most countries and their businesses utilize different strategies, it is necessary for a firm to prepare a solid and distinctive plan for its international operations. These firms need a qualified and experienced person responsible for the competitive global environment that may differ from the domestic market. For example, companies have derived competitive advantage from good human resources practices (Arslan, Akdemir, & Karslý, 2013; Gannon, Roper, & Doherty, 2015; Progoulaki & Theotokas, 2010; Serafini & Szamosi, 2015). To expand business activities from their home base into other countries, the skills of qualified persons who will responsible for the company's goals and objectives are very important. Every business firm that has a vision to operate efficiently internally and externally will need to prepare their plans based on successful human resources practices. The human resources into intellectual capital will create a competitive advantage where key skilled employees add value to the company (Karimi-Majd, Mahootchi, & Zakery; Lapiòa, Maurâne, & Stariòeca, 2014; Lendzion, 2015). Hence, with reference to the above literature, this study posits eight hypotheses which are explained in more detail later in this paper.

### **3. RESEARCH METHODOLOGY**

#### 3.1. Sample and data collection

Data were collected from SMEs in Bangkok and its vicinity. This area has been found to present advantages to business firms that have the capacity to develop their international operations. Since it has been a center for foreign investors in determining foreign direct investment in Thailand, local firms have to follow up their operations along the foreign investment supply chain. Therefore, the subjects in this environment are

most appropriate for describing and proving the empirical results. The subjects are small and medium enterprises in a range of industries. Some conduct their international operations through their overseas subsidiaries, some act as exporters, while others have never conducted an international transaction. Since these SMEs are scattered across many types of businesses, a non-probability sampling method was applied. A limited pilot survey was undertaken to confirm that the chosen respondents qualify to answer the questionnaire.

### 3.2. Measurement

The conceptual framework of this study was developed from a thorough review of other studies. Experts who have actual experience working specifically for SMEs in Thailand's business environment were included in the discussion. The decision support system and firms' innovation served as independent variables. The firms' international capability was measured by: firstly, their potential to compete with foreign competitors; and secondly, their operations in foreign countries.

### 3.3. Instrument

The instrument used for data collection consisted of a questionnaire. In order to develop the questionnaire, the initial stage of its construction was determined in consultation with the SME experts. The purpose was to craft a questionnaire that is specifically appropriate to respondents who work for SMEs, despite their differences in terms of industry context and interests. The group of experts provided information particularly to match the variables concerning the decision support systems used by the SMEs, management adherence to innovation, and international orientation of the SMEs. The researchers constructed a questionnaire appropriate for Thai subjects in terms of readability, understandability, and able to be completed easily. A five-point Likert scale was used for measuring the results, ranging from "strongly agree" to "strongly disagree". The set of questions and scale were tested for their reliability, then reworded, and retested until the Cronbach alpha for each variable established a minimum of .92. To ensure that the data carried across normal distribution, the kurtosis of these data were examined, and found to value between -2 and +2, with the lowest at -.784 while the highest was .004. This confirmed that the collected variables carried a normal distribution. The conditions of Multiple Regression require a non-relationship between variables, so this study tested the issue of multi-collinearity. The results of multi-collinearity found that the value of the Variance Instruction Factor (VIF) must be less than 10, or the value of Tolerance, which is more than 0.1. The test found no multi-collinearity existed between each variable.

### 3.4. Validation of Measurement

To ensure the subjective assessment of the validity of the latent variable, the two examining techniques of convergence validity and discriminant validity were tested. In examining convergent validity, a confirmatory factor analysis was employed to test and refine the model that comprised the variables, decision support system, research and development, electronic commerce and international operations strategy. The result yield factor loading ranged from .77 to .90, which indicates a satisfactory convergence validity should be higher than .60. Conversely, competitive advantage was measured as an independent observe variable.

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Latent variables	Observer variables	Standardized Factor Loading		
Decision Support Systems	DSS1	.90		
	DSS2	.89		
	DSS3	.87		
Firms' Innovation Oriented	FIO1	.78		
	FIO2	.80		
Digital Marketing	DM1	.84		
	DM2	.64		
Foreign Operation Oriented	FOO1	.87		
	FOO2	.90		

Table 1 Standard factor loading

According to the discriminant validity that proposes to ascertain the relationship of the latent variable between each group, a correlation indicates: firstly, the closely linked relationship of variables in each group; and secondly, a low relationship between those variables from different groups of latent variables.

### 4. ANALYSIS AND RESULTS

#### 4.1. The measure of model fit

Prior to summarizing the empirical results, the model was tested to evaluate the best fit for the test. Results indicate the Normed Chi-Squared fit index is 1.57, which illustrates the model has a good fit. The value of Goodness of Fit and the Adjusted Goodness of Fit Index are .982, and .964, respectively. The Root Means Square Error of Approximation (RMSEA) is 0.036. The Normed Fit Index (NFI) and Comparative Fit Index (CFI) value equal .985, and.994, respectively. Therefore the above results can ensure a good fit for the tested model.

Table 2           Pearson correlation for discriminant validity testing										
	DSS1	DSS2	DSS3	FIO1	FIO2	DM1	DM2	WP1	WP2	CA1
DSS1	1									
DSS2	.811**	1								
DSS3	.779**	.778**	1							
FIO1	.480**	.513**	.507**	1						
FIO2	.537**	.511**	.507**	.626**	1					
DM1	.582**	.548**	.559**	.478**	.455**	1				
DM2	.573**	.572**	.604**	.467**	.496**	.645**	1			
FOO1	.375**	.368**	.362**	.344**	.406**	.375**	.412**	1		
FOO2	.428**	.417**	.436**	.370**	.418**	.344**	.421**	.787**	1	
СА	.578**	.559**	.562**	.504**	.460**	.511**	.642**	.560**	.565**	1

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Chi-square/Degree of freedom (CMIN/df)	1.57
Goodness of Fit Index (GFI)	.982
Adjusted Goodness of Fit Index (AGFI)	.964
Root Means Square Error of Approximation (RMSEA)	.036
Normed Fit Index (NFI)	.985
Comparative Fit Index (CFI)	.994

Table 3Assessing the model fit indicators

### 4.2. Findings

When measuring the model fit was completed, the structural equation model was tested for its result upon the hypotheses.

	Regression Weights
Decision Support System —> Digital Marketing	.51***
Decision Support System -> International Oriented	.22***
Decision Support System —> Firms' International Capability	.22***
Firms' Innovation Oriented —> Digital Marketing	.33***
Firms' Innovation Oriented -> Foreign Operation Oriented	.39***
Firms' Innovation Oriented —> Firms' International Capability	.10****
Digital Marketing —> Firms' International Capability	.20**
International operations plan -> Competitive Advantage	.37***

 Table 4

 Regression Weights between the latent variables in the model

\*\*\* p-value < .001, \*\* p-value < .01

For the standardized direct effect, the results indicate that the decision support system does wield a direct effect on digital marketing, the foreign oriented operations and firms' international capability at .51, .22 and .22, respectively. Research and development has a direct effect on foreign oriented operations and the firms' international capability at .33, .39 and .33, respectively. Digital marketing has a direct effect on the firms' international capability at .20, while the foreign oriented operations impose a direct effect on the firms' international capability at .37. With reference to standardized indirect effect, the decision support system does have an impact on the firms' international capability at .18.

A detailed examination of the positive effect of the decision support system on digital marketing and the foreign operation oriented of SMEs was conducted. As expected, the decision support system did so on digital marketing, competitive advantage and the international operations plan (.51\*\*\*, .22\*\*, .22\*\*). The results also indicate that firms' innovation orientation has a positive effect on digital marketing and foreign oriented operations (.33, .39). The other result also found both the decision support systems and firms' innovation orientation have a positive effect on firms' international capability, via digital marketing and foreign oriented operations (.20\*\*,.37\*\*\*).

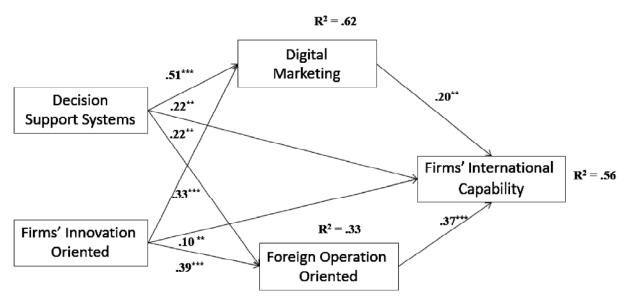


Figure 2: Research Results

\*\*\* p-value < .001, \*\* p-value < .01 [figure above: change Foreign Operation Oriented to Foreign Oriented Operations; and Firms' Innovation Oriented to Firms' Innovation Orientation]

### 5. DISCUSSION AND CONCLUSIONS

Variable Label	Question Word	Mean	Std. Deviation	Ν	Cronbach's Alpha
DSS1	Has a process of decision support system	3.34	1.01	448	.92
DSS2	Applies formal information for managerial decisions	3.38	.96	448	.92
DSS3	Has information for managerial decisions	3.27	.98	448	.92
FIO1	Always has a new concept and new products	3.58	.94	448	.93
FIO2	Emphasis on research and innovation	3.40	1.03	448	.93
DM1	Has confidence that e-commerce is important for the future	3.73	.95	448	.92
DM2	Benefits from using digital marketing	3.43	.94	448	.92
FOO1	Has a plan to operate abroad in the future	3.41	1.26	448	.93
FOO2	Has a plan to prepare human resources for work abroad	3.12	1.20	448	.93
FIC	Ready to compete with foreign competitors at the same level	3.39	1.04	448	.92

 Table 5

 Variable Dimension [Variables' Dimensions?]

The development of technology and foreign direct investment in Thailand has led to dramatic changes in SMEs' business strategies. All SMEs in Thailand have learnt how crucial technology is to their operations, such as decision support systems, as well as the management of innovation to maintain transactions and market share, especially when doing business with multinational enterprises. The findings of this study support the reviewed literature which proposes that the relationship between the decision support system and firms' innovation orientation affects digital marketing and international operations plans. Thailand has

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a long history of international trade with industrialized countries and encouraging for foreign direct investment from industrialized countries. The foreign investments by these firms have also created a knowledge base concerning technology transfer, know-how, and information systems that support the operations of local SMEs. The importance of this finding is that a free enterprise system in Thailand has created opportunities for any firm to perform better than their competitors. For this reason local SMEs have become keenly aware of the necessity of developing new technologies to support their operations, especially those involving transactions with foreign enterprises which may include a large portion of their income.

One of today's most important technologies is that comprising digital information that can support the SMEs' decision-making. Another factor is how management awareness of the importance of innovation to foster products and/or goods and services in the current business environment has grown. This study found that Thai SME firms' managers have garnered information for their decisions (x 3.27, SD. 98), and they apply such formal information to their managerial decision-making process (x 3.38, SD. 96). In addition, those firms have a process for their decision support system (x 3.34, SD. 1.01). The outcome of applying the decision support system to their managerial functions impacts on the use of both digital marketing and foreign oriented operations. The uses of digital marketing are also important for both marketing and business management. This is supported by several studies which found that e-commerce has an impact on productivity and the management of logistics (Falk & Hagsten, 2015; Wang, Cavusoglu, & Deng; Xu, Cheng, & Huang, 2015). Furthermore, digital marketing includes marketing information, communication, and the effective delivery of products to their customers.

This study additionally found important issues regarding the relationship of the decision support system that affect SMEs' digital marketing. Consequently, the integration of the decision support system and digital marketing creates a competitive advantage for those firms themselves as well as benefiting international competition that increased significantly among Thai business firms. Indeed, SMEs benefit from using digital marketing (x 3.34, SD. .94), and they have confidence that digital marketing is important for future operations (x 3.73, SD. .95). Furthermore, those decision support systems also support the SMEs in terms of their international strategy plans. The research results indicate that many SMEs have a plan to do business abroad in the future (x 3.41, SD. 1.26). They have not, however, yet seen the need to prepare their human resources units for operating abroad (x 3.12, SD. 1.20). Similar to the decision support system, some Thai SMEs are also aware of innovation. Some of them are clearly endeavoring to put more emphasis on research and development (x3.40, SD. 1.03). Moreover, they seem keen to explore new concepts and new products (x 3.58, SD. .94).

Firms' innovation orientation has revealed an impact on digital marketing and foreign oriented operations, which consequently support the firms' international capability. This finding agrees with that showing managerial innovations are key success factors required for organizational performance in a globally competitive business environment (Dereli, 2015; Weerawardena & Mavondo, 2011). On this theme, Thai SMEs may have to foster cooperation in innovation with their neighboring partners in the future since such innovation, in cooperation with partners, is important for cross-border activities (Raposo, Ferreira, & Fernandes, 2014). Finally, as an antecedent to a decision support system, research and development has created a competitive advantage for Thai SMEs via digital marketing and foreign oriented operations. The firms' international capability emerged in terms of their potential in compete with foreign companies at

the same level (x 3.39, S.D. 1.04). The research respondents expected that the firms will expand their operations in many countries in the future (x 3.25, S.D. 1.10). This is supported by the stakeholder engagement to create shared value, and enhance competitive advantage (Herrera, 2015).

### 6. LIMITATIONS OF THE STUDY AND FUTURE STUDIES

Future scholars or practitioners should consider this study's findings in the light of its inherent limitations. First, this study used a cross-sectional research method which creates restrictions in causal inference; causality is not appropriate for determination because the evidence is based on a single point in time. Future research should aim to conduct a longitudinal investigation along with a qualitative study. Second, the conclusions of the dependent variables were limited to just a couple of questions. Future scholars who want to carry out an in-depth investigation should prepare more detailed and focused questions; for instance, detailed and specific questions that are appropriate would support findings concerning the international capability of Thai SMEs. Future research should also seek to provide a more in-depth account of the relevant details concerning SMEs in other strategic areas. Finally, as the respondents to this study come from a variety of SMEs operating in Thailand, the generality of the results is constrained by the different types of industries the respondents represent. Firms that have been operating in different industries may need to be determined for the specific factors; doing so may encourage more helpful, or reveal more relevant differentiation. Finally, future research needs to be conducted with reference to specific industries to uncover specific details that will improve management strategies for digital marketing and overseas business operations.

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