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The Effect of Internal and External Resources on Innovative Capabilities in Thai Firms

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Abstract

Innovation is an important organisational feature that helps firms to cope with the pressures of various business environments as well as to increase their performance. However, previous studies have paid limited attention to investigating the effect of internal and external resources on innovation in Thai firms. Therefore, this study aimed to determine the factors of technological resources, commercial resources and industry competitiveness that affect the innovative capabilities of 1043 Thai firms. This paper analysed R&D intensity (referred to as a technological resource), export intensity (referred to as a commercial resource) and number of competitors (referred to as industry competitiveness). The empirical analysis of this study showed that the levels of export intensity and R&D intensity are positively and significantly related to firms' innovative capabilities. Conversely, the number of competitors is not significantly related to firm innovative capabilities. The findings in this study will increase understanding of the necessary resources for Thai firms to increase innovative capabilities, which are export intensity and R&D intensity.

Keywords: Innovative Capabilities, Export Intensity, R&D Intensity, Technological Intensity and Thai firms.

1. Introduction

Nowadays, businesses around the world are faced with intense competition, which is increasing by globalisation. Organisations have to identify and adapt their own strategies with timeliness and efficiency. The current competition is not only given to production cost or the quality of goods and services, but also the ability for products and services to meet customer expectations consistently (Wong and Chin, 2007). One strategy that entrepreneurs use to generate a competitive advantage for their organisation is innovation, with the focus on bringing the latest innovations into the market before their competitors (David et al., 2007). Competitive advantage is the objective of innovation. This useful idea is to maintain a competitive advantage in the long term (Adams et al., 2006; Muammer et al., 2008). Dorf and Byers (2008) illustrated in their study that a firm can generate a competitive advantage globally by being viewed as an innovative organisation. Thus, the concept of business competition currently emphasises creating an advantage by managing innovation because such innovation provides a strategic advantage for an organisation to outperform its competition (Kagan, 2012).

As intangible assets, research and knowledge are the key sources of a firm's competitive advantage (Yung and Feng, 2012) to generate innovation. Innovation has become an important element of every organisation and played an important role in the rising importance of competitive advantage for firms. The measurement of innovative capabilities in an organisation must include the product innovation, process innovation, radical innovation, and incremental innovation that happens in an organisation (Smith, 2006; Bessant and Tidd, 2007; Schilling, 2008). Innovation management for organisational achievement is not effortless (Wong and Chin, 2007) because there are main problems related to maintaining innovation over the long term (Kathryn and David, 2004). Another important reason for difficulty is caused by the instability of effective innovation management (Adams et al., 2006). This is especially true in developing countries such as Thailand, which is well-known as a production-based country. By the beginning of the 1990s, Thailand was well advanced into its transition from an agricultural-based to an industrial and services-based economy. Thailand's exports have shifted from more traditionally manufactured products like textiles, sugar, jewellery and canned foods, to electronic components, automotive components, and computer components, as well as integrated circuits, machinery and equipment by foreign direct investment. In this study, we selected particular Thai firms to investigate innovative capabilities because Thailand currently faces new competition in an era of knowledge-based economy.

The aim of this study was to investigate the relationship between internal factors and external factors for innovative capabilities. This paper is divided into 5 sections. This section describes and discusses the

background of the study topic and provides an introduction. Next, describes the theoretical background and hypotheses. In the section 3, presents the research methodology. Section 4 provides data analysis and findings. Hypotheses testing for this study is also revealed in this section. Finally, the last section presents the conclusion of this study.

2. Theoretical background and research hypotheses

Innovation is one of the most important strategies that firms use to increase their competitive advantage. The key factor in this strategy is the resources that are available to firms. Consideration of these resources is known as the "resource-based review" (RBV) theory. A firm's resources include all the assets within the firm such as capabilities, organisational processes, and firm attributes, in addition to information and knowledge. Lee and Pennings (2001) suggested that technological knowledge, the skills of the staff, machinery, capital, company reputation, and real estate represent the primary resources for firms. In addition, work efficiency, effectiveness, and the ability to combine assets, staff, and organisational processes are also resources for a firm. Previous studies supports RBV by showing that a firm's capability to enter the international market or compete globally is positively with its tangible and intangible resources. From many previous studies, it has been illustrated that internal resources such as technological and commercial resources will increase a firm's capacity. However, such studies lack attention to the relationship between internal resources and innovative capabilities. The hypotheses drawn from RBV evaluate the impact of technological and commercial resources.

2.1 Internal factors

2.1.1 Technological resources

We divided the internal resources that affect firm innovative capability into two categories, being technological resources and commercial resources. Zahra and George (2002) demonstrated that firms with a high quantity of technological resources will increase their capability. A high level of technological resources is understood to mean high R&D intensity. On the other hand, a low quantity of technological resources in firms means they will have low R&D intensity, indicating that R&D activities are not core activities in those firms (West, 2002). Previous studies of R&D activities in developed countries showed that R&D expenditure affects export and innovation performance. Furthermore, previous empirical studies revealed that R&D intensity increased the potential of firm innovativeness. However, they also illustrated R&D expenditure to be a crucial factor in medium and high technological intensity industries to generate innovativeness. The gap of previous studies does not investigate the relationship of technological resources in terms of R&D intensity and innovative capabilities in developing countries. Our argument highlights the importance of technological resources in supporting firms' innovative capabilities. Accordingly, we suggest that R&D intensity is positively related to firms' innovative capabilities and leads to the following hypothesis:

H1. R&D intensity is positively related to a firm's innovative capabilities.

2.1.2 Commercial resources

The second internal resource is commercial resources. A firm's commercial resources are important for suitable exploitation and exploration of innovations achievement (Teece, 2006). Commercial resources can be understood as the level of internationalisation for firms. The level of internationalisation may be represented by level of exportation. Exportation is significant for organisational achievement and growth (Suarez-Porto, V. and M. Guisado-Gonzalez, 2014). Exportation is considered an important activity that brings income into a country. International trade is based on export and import activities. The era of ancient commercialism was focused mainly on export activities only because the wealth of a country was measured by a surplus in the balance of trade where a country's exports exceeded its imports. Previous studies of the relationship between export performance and innovative capabilities in developed countries were limited. On the other hand, several previous studies have shown that innovation performance does affect organisation performance, especially since product innovation will inevitably increase export intensity. Besides, some previous studies argued that the amount of innovation did not increase the level of export intensity. In this paper, we will investigate the reverse contributions because previous studies lack adequate investigation into the relationship between commercial resources in terms of export intensity and innovative capabilities for developing countries. Therefore, we would like to explore how export performance affects innovation performance. Our argument highlights the importance of commercial resources in supporting a firm's innovative capabilities. Accordingly, we suggest that export intensity is positively related to firm's innovative capabilities, which leads us to present the following hypothesis:

H2. Export intensity is positively related to firm's innovative capabilities.

2.2 External factors

2.2.1 Industry competitiveness

In previous decades, most developing countries concentrated on the production and manufacture of goods with low cost for export to global partners, mainly for scale of productivity and operational costs. They had the ability to produce goods or services at higher rates than competitors and export in high volume, meaning they gained an absolute competitive advantage. Low cost is an important strategy when a country has minimal resources but it intends to be competitive in the global market. Such firms do not focus on innovation strategies, but concentrate on penetrating new markets, new distribution channels, increased productivity, price reductions, and improving production facilities. These strategies can help a company to compete over the short term, but they are also easily imitated by competitors (Bradley, 1991). Therefore, long-term strategies must be prepared to create a sustainable competitive advantage. Slater (1996) explained that a sustainable competitive advantage for greater performance is the result of innovation and learning, which are difficult to imitate.

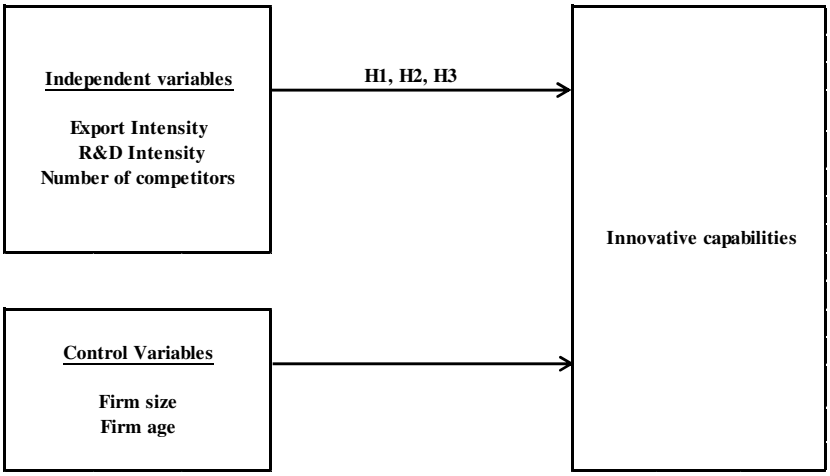

Figure 1. Proposed framework

Pisano (1990) argued that, in each industry where competition is high, a firm will generate new products or processes to enter a market as the first-mover. Therefore, industry competitiveness in terms of the number of competitors will affect a firm's innovation performance. Our argument highlights the importance of industry competitiveness in supporting a firm's innovative capabilities. Accordingly, we suggest that the number of competitors is positively related to a firm's innovative capabilities and leads to the following hypothesis:

H3. Number of competitors is positively related to firm's innovative capabilities.

As a consequence of the hypotheses in this study, we proposed a research framework to explore the relationship between R&D intensity, export intensity, number of competitors and innovative capabilities, as shown in Figure 1.

3. Research Methodology

3.1 Samples and sources

This study utilises company level data from Thailand, obtained from the "Productivity and Investment Climate Survey" (PICS), carried out by the Thai government in collaboration with the World Bank. The survey examined 1043 Thai companies and was performed in 2007. The participating companies were drawn from the following industry sectors: clothing and textiles, furniture products, food processing, auto parts, electronics, machinery and equipment, plastics and rubber. The selected industries comprise over fifty percent of manufacturing exports and include companies from all six regions of Thailand. The population was defined to include only those firms that were legally registered, using the support of the National Statistical Agency and data from the World Bank. This information was then applied in selecting the sample group of companies from small, medium and large-sized categories by random sampling methods for evaluation.

We used the STATA 12 program to run the regression results and analyse the results from those sample data. The

correlation and regression analysis were analysed to measure the results of the relationship between R&D intensity, export intensity, number of competitors and innovative capabilities of Thai firms.

3.2 Variable description

3.2.1 Dependent variable

According to the purpose of this study, our dependent variable is *innovative capabilities*. Following previous studies (He & Wang, 2009; Luo, 2000; Tallman & Fladmoe-Lindquist, 2002), we operationalise innovative capabilities as the share of new products sales in total sales.

3.2.2 Independent variables

Export intensity is employed as an independent variable. We used the variable of export intensity to test its effect on a firm's innovative capabilities. This variable can be measured by the share of export sales over total sales (Pla-Barber & Alegre, 2007).

R&D intensity is also used as an independent variable in this paper. We used the variable of R&D intensity to test its effect on a firm's innovative capabilities. This variable can be measured by the ratio of R&D expenditure to total sales.

Number of competitors is also an independent variable in this study. We used the variable of number of competitors to test its effect on a firm's innovative capabilities. This variable can be measured by the number of competitors in a firm's main market.

3.2.3 Control variables

Firstly, we include *firm size* in this study regarding previous studies investigating the determinant factors affecting firm performance (Hsu, Lien et al. 2015), measured by using the natural logarithm for the number of total employees. Secondly, *firm age* is a control variable measured by the length of time since a firm was established. Table 1 summarises the variables and expectations of relationships between independent and dependent variables.

Table 1. Definition of variables

	Definition	**Expected**
Dependent variable		
Innovative capabilities	Ratio of new product sales to total sales	
Independent variables		
Export Intensity	Ratio of export sales to total sales	+
R&D Intensity	Ratio of R&D expenses to total sales	+
Number of Competitors	Number of competitors in the main market	+
Control variables		
Firm age	Number of years in operation	+/-
Firm size	Logarithm for total employees	+/-

4. Data Analysis and results

This research study utilises company level data from Thailand, obtained from the "Productivity and Investment Climate Survey" (PICS), carried out by the Thai government in collaboration with the World Bank. The survey examined 1043 Thai companies and was performed in 2007. The participating companies were drawn from the following industry sectors: clothing and textiles, furniture products, food processing, auto parts, electronics, machinery and equipment, plastics and rubber. The selected industries comprise over fifty percent of manufacturing exports and include companies from all six regions of Thailand. The selected 1043 Thai firms were drawn from these 9 industry sectors. In Table 2, we can see that almost 25% of the data was collected from rubber and plastics firms, followed by garments with 15% and the textiles industry with around 12%. Participating companies drawn from the electrical appliances and electronic components sector accounted for just 9% of the total (2.69% and 6.23%, respectively).

Table 2. Summary data of Productivity and Investment Climate Survey (PICS) in 2007

Industry	**Amount**	**Percentage**
Auto components	109	10.45
Electrical appliances	28	2.69
Electronic components	65	6.23
Food processing	108	10.35
Furniture and wood products	100	9.59
Garments	159	15.24
Machinery and equipment	83	7.96
Rubber and plastics	258	24.74
Textiles	133	12.75
Total	1043	100

As mentioned previously above, we collected each variable from 2007 based on "Productivity and Investment Climate Survey" (PICS), carried out by the Thai government in collaboration with the World Bank. From the data, it is apparent that there were 1043 observed firms in Thailand. The summary of Table 3 includes Mean values, Standard deviation and Variable correlations.

Table 3. Means, standard deviations and variables correlations

Variables	**Mean**	**Std.dev**	**1**	**2**	**3**	**4**	**5**	**6**
1. Innovative capabilities	23.3179	31.5510	1					
2. Export Intensity	28.1518	38.3996	0.0657**	1				
3. R&D Intensity	0.3812	1.4136	0.1567***	-0.0304	1			
4. Number of Competitors	32.9770	55.8217	0.0395	0.0076	-0.0167	1		
5. Firm age	15.2857	9.4791	0.0928***	0.087***	0.0134	0.0256	1	
6. Firm size	2.0051	0.5560	0.0389	0.4314***	0.0273	-0.0244	0.2749***	1

Significance level: * p<0.1, **p<0.05, ***p<0.01

The empirical study from regression analysis model is shown in Table 4 as the objectives of this study are to study the significance and importance of independent and control variables as export intensity, R&D intensity, and number of competitors, as well as firm size and firm age to innovation performance. Data from the 1043 samples taken by The Foundation for the Thailand Productivity institute (FTPI) and the World Bank in 2007 were collected. Subsequently, the STATA 12 program was used to run the regression results and analyse the results from those sample data. Table 4 shows the results in 4 groups, with the results of all Thai firms from World Bank data (1043 sample) in the first row. From the second row until the fourth row, the regression results of Thai firms divided by technological intensity; low-technological intensity, medium-technological intensity and high-technological intensity based on the Oslo Manual's guidelines are shown.

Table 4. Regression analysis results of innovative capabilities

Variables	All	Low-Technology Intensity	Medium-Technology Intensity	High-Technology Intensity
1. Export Intensity	0.048*	0.089**	0.059	0.096
2. R&D Intensity	3.62***	4.511***	4.365***	0.46
3. Number of Compettitor	0.026	0.051*	-0.09	0.166
4. Firm age	0.384***	-0.284*	0.55**	0.115
5. Firm size	2.89	-0.081	3.8	7.169
Constant(β_0)	19.8***	23.561***	22.261***	0.167
F-value	9.49***	7.09***	5.33***	1.72
R^2	0.044	0.067	0.053	0.127

Significance level: *p<0.1, ** p<0.05, ***p<0.01

The regression analysis results for all Thai firms, when considering the regression data of independent variable, found that export intensity (β = 0.048, p < 0.1), R&D intensity (β = 3.62, p < 0.01), and Number of Competitors (β = 0.026, p > 0.1), as in Hypothesis 1, indicates that export intensity is positively related to firm innovative capabilities. The results above show that export intensity has a positive relationship with significance at more than 90% confidence. Therefore, Hypothesis 1 does receive support. Hypothesis 2 indicates that R&D intensity determines positive relation to firm innovative capabilities. The results above show that R&D intensity is positively related with significance at more than 99% confidence. Therefore, Hypothesis 2 is supported as well. Hypothesis 3 indicates that the number of competitors determines a positive relation to firm innovative capabilities. The results above show that the number of competitors is positively related. Therefore, Hypothesis 3 is supported by the information. Consequently, we accept Hypotheses 1, 2 and 3, which means that export intensity, R&D intensity and number of competitors are positively related to firm innovative capabilities.

5. Conclusion

The outcome of multiple regression analysis showed that the relative levels of export intensity, R&D intensity and number of competitors are positively related to firm innovative capabilities. The highly significant factor is R&D intensity. This means firms focus on R&D activities, both inside activities and outside activities, to a high level. The level of R&D intensity does raise the level of innovative capabilities directly. The second significant factor is export intensity with greater than 90% confidence. This reveals that, when firms concentrate more on exportation, they can increase the potential to generate innovative capabilities. For the number of competitors related to industry competitiveness, it may be helpful for firms to increase the potential to generate innovative capabilities.

The findings of this study contribute theoretical and managerial value. The findings of this study provide a support resource-based view theory (RBV) that internal resources are required for increased exportation and development of innovations. Necessary resources for increased innovative capabilities include export intensity and R&D intensity. This study indicates that RBV could be applied in emerging markets such as Thailand. Previous innovation literature suggested that RBV could be applied in developed countries (AtuaheneGima, 2005). Despite the fact that firms have limited resources, firms can still utilise these limited resources to success in developing innovation, especially low and medium technological industries that have a desire to survive in the global market. Such firms must continuously use their resources and adapt their strategy to increase innovativeness. Managers can define the appropriate strategy to fit with available resources within the firm to create innovative capabilities.

There are some limitations to this study. Firstly, the data collection in this study has been conducted by The

Foundation for Thailand Productivity Institute (FTPI) with the assistance of the World Bank in 2007 for only nine industrial sectors (Food Processing, Textile, Garment, Auto Parts, Electronics, Electrical Appliances, Rubber and Plastic, Furniture, Machinery and Equipment). A longitudinal study may be done to capture these impacts in future study to increase the explanatory power. Such a longitudinal research should also help to better understand the dynamic changes for the impact of export intensity, R&D intensity and number of competitors on innovative capabilities.

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