IT capability on firm performance: Evidence from it service business in Thailand

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Keywords
IT Capability, IT management capability, IT infrastructure capability, IT personal capability, Organizational Innovation, Business Excellence, Marketing Effectiveness, Corporate Competitiveness

Abstract

IT capability is important and become one of strategy that effected to success in business. This study purpose investigates the effect of each dimension of IT capability consist of IT management capability, IT infrastructure capability, and IT personal capability on organizational innovation, business excellence, marketing effectiveness, corporate competitiveness, and firm performance. The result from survey of 118 IT service firm in Thailand indicated that have IT infrastructure capability is positively related to organizational innovation and IT personal capability is positively related to organizational innovation, business excellence, marketing effectiveness, and corporate competitiveness. Furthermore, the finding identified that organizational innovation is positive significantly to business excellence, marketing effectiveness, and corporate competitiveness which relate with firm performance. The summary of this paper provide theoretical and managerial contributions. Moreover, it also suggestions and directions of the future research.

1. Introduction

Information technology (IT) has greatly played a role in the daily lives of human beings for both academic work and the application in operation in various organizations, such as the public or private sectors. The general definition of Information Technology or IT is the application of computer and telecommunications equipment to store, search, transmit, and organize information (Daintith, 2009). It may be said that it makes use of technology to create and add value to the information. The information becomes more useful and can be exploited more fully. We see that IT has become one of the important strategies affecting the success in the business or enterprise management.

Business firms need to be aware of organizing and managing IT in order to sustain competitive advantages (Chukwunonso et al, 2011). Moreover, IT capability has influence on organizational performance which include organizational learning and knowledge management capability (Pebrianto, 2013). Prior research studies have attempted to define IT capability and characteristics measurement, in which Kim et al. (2011, 2012) preferred three dimensions of IT capability. Accordingly, we considered IT capability in terms of ability to manipulate resources related to IT including management, infrastructure, and personal to implementation of the business strategy. The effect of IT capability is evident in every organization due to the changes of technology at a very fast pace as Gheysari et al. (2012) indicated that IT infrastructure capability plays a significant role in management. The attention has been drawn to examine whether or not IT capability will contribute to the performance of the firms in any aspects. Therefore, this paper aims to investigate the effects of each dimension of IT capability consisting of IT management capability, IT infrastructure capability, and IT personal capability on organizational innovation, business excellence, marketing effectiveness, corporate competitiveness, and firm performance.

This paper is structured based on the following outline. There is a link between the construct of each variable in the literature to establish and develop the hypotheses in the second part. The third and fourth sections present the strongest research method. Then, the results are discussed in the fifth section. Finally, the theoretical and managerial contributions are given followed by the suggestions for future research and the conclusion.

2. Literature Review and Hypotheses Development

The conceptual model presents the key variable of IT capability which expectations theory used to explain research phenomenon. As show in Figure 1, the dimensions of IT capability are composed of IT management capability, IT infrastructure capability, and IT personal capability related to various aspects of firm performance.

In this study, IT capability and firm performance in IT service businesses in Thailand are a thorough examination. Therefore, the conceptual and research model is presented in Figure 1.

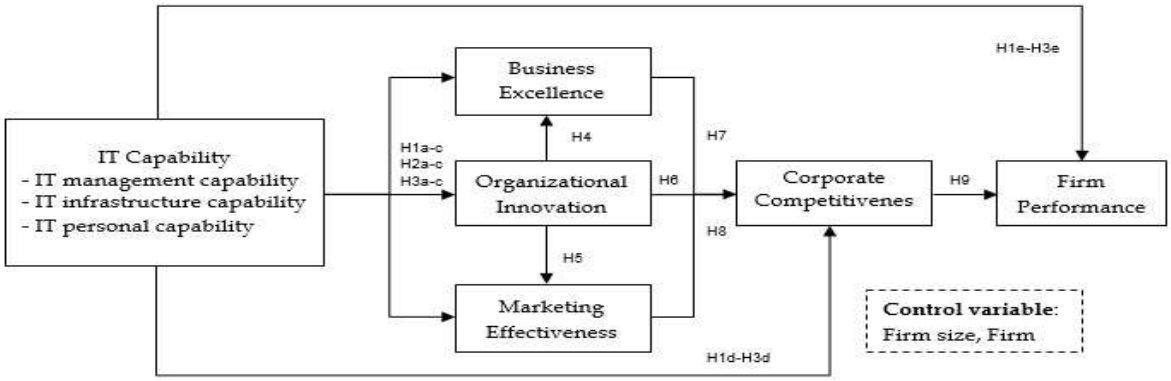

Figure 1: Relationship Model of IT capability and firm performance

2.1 IT Capability

IT capability is defined by many researchers, but the definition most frequently referred to is Bharadwaj, A.S.A. (2000) which stated that "a firm's IT capability is its ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities." In addition, Peppard, J., & Ward, J. (2004) defined it as "the ability to translate the business strategy into long term information architectures, technology infrastructure and resourcing plans that enable the implementation of the strategy (i.e. the IT strategy)". And we can classify IT capabilities into those that are characterized by value, heterogeneity, and imperfect mobility (Bhatt and Grover, 2005).

Later, Kim et al. (2011, 2012) defined three major dimensions of IT capability: IT management capability, IT infrastructure capability, and IT personal capability.

IT management capability

IT management capability is the ability for IT departments to manage the structure features to manage IT resourcesto deliver business value in line with business needs and priorities. Kim et al. (2011) argued that routines are the fundamental building blocks of IT management capability consisting of IT planning, IT investment decision making, IT coordination, and IT control. The level of each routines is structured according to formal and informal procedures.Many research studies examined IT capability that related to organizational innovation; for example, Chukwunonso et al (2011) found that the use of IT has a positive effects on innovative practices, which enhance the competitive advantage of the firms. Moreover, Mithas et al. (2011) found that information management capability has an important role in the development of ability in other firms for customer, process, and performance management to manager that will start towards business excellence. Consequently, IT management capability will affect different aspects of firm performance as stated in the following hypotheses:

Hypothesis 1: IT management capability is positively related to (a) organizational innovation, (b) business excellence, (c) marketing effectiveness, (d) corporate competitiveness, and (e) firm performance.

IT infrastructure capability

Kim et al. (2012) stated that IT infrastructure capability refers to "the ability of the IT infrastructure (e.g., applications, hardware, data, and networks) to enable the IT staff to quickly develop, deploy, and support necessary system components for a firm"when confronted with an uncertain business conditions that requireIT infrastructure' flexibility by considering the level of connectivity among different system both internal and external IT element. Also, we need to take into account the compatibility to share many types of data and information, regardless of technical background and including modularity that can add, modify, and remove system or software components. The study had found that the integration of IT infrastructure impacted firm performance, especially in the supply chain management (SCM) system to increase performance sustainability (Rai et al, 2006).There is also a study in the use of IT to support the customer relationship management (CRM) system and the functionality of IT infrastructure capabilities that can affect dynamic marketing capabilities (Wang et al, 2013). Thus, our proposed hypothesis is follow:

Hypothesis 2: IT infrastructure capability is positively related to (a) organizational innovation, (b) business excellence, (c) marketing effectiveness, (d) corporate competitiveness, and (e) firm performance.

IT personal capability

Professional skills or knowledge of the IT staff to carry out the tasks assigned are IT personal capability. It also includes the level of individual ability to contain knowledge about technical elements, IT resource management, business functional, and ability to communicate and work with other people (Kim et al, 2011, 2012). Moreover, Chen and Tsou (2012) suggest results that project management should be directed to the development of IT capability and innovative services and exploit them to facilitate customer service to achieve superior firm performance. Therefore, the hypothesis is as follows:

Hypothesis 3: IT personal capability is positively related to (a) organizational innovation, (b) business excellence, (c) marketing effectiveness, (d) corporate competitiveness, and (e) firm performance.

2.2 Organizational Innovation

Crossan and Apaydin (2010) explained that organizational innovation is operationalized as, "production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. Hence, it is both a process and an outcome." OstojićMihić et al., (2015) found empirical evidence that supports assumption that a higher degree of organizational innovation yields business excellence at a statistically significant level. Moreover, the research finding shows that there are the different effects of the different dimensions of innovativeness on marketing effectiveness and firm performance (Alpay et al., 2012). Thus, the hypotheses are as follows:

Hypothesis 4: The higher organizational innovation is, the more likely that firm will gain greater business excellence.

Hypothesis 5: The higher organizational innovation is, the more likely that firm will gain greater marketing effectiveness.

Hypothesis 6: The higher organizational innovation is, the more likely that firm will gain greater corporate competitiveness.

2.3 Business Excellence

As explained by the European Foundation for Quality Management (EFQM, 1999), business excellence means dominant practices in managing the organization and achieving results in terms of a set of eight basic concepts. These concepts are "results orientation, customer focus, leadership and constancy of purpose, management by processes and facts, people development and involvement, continuous learning, innovation & improvement; partnership development, and public responsibility." Therefore, the hypothesis is follow:

Hypothesis 7: The higher business excellence is, the more likely that firm will gain greater corporate competitiveness.

2.4 Marketing Effectiveness

Marketing effectiveness is the results of IT capability which is defined as the firm's ability to study the market, perceive the many opportunities, choose the most suitable segments of the market to perform in its and efforts to provide superior value to meet the needs of customers choice and wants (Kotler, 1977). Five dimensions of these construct elements are customer philosophy, integrated marketing organization, adequate marketing information, strategic orientation, and operational efficiency (Nwokah and Ahiauzu, 2008). However, marketing effectiveness is not equivalent to profitability. Gyulavári and Kenesei (2012) found that the dimension of the most marketing-related resource known as market management has a strong relationship with firms' competitive performance. Thus, marketing effectiveness is likely to have a positive relationship with corporate competitiveness. Therefore, the hypothesis is as follows:

Hypothesis 8: The higher marketing effectiveness is, the more likely that firm will gain greater corporate competitiveness.

2.5 Corporate Competitiveness

Corporate competitiveness has many terms used in a wide variety of calls such as the competitiveness of the firm to offer products to consumers in a way that consumers are willing to pay the price for those products, which ensures that the profitability is higher for them than what competitors enjoy while observing social norms (Gyulavári and Kenesei, 2012). Lee and Choi (2005) stated that the competitiveness of firms can be checked through the various indexes and standards, and they used six sigma to measure corporate

competitiveness, which is not firm performance itself, but will contribute to firm performance. Thus, the hypothesis is below:

Hypothesis 9: The higher corporate competitiveness is, the more likely that firm will gain greater firm performance.

3. Research Methods

3.1 Sample Selection and Data Collection Procedure

In this study, IT service businesses of Thailand were selected. In all, 882 firms were randomly chosen from the database list of the Department of Business Development, Ministry of Commerce in Thailand. Due to IT service businesses, data collection was through a mail survey procedure with the questionnaire. The key participants in this study were managing directors or managing partners of IT service businesses of Thailand. With regard to the questionnaire mailing, 187 surveys were undeliverable because some firms were no longer in business or had moved to unknown locations. Deducting the undeliverable from the original 882 mailed, the valid mailing was 695 surveys, from which 141 responses were received. The effective response rate was approximately 20.14%. Of the surveys completed and returned, only 118 were usable after ignoring the missing data.

3.2 Questionnaire Development

The questionnaire was conducted through five sections. The first part, asking for the personal profile of respondent such as gender, age, status, education, experience, salary, and position. Secondly, the questions include general business profile which are business type, location, firm capital, number of employee, firm age, and firm revenue. Thirdly, the perceived evaluation of respondents in terms of IT capability which are composed of IT management capability, IT infrastructure capability, and IT personal capability. Fourthly, the results of operation in the firm include organizational innovation, business excellence, marketing effectiveness, corporate competitiveness, and firm performance. Finally, the open-ended question asks for opinions and suggestions. This questionnaire was checked for content validity by an expert before pretesting with 30 people from the non-target sample to measure reliability.

3.3 Measurement of Variables

There are multiple-items scales in each construct measured by the five-point Likert scale. Each of these variables ranges from 1 to 5 in the order of 'strongly disagree' to 'strongly agree'. The dependent, independent, and control variables are discussed below.

Independent Variables

*IT capability*is a main construct of this study using a scale from the related literatures and its definitions. According to Kim et al. (2012), fourteen items are used to determine IT capability, and these items are classified into three dimensions: IT management capability, IT infrastructure capability, and IT personal capability.

*IT management capability*is defined as the ability of a firm to manage IT resources to deliver business value (Kim et al, 2012). There are four items to measure the level of IT planning, IT investment decision making, IT coordination, and IT control.

*IT infrastructure capability*is defined as the ability of a firm's IT infrastructure to enable quick development and support of various system components (Kim et al, 2012). There are three items to measure ability to develop connectivity, compatibility, and modularity.

*IT personal capability*is defined as the level of professional skills or knowledge of IT staff (Kim et al, 2012). There are four items to measure the knowledge about technical element, technology management, business functions, and interpersonal communication.

Consequent Variables

*Organizational innovation*is defined as production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems (Crossan and Apaydin, 2010). Five items were used to assess the firms that have IT adoption, new operation, improve process, product development, and new response service.

Business excellence refers to outstanding practices in managing the organization and achieving results. There are four items adapted from EFQM (1999) to assess the degree to which firms have strategy, process management, effective process, and useful human resource management.

Marketing effectiveness is defined as the firm's ability to study the market, perceive the many opportunities, and choose the most suitable segments of the market to provide superior value to meet the needs of customer's choice and wants (Kotler, 1977). Five items were used to assess the degree to which firms perceive the market, opportunities, suitable segment of the market, and provide superior value to customer.

Corporate competitiveness is the way to offer products to consumers who are willing to pay a price for those products which ensures a higher profitability for them than competitors (Gyulavári and Kenesei, 2012). There are five items used to assess the degree to which firms have structure organization, research development, networking, product/service differentiation, and communication.

Firm performance is defined as an outcome of firms using four items to assess the degree to which firms have profitability, market share, sales growth, and effective operation. (Lee, 2010).

Control Variables

*Firm size*is measured by number of full-time employees working in firms (Christmann 2000; Hong and Zhu, 2006). In this study, firm size is described by a dummy variable; '0' is a firm that has lower than or equal to 10 employees, and '1' is a firm that has more than 10 employees.

*Firm age*is measured by the years of operation with IT service business (Kotabe et al, 2011). In this study, firm age is demonstrated by a dummy variable; '0' is a firm that has lower than or equal to 10 years of operation, and '1' is a firm that has equal to or more than 10 years of operation.

4. Methods

To examine and assess the association of many items, factor analysis was used for the first time. Then, the factor analysis is to verify that they can be reduced to a small set of factors (Ussahawanitchakit, 2012). Total factors loading are 0.64 – 0.94, being over than 0.40 cut-off and are statistically significant (Nunnally and Bernstein, 1994). In addition, the reliability scale was the Cronbach's alpha coefficient. The multiple-item scales showed Cronbach's alpha between 0.76 – 0.92, which indicated that there was sufficient internal consistency over 0.60 (Malhotra, 2004), with the exception of IT capability. Both factor loadings and Cronbach's alpha as the validating result for multiple-item scales are provided in Table 1.

Construct	Factor Loading	Cronbach Alpha
IT management capability (ITM)	0.71 – 0.83	0.86
IT infrastructure capability (ITI)	0.70 – 0.87	0.76
IT personal capability (ITP)	0.69 – 0.86	0.87
Organizational Innovation (OI)	0.74 – 0.88	0.88
Business Excellence (BE)	0.71 – 0.90	0.83
Marketing Effectiveness (ME)	0.65 – 0.84	0.85
Corporate Competitiveness (CC)	0.64 – 0.81	0.79
Firm Performance (FP)	0.85 – 0.94	0.92

Table 1: Results of Measure Validation

Statistical Techniques

This study used the ordinary least squares (OLS) regression analysis to determine the relationships of hypotheses and estimate factors affecting firm performance of IT service firm in Thailand. Multiple regressions were used to determine the relationship of hypotheses in this study. The assumptions of regression were not ignored, especially,multicollinearity by assessing Variance Inflation Factor (VIF) values (Eng, 2008; Ramanathan, Ramanathan, and Hsiao, 2012). The research model of these relationships is as follows:

Equation 1: OI
$$\beta_{01} + \beta_1 ITM + \beta_2 ITI + \beta_3 ITP + \beta_4 FS + \beta_5 FA + \varepsilon$$

Equation 2: BE
$$\beta_{02} + \beta_6 ITM + \beta_7 ITI + \beta_8 ITP + \beta_9 FS + \beta_{10} FA + \varepsilon$$

Equation 3: ME
$$\beta_{03} + \beta_{11} ITM + \beta_{12} ITI + \beta_{13} ITP + \beta_{14} FS + \beta_{15} FA + \varepsilon$$

Equation 4: BE
$$\beta_{04} + \beta_{16} OI + \beta_{17} FS + \beta_{18} FA + \varepsilon$$

Equation 5: ME
$$\beta_{05} + \beta_{19} OI + \beta_{20} FS + \beta_{21} FA + \varepsilon$$

Equation 6: CC
$$\beta_{06} + \beta_{22} OI + \beta_{23} BE + \beta_{24} ME + \beta_{25} FS + \beta_{26} FA + \varepsilon$$

Equation 7: CC $\beta_{07} + \beta_{27}ITM + \beta_{28}ITI + \beta_{29}ITP + \beta_{30}FS + \beta_{31}FA + \varepsilon$

Equation 8: FP $\beta_{08} + \beta_{32}CC + \beta_{33}FS + \beta_{34}FA + \varepsilon$

Equation 9: FP $\beta_{09} + \beta_{35}ITM + \beta_{36}ITI + \beta_{37}ITP + \beta_{38}FS + \beta_{39}FA + \varepsilon$

5. Results

Correlation Matrix Analysis

Table 2 provides the descriptive statistics and correlation matrix of all variables. Since correlations were not over 0.8, there was no multicollinearity problem, verifying the correlation of any independent variables. The results of Variance Inflation Factors (VIFs) range from 1 to 2.711, recommended by Hair et al., (2010), which is well below the cut-off value of 10 indicating that the independent variables are not correlated with each other.

Variables	ITM	ITI	ITP	OI	BE	ME	CC	FP	FS	FA
Mean	4.285	4.220	4.348	4.048	3.934	3.888	3.824	3.689	-	-
S.D.	0.527	0.598	0.559	0.658	0.600	0.647	0.664	0.747	-	-
ITM										
ITI	.728***									
ITP	.671***	.675***								
OI	.342***	.395***	.408***							
BE	.357***	.358***	.441***	.611***						
ME	.372***	.418***	.468***	.715***	.706***					
CC	.423***	.401***	.459***	.696***	.794***	.762***				
FP	.302***	.240***	.282***	.597***	.627***	.673***	.747***			
FS	-.071	-.151	-.004	.020	.160	.020	.060	.170		
FA	-.021	-.008	-.037	.005	.112	.002	.088	.074	.399***	

** $p<.05$, *** $p<.01$, FS = Firm Size, FA = Firm Age

Table 2: Descriptive Statistics and Correlations Matrix

Hypothesis Testing and Results

Table 3 shows the result of multiple regression analysis of relationship among dimension of IT capability as IT management capability (ITM), IT infrastructure capability (ITI), and IT personal capability (ITP). Moreover, the relationship of organizational innovation (OI), business excellence (BE), marketing effectiveness (ME), corporate competitiveness (CC), and firm performance (FP) was investigated from first to nine hypotheses.

Independent Variables	Dependent Variables								
	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9
	OI	BE	ME	BE	ME	CC	CC	FP	FP
ITM	0.018	0.072	0.015				0.168		0.210
	(0.132)	(0.129)	(0.129)				(0.128)		(0.137)
ITI	0.226*	0.116	0.194				0.095		0.036
	(0.136)	(0.132)	(0.132)				(0.131)		(0.141)
ITP	0.243*	0.318**	0.327**				0.286**		0.118
	(0.124)	(0.121)	(0.121)				(0.120)		(0.129)
OI				0.608***	0.715***	0.209**			
				(0.073)	(0.065)	(0.071)			
BE						0.467***			
						(0.072)			
ME						0.285**			
						(0.080)			
CC								0.743***	
								(0.061)	
FS	0.118	0.317*	0.107	0.248	0.015	-0.091	0.110	0.291**	0.375*
	(0.190)	(0.184)	(0.184)	(0.158)	(0.143)	(0.108)	(0.183)	(0.133)	(0.196)
FA	-0.016	0.131	-0.011	0.124	-0.009	0.110	0.169	-0.103	0.018
	(0.194)	(0.188)	(0.188)	(0.165)	(0.148)	(0.111)	(0.187)	(0.139)	(0.200)
Adjusted R^2	0.160	0.206	0.207	0.382	0.498	0.723	0.217	0.565	0.100

*$p<.10$, ** $p<.05$, *** $p<.01$, [a]Beta coefficients with standard errors in parenthesis

Table 3: Results of Regression Analysis

The findings suggest that there is **not support Hypotheses 1a-e**. The result indicate that the coefficients of IT infrastructure capability are positive and have significant impacts on organizational innovation (H2a: β_2 =

.226, p<.10). **Thus, Hypotheses 2a are supportedbut 2b-e are not.** Moreover, the relationship of IT personal capability has a positive significant influence on organizational innovation (H3a: β_3 = .243, p<.10), business excellence (H3b: β_8 = .318, p<.05), marketing effectiveness (H3c: β_{13} = .327, p<.05), and corporate competitiveness (H3d: β_{29} = .286, p<.01). **Thus, Hypotheses 3a, 3b, 3c, and 3d are supported but 3e are not.**Surprisingly, the results revealed that IT management capability and IT infrastructure capability in the Thai context had no effects on organizational innovation, business excellence, marketing effectiveness, corporate competitiveness, and firm performance. However, IT personal capability is more significant for them in IT service businesses of Thailand.

Next, the organizational innovation has a positive effect on business excellence (H4: β_{16} = .608, p<.01), marketing effectiveness (H5: β_{19} = .715, p<.01), and corporate competitiveness (H6: β_{22} = .209, p<.05). **Thus, Hypotheses 4, 5 and 6 are supported.** The results support the finding of OstojićMihić et al., (2015); a higher degree of innovation within an organization significantly determines its business excellence.Alpay et al. (2012) maintained that different dimensions of innovativeness have different effects on marketing effectiveness and firm performance.

As show in model 6, the business excellence and marketing effectiveness have a positive significant impact on the corporate competitiveness (H7: β_{23} = .467, p<.01; H8: β_{24} = .285, p<.05). **Thus, Hypotheses 7 and 8 are supported.**

Furthermore, corporate competitiveness has a positive, strong and significant relationship with firm performance (H9: β_{32} = .743, p<.01). **Thus, Hypothesis 9 is supported**.

6. Contributions and Direction for Future Research

6.1 Theoretical Contribution

This study was designed to provide an obvious understanding of IT capability which affects the aspects in firms such as organizational innovation, business excellence, marketing effectiveness and corporate competitiveness. No research has been done to examine the impact of IT capability on these aspects simultaneously. However, the result of this research is one empirical evidence confirming that organizational innovation has effects on business excellence, marketing effectiveness and corporate competitiveness.

6.2 Managerial Contribution

The findings indicated that among the dimensions of IT capability including IT management capability, IT infrastructure capability, and IT personal capability, there was no statistical significance with any aspects in firms except that IT personal capability has the most impact on firms. Because of the changes of technology at a very fast pace, executives rarely take into account the importance of IT capability in organizations. In view of this author, this practice is not beneficial because it is likely that firms will have lower performance. Managers should pay more attention to managing both their IT management capability and IT infrastructure capability, instead of focusing on only IT personal capability.

7. Conclusion

IT capability is essential for firms to develop competitive advantages and succeed in business. This study attempted to examine the effects of each dimension of IT capability in firms including organizational innovation, business excellence, marketing effectiveness and corporate competitiveness. The findings from 118 IT service businesses in Thailand indicate that only IT personal capability affects several aspects in firms, but IT management capability and IT infrastructure capability do not. However, the result also confirms that organizational innovation has impacts on business excellence, marketing effectiveness and corporate competitiveness. Consequently, the future research may focus on enabling the executives to better recognize the importance of IT capability.

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