

# The investigation of ERP and E-business effects in Thailand: A resource based view

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## Keywords

Enterprise Resource Planning System (ERP), E-business, Resource Based View (RBV), Competitive Advantage, and Firm Performance

## Abstract

*Formulated on resource based view of the firm, the purpose of this study is to investigate the effects of enterprise resource planning system (ERP) adoption within the firm and e-business between firm and business partners for competitive advantage. The relationship between competitive advantage and firm performance is also investigated. Mailed-questionnaire is determined as a data collection instrument distributed to listed companies that are registered on the Stock Exchange of Thailand. Hence, 122 completed questionnaires are used in the analysis. The results indicate that ERP adoption within the firm and e-business between firms positively impact competitive advantage. The positive relationship between competitive advantage and firm performance is also established. In addition, this research discovers the positive effects of the introducing of ERP within the firm and e-business between firms for competitive advantage.*

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## 1. Introduction

To gain the competitive advantage, many firms attempt to invest on information technology or information systems to provide the useful information supporting for enterprise resource planning and controlling. The advantageous information systems help firms to collect data from many activities occurring from various departments within the firm. Also, it provides beneficial information to the related users and enhances the efficiency of decision making. Enterprise resource planning system (ERP) is an important tool for firm progress because it integrates firm's core business processes based on a common database management system. Management can retrieve all information throughout an organization via the database system. Therefore, departments of various functions within the firm can share and communicate among themselves to enhance the effectiveness of their business making decisions.

According to resource based view of the firm (RBV), competitive advantage and sustainable performance are effectively derived from the information and other resources of the firm (Barney, 1991). ERP is a knowledge based system, as an enterprise resource, that is developed from the organization's best practice. It contains the characteristics that appropriate the valuable, rare, non-substitutable, and inimitable. Therefore, ERP helps firm to gain competitive advantage and sustained performance (Ram et al., 2012).

As the suggestion of previous research, the full potential of ERP not only generates from the integration of subsystems within local firm, but also gains from the integration between firms (Swaminathan and Tayur, 2003). Electronic business technologies (or e-business) are ultimate solution that can create the benefit of relationships between firm and business partners. E-business technologies are defined as the applications of information and communication technology, internet based, in support of all the activities of business and enable the external activities and relationships of the business with its partners. It also supports the information exchange problem among the firms various enterprise systems. Furthermore, E-business links two (or more) firms for performing business functions such as online selling, online purchasing, coordination, and information sharing.

Prior research found that e-business technologies such as extranet, website, EDI communication, and e-commerce have positive effects on business performance (Sprano and Zakak, 2000; Phan, 2003; Grandon and Pearson, 2004; Schubert et. al., 2011). Especially, Hsu (2013) investigated the effects of ERP, e-business, and the interaction of ERP and e-business on business value. As the results, this research indicated that ERP, e-business, and the interaction of ERP and e-business positively affected business value.

As aforementioned, this research links the theoretical contribution of RBV and previous literatures, the objective of this research is to investigate the relationship between ERP, e-business and competitive advantage, and the relationship between competitive advantage and firm performance. This research collects data from listed companies registered on the Stock Exchange of Thailand. For the rests of this paper, section 2 provides literature reviews and hypothesis development. Next, section 3 provides research methodology. Section 4 shows research results and discussion. Section 5 contains implications. Finally, conclusion is provided in section 6.

## **2. Literature Reviews and Hypothesis Development**

### **2.1. Resource Based View of the Firm**

The resource-based view (RBV) maintains that competitive advantage and sustainable performance are effectively derived from the information and other resources of the firm (Barney, 1991). RBV is useful in determining whether a firm's strategy has created value. In this view, a unique resource enables firm to attain competitive advantage and thus, sustain the advantage over the long term. The considered resource contains four significant characteristics of being rare, valuable, non-substitutable, and inimitable. A resource is decided valuable when it enables the firm to obtain more effective of efficiency. It is rare when other firms do not possess it. Firm utilizes both valuable and rare resources to establish a superior competitive advantage. To sustain the competitive advantage over the long term, resource must be containing the characteristics of being non-substitutable and inimitable. Simply, it must be difficult to transfer or relatively immobile (Piccoli and Ives, 2005).

ERP, as an information technology resource, is considered the drivers of competitive advantage and sustain firm performance. ERP is valuable when it effectively enhances business information processing (Bradford and Florin, 2003) and provide the advantageous information enabling firm to achieve the business planning, decision making, and business objectives (Jennex et al., 2004; Rivard et al., 2006; Kobelsky et al., 2008; Masquefa, 2008; Gorla, 2010). ERP is systematically generated around the best practices within the firm and embedded in business routines. Therefore, it is difficult to imitate and transfer. Moreover, e-business is an information system formulated on internet technology such as extranet, EDI communication, and e-commerce that links organization's enterprise systems and information systems of business partners. Also, previous research found that integration of ERP and e-business has a positive impact on the business value (Hsu, 2013).

### **2.2. Enterprise Resource Planning System**

Enterprise resource planning system (ERP) is a software package, a set of integrated business applications that are utilized to enable information flows within and between processes across the organization. The main characteristic of ERP is the integrated system designed to seamlessly integrate information flows throughout the company. Therefore, it is developed to integrate and coordinate across business functions such as sales and marketing, purchasing, inventory control, manufacturing, and accounting. Also, ERP reflects company best practices for business processes and computerizes based on client/server architecture. In addition, ERP is designed to support particular businesses such as health care, hotel, and manufacturing.

As the results of prior research, ERP has abilities on provide system quality and information quality that are key drivers for the achievements of competitive advantage (Ram et. al., 2014). Further, ERP's abilities on provide system quality, information quality, and service quality lead to intention to use ERP and also resulting in the business value (Chien and Tsaur, 2007). Consistently,

Hsu (2013) found that ERP and e-business applications enable firms to success business strategy including cost efficiency, differentiation, and intangible value. In addition, previous literatures found the relationships between ERP and competitive advantage, business value, and firm performance (Jermias and Gani, 2004; Matolcsy et. al., 2005; Kallunki et. al., 2007; Konthong and Ussahawanitchakit, 2009) Therefore, hypothesis 1 is postulated.

Hypothesis 1: Enterprise resource planning system has a positive effect on competitive advantage

### 2.3. E-business

E-business system is an interorganizational system that is designed to extend an organization's electronic reach beyond its own organizational boundaries to related partners such as customers and suppliers using internet communication. E-business links two firms for performing business functions such as online selling, online purchasing, coordination, and information sharing. Clearly, e-business applications include electronic data interchange (EDI), e-commerce, mobile commerce, business to business (B2B) applications, and business to consumer (B2C) applications.

Prior studies indicated that e-business system positively related competitive advantage and firm performance. Beheshti et. al. (2006) investigated the contributions of e-business applications for competitive advantage. They found the positive effects of e-business applications such as B2B and B2C for creating efficiencies and cost reduction. Likewise, Guarda et. al. (2012) discovered the positive relationship between e-commerce using database marketing and competitive advantage on customer perspective. Also, previous study found that competitive advantage is derived from e-business applications (Sprano and Zakak, 2000; Phan, 2003; Grandon and Pearson, 2004; Schubert and Woelfle, 2011). Therefore, hypothesis 2 is postulated.

Hypothesis 2: E-business has a positive effect on competitive advantage

### 2.4. Competitive Advantage

Competitive advantage is described as positional superiority based on organizational strategies which are the combination of differentiation and/or cost leadership (Day, 1984). Competitive advantage is also regarded as the ability to gain returns on investment continually above the industry average (Porter, 1985). To gain the sustainable competitive advantage, firm should persistently obtain the superiority over competitors and diminish competitive abilities of its rivals. In accordance with RBV, competitive advantage can be achievable based on firm specific resources. Firm utilizes both valuable and rare characteristics of resources to acquire the superior advantage. Further, non-substitutable and inimitable resources lead competitive advantage to the sustainability. Prior research indicated that information system adoption created competitive advantage through the business value creation such as lower costs and product differentiation (Griffiths and Finlay, 2004; Doherty and Terry, 2009; Kontong and Suwan-natada, 2012). Hence, the related hypothesis is postulated.

Hypothesis 3: Competitive advantage has a positive effect on firm performance

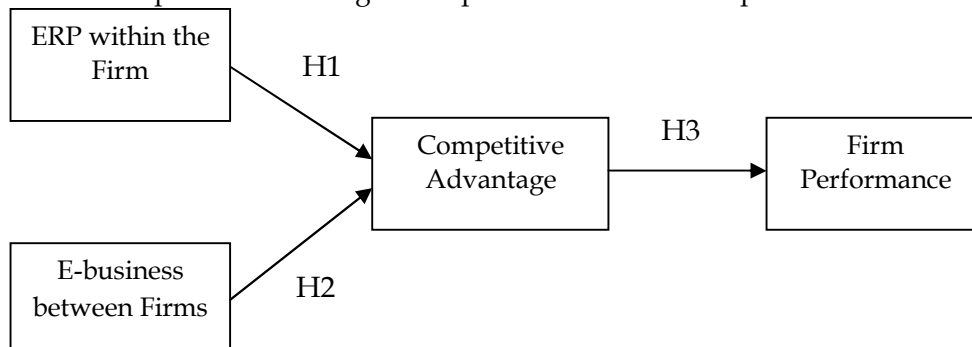


Figure 1: Research Model

### 3. Data and Methodology

#### 3.1. Sample and Data Collection

This research uses mail-questionnaire as a data collection instrument distributed to 572 listed companies registered on the Stock Exchange of Thailand. Each questionnaire contains five parts including respondent personal data questions, firm demographic questions, questions required for the perceptions of ERP within the firm, questions required for the perceptions of e-business between firms, and questions required for the perceptions of competitive advantage and firm performance.

According to data collection procedure, 9 mails were returned because they are undeliverable. However, 122 complete questionnaires are usable making the response rate of 21.33%. As the suggestion of Aaker et al. (2001), the acceptable criteria should be greater than 20% that is appropriately satisfied. In addition, the non-response bias between early and late respondents is critically concerned. This study equally separates the returned questionnaires into two groups and statistically examines using t-test comparison. Hence, the result indicates that there is no significant different between both groups of respondents.

#### 3.2. Validity and Reliability

To be acceptable for the results, this research concerns the validity and reliability of the data collection instrument. Confirmatory factor analysis is employed to test the validity of data in the questionnaire. As suggested by Nunnally and Berstein (1994), the acceptable cut-off score of factor loading is 0.40. As a result, this research finds that all factor loadings of each construct are greater than 0.40 ranging from 0.574 to 0.914 and are statistical significant, as presented in Table 1. Therefore, the measurements of all constructs in conceptual model are satisfied.

To assure the reliability, Cronbach's alpha coefficient is designated to assess the internal consistency and the stability of the developed instrument. As suggested by Nunnally and Berstein (1994), the coefficient should be higher than 0.60. Evidently, the Cronbach's alpha coefficients of each construct are greater than the accepted criteria indicating that all constructs are acceptable. Simply, Table 1 provides the Cronbach's alpha coefficients ranging from 0.786 to 0.918.

Variables	Factor Loadings	Cronbach's Alpha Coefficients
ERP within the firm (ERP)	0.772-0.914	0.899
E-business between firms (EB)	0.547-0.862	0.786
Competitive Advantage (COM)	0.816-0.891	0.918
Firm Performance (FPM)	0.611-0.873	0.912

Table 1: Results of validity and reliability test

#### 3.3. Statistical Techniques

To test the postulated relationships, this study employs the ordinary least squared regression to estimate the parameters in hypothesis testing. This statistical analysis is appropriate for examining the relationship between independent and dependent variables which are categorical and interval data (Hair et al., 2006). Hence, all hypotheses in this research are developed into two statistical equations depicted as follows:

$$\text{Equation 1: COM} = \alpha_1 + \beta_1\text{ERP} + \beta_2\text{EB} + \beta_3\text{ERP*EB} + \beta_4\text{AGE} + \beta_5\text{SIZ} + \varepsilon_1$$

$$\text{Equation 2: FPM} = \alpha_2 + \beta_6\text{COM} + \beta_7\text{AGE} + \beta_8\text{SIZ} + \varepsilon_2$$

Where:

ERP	=	ERP within the firm
EB	=	E-business between firms
COM	=	Competitive Advantage
FPM	=	Firm Performance

AGE = Firm Age (Control Variable)  
 SIZ = Firm Size (Control Variable)

## 4. Results and Discussion

### 4.1. Correlation Analysis

For the examination of multicollinearity problems, this study employs Pearson Correlation to evaluate the correlation coefficients among independent variables. The results from Table 2 show that the coefficients among independent variables are smaller than 0.80. As suggested by Hair et al. (2006), there is no multicollinearity problem in this study. In addition, this study also employs the variance inflation factors (VIFs) to examine the multicollinearity concerns. Thus, the VIFs for all variables are smaller than 10 which indicate that the independent variables are not correlated with each other (Neter et al., 1985).

Variables	ERP	EB	COM	FPM	AGE	SIZ
Mean	4.293	4.027	3.736	3.706	1.443	1.369
S.D.	.617	.609	.695	.622	.499	.484
ERP						
EB	.552***					
COM	.475***	.573***				
FPM	.484***	.570***	.646***			
AGE	-.053	-.145	.065	.166		
SIZ	.035	-.142	.060	.031	.550***	

\*\*\* p < 0.01

Table 2: Results of validity and reliability test

### 4.2. Effects of ERP and e-business on Competitive Advantage

Table 3 shows the positive relationship between ERP within the firm and competitive advantage ( $\beta = 0.219$ ,  $p < 0.05$ ). Consistently, ERP has abilities on provide system quality and information quality that are key drivers for achievement of competitive advantage (Ram et. al., 2014) and result in business value creation (Chien and Tsaur, 2007; Konthong and Ussahawanitchakit, 2009). Hence, hypothesis 1 is supported.

Independent Variables	Dependent Variable Competitive Advantage <sup>a</sup>
ERP	.219** (.093)
EB	.471*** (.104)
ERP * EB	.104** (.107)
Firm Age (AGE)	.112 (.178)
Firm size (SIZ)	.058 (.182)
Adjusted R <sup>2</sup>	0.361

\*\* p < 0.05, \*\*\* p < 0.01

<sup>a</sup> Beta coefficient with standard errors in parenthesis

Table 3: Results of OSL regression analysis of equation 1



The results from Table 3 also indicate that e-business between firm and its partners positively affects competitive advantage ( $\beta = 0.471$ ,  $p < 0.01$ ). Consistent with prior research, there are positive relationship between e-business application and competitive advantage (Sprano and Zakak, 2000; Phan, 2003; Grandon and Pearson, 2004; Schubert and Woelfle, 2011). *Therefore, hypothesis 2 is supported.* In addition, this research also investigates effect of integration of ERP within the firm and e-business between firms for competitive advantage, according to the implications of Hsu (2013). The results also show the positive relationship between the integration of ERP and e-business and competitive advantage ( $\beta = 0.104$ ,  $p < 0.05$ ).

#### 4.3. Effect of Competitive Advantage on Firm Performance

As the results shown in Table 4, competitive advantage significantly and positively influences firm performance ( $\beta = 0.640$ ,  $p < 0.01$ ). In accordance with previous studies, implemented IS supports strategic goals such as cost reduction and the differentiation. Therefore, these competitive advantages enable firms to persistently sustain their performance (Klein, 2007; Barratt and Barratt, 2011; Cheng, 2011). *Respectively, Hypothesis 3 is supported.*

Independent Variables	Dependent Variable Firm Performance <sup>a</sup>
Competitive Advantage (COM)	.640*** (.069)
Firm Age (AGE)	.184** (.165)
Firm size (SIZ)	.108 (.170)
Adjusted R <sup>2</sup>	0.427

\*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

<sup>a</sup> Beta coefficient with standard errors in parenthesis

Table 4: Results of OLS regression analysis of equation 2

## 5. Implications

### 5.1. Theoretical Implications

To generalize the implications of RBV, this study investigates the impacts of integrated information systems, as IT resources, on competitive advantage. In details, this study evaluates the effects of ERP adopted in various functions within the firm and e-business links intra-system and external partners. Additionally, this study also investigates the effects of the integration of both internal and external system and also discovers a positive relationship.

### 5.2. Managerial Implications

As the results, firms should spend on enterprise system investment and attempt to coordinate their systems with other related applications such as e-commerce, EDI, and mobile commerce that are communicate to the related business partners (customers and suppliers) to gain more competitive advantage.

## 6. Conclusion

The purpose of this study is to investigate the effects of ERP and e-business application for competitive advantage and firm performance, based on RBV theory. As the result of Hsu (2013), this research develops ERP, e-business, and the integration between both systems as independent variables and designates competitive advantage as dependent variable. The relationship between competitive advantage and firm performance is also examined. Based on literature review, four hypotheses are postulated and tested using OLS regression analysis. The results support all hypotheses and implications of this study are also provided.

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