THE ANTECEDENT FACTORS AFFECTING THE SUCCESS IN IMPLEMENTATION OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM FOR FIRMS IN THAILAND

ปัจจัยเชิงสาเหตุที่มีผลต่อความสำเร็จในการประยุกต์ใช้ระบบบริหารทรัพยากรองค์กรของบริษัทในประเทศไทย

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ABSTRACT

The purpose of this study was to investigate four antecedent factors of a successful Enterprise Resource Planning (ERP) implementation that included (1) information system resources, (2) information system capabilities, (3) executive support, and (4) business strategy. What contributed to the positive firm's performance after successful implementation was also studied. Data from 2,692 Thai industrial firms in the Industrial Estate Authority of Thailand were used. A mathematical model for the contributions of each of these factors was constructed. The result of ordinary least square regression revealed that the relationships between the four antecedent factors and a successful implementation were significant and positive. In addition, success in implementation had a positive effect on Thai firm performance.

KEYWORDS: Successful ERP implementation, Information system resources, Information system capabilities, Executive support, Business strategy

บทคัดย่อ

การศึกษาวิจัยครั้งนี้มีวัตถุประสงค์เพื่อทดสอบปัจจัยที่มีผลต่อความสำเร็จในการประยุกต์ใช้ระบบการบริหารทรัพยากรองค์กร(ERP) 4 ตัว ซึ่งประกอบด้วย (1) ทรัพยากรของระบบสารสนเทศ (2) ความสามารถในระบบสารสนเทศ (3) การสนับสนุนของผู้บริหาร (4) กลยุทธ์ขององค์กร นอกจากนี้ยังทำการทดสอบถึงผลการดำเนินงานขององค์กรเมื่อเกิดความสำเร็จในการประยุกต์ใช้ระบบ ERP โดยกลุ่มตัวอย่างที่ใช้ในการศึกษาเป็นบริษัทอุตสาหกรรมในนิคมอุตสาหกรรมการผลิตแห่งประเทศไทยจำนวน 2,692 บริษัท และการใช้แบบจำลองทางคณิตศาสตร์ในการแสดงถึงตัวแปรแต่ละตัวที่ทำการศึกษา ซึ่งผลการศึกษาพบว่ามีความสัมพันธ์ทางบวก

ระหว่างตัวแปรที่เป็นสาเหตุให้เกิดความสำเร็จในการประยุกต์ใช้ระบบ ERP กับความสำเร็จในการประยุกต์ใช้ระบบ ERP อย่างมีนัยสำคัญทางสถิติ นอกจากนี้ความสำเร็จในการประยุกต์ใช้ระบบ ERP ส่งผลกระทบทางบวกต่อผลการดำเนินงานขององค์กร

คำสำคัญ : ความสำเร็จในการประยุกต์ใช้ระบบ ERP ทรัพยากรของระบบสารสนเทศ ความสามารถในระบบสารสนเทศ การสนับสนุนของผู้บริหาร กลยุทธ์ขององค์กร

1. INTRODUCTION

1.1 Enterprise Resource Planning (ERP)

In the past two decades, companies around the world have implemented Enterprise Resource Planning (ERP) systems. ERP is an integrated, multi-dimensional system that encompasses all functions of an organization, including planning, control, and global optimization of the supply chain using state of the art information technology tools (Jarrar, Al- Mudimigh, and Zairi, 2000).Wah (2000) posited that today's ERP systems link more than just business processes by integrating people, suppliers, and customers as well. Allen et al., (2002) added that ERP is implemented by organizations to increase decision-making speed, to improve the control of operations and costs, and to improve enterprise wide information dissemination.

However, ERP implementation is costly, complex and prone to failure (Langernwalter, 2000). Schmidt, Lyytinen and Hirschheim(2001) posited that 80 percent of all software projects exceed their original budgets while 25 percent of these projects are cancelled before they are completed.In all these cases, the firms went into implementation without considering its pre-implementation state. Were all the indicators for a successful implementation in place? With this question in mind, the main point of the study addresses how antecedents of success of ERP implementation relate to success of ERP implementation and whether impacts of success of ERP implementation affect a firm's performance. The underlying context is the body of Thai manufacturing firms.

1.2 Research Questions and Objectives of the Study

A vital consideration of ERP research is to focus on the antecedents prior to a successful ERP implementation. Of all the antecedents, four variables, can be thought of as influencing the implementation: information systems (IS) resources, IS capabilities, executive support, and business strategy. In addition, one has to consider how motivated is management to examine how the success of ERP implementation affects the firm's performance. Hence, the research questions are formulated as:

- H*ow do antecedents of success in an ERP implementation (IS resources, IS capabilities, executive support, and business strategy) affect the success of an ERP implementation?*
- *How does the success of an ERP implementation affect subsequent firm performance?*

The objectives of this study are to (1) prior to implementation examine the IS resources, IS capabilities, executive support, and business strategy and find out what they mean to ERP implementation, and (2) investigate the effects, if any, the successful ERP implementation had on the firm's performance.

2. LITERATURE REVIEW AND CONCEPTUAL MODEL

As shown in figure 1, a conceptual model was built to answer and test how antecedents of success of ERP implementation affect success of ERP implementation, and how a successful ERP implementation influences the firm's performance. The conceptual model is delineated with the resource-based view of its logically linked variables.

Resource-Based View of firms

The resource-based view of the firm (RBV) describes an organization as a collection of productive resources with the central assumption that organizations gain competitive advantage through their internal resources (Peteraf and Barney 2003). The core issue in the resource-based view is how to identify and exploit existing resources more effectively in the organization (Hedman and Kalling 2002). Hedman and Kalling (2002), adding that the resource-based view is part of strategy theory and, as such, deals with explanations of firm performance in a competitive environment. The resource-based view focuses on resources and capabilities and the linkage between resources and capabilities in order to underlie persistent performance; it also deals with the way in which organizations differ from one other when it comes to performance. Persistently high levels of performance are described by Peteraf and Barney (2003) as a sustained competitive advantage. Noteworthy in the resource-based view is that it builds on assumptions about competitive advantage and heterogeneity of resources. The basic assumption is that the heterogeneity of resources makes it possible to have competitive advantage. Barney (1991 cited by Finney et al. 2004 p.1722) explains RBV of the firm that competitive advantage is obtained from resources and capabilities that create to be valuable, rare, inimitable, and non-substitutable. The resources and capability are viewed as tangible and intangible assets, including managerial skills, organizational operation process and routine, and knowledge its controls.

In this study being addressed to success of ERP implementation can be viewed resources and capability in order to produce quality of information that depends on a resource and capability obtained by IS resources, IS capabilities, executive support, and business strategy link to success of ERP implementation. Success of ERP implementation can be improves firm performance. Accordingly, Paiva et al., (2008) argue that in recent, competitive environment is focused on new information resources, technologies, management practices,

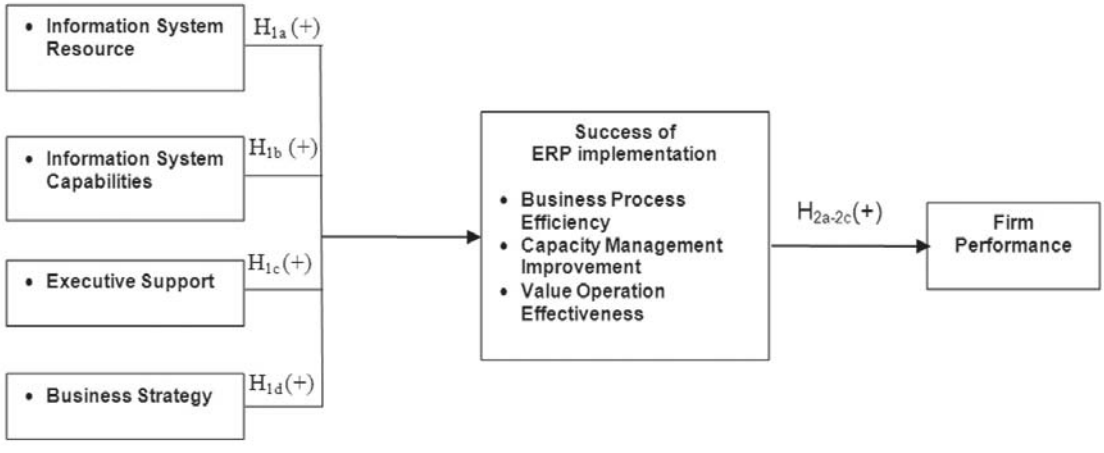

FIGURE 1 Conceptual Model of the Antecedents of a Successful ERP Implementation in Thai Firms

competitors, shorter product life cycles, and especially, organizational knowledge in manufacturing firms. Paiva et al., (2008) find the evidences to conclude that the organizational knowledge-based approach related to cross-functional orientation, new technologies, and adding information access to impact manufacturing strategy. For this reason, success in ERP implementation framework is formulated from RBV that framework has to control and apply resources and capabilities that are implied to tangible (e.g. hardware, other equipment) and intangible assets to provide information to be competitive advantage when the managers have information on their hands, owing to the fact that they can control organization processes with produced information to be improve firm performance (Rivard et al., 2006; Wu et al., 2006).

2.1 Success of ERP Implementation

Success is popularly defined as completing the project on time and within budget. However, those who adopt ERP systems and use them to achieve business results define success as having a smooth transition to stable operations with the new system, achieving intended business improvements like inventory reductions, and gaining support capabilities for improved decisions. Markus and Tanis (2000) state that success of ERP implementation does not simply come from installing ERP but from implementing it so that measurable business benefits are achieved. Jarrar et al. (2000) concurred with Markus and Tanis by suggesting that ERP success is much more than completing an ERP project on time and on budget.

For this research, a successful ERP implementation meant that the project was completed on time and within budget, and provided value to the operation and the business processes. Desirable features were smooth transitioning to stable operations and achieving intended business process efficiency like improving inventory reductions, and enhancing the capacity of the operation. Moreover, the transition contributed the opportunity for interdepartmental teamwork and communication. A successfully implemented ERP system is one of the best systems on the market to help organizations achieve their business objectives and be strong enough to enter the competitive international market.

A successful ERP implementation translates into an efficient business process, improved capacity management and more effective value operation. These terms are defined below.

Business process efficiency refers to effective accounting practices such as reducing the time to process a transaction, improving the quality of annual reports, and increasing the integration of accounting applications. ERP systems offer companies the ability to improve business process efficiency by integrating all the functional areas within an organization. Both financial and non-financial data can be integrated. Additionally, this study emphasizes on accounting process, as part of business processes also, to determine the extent to which ERP systems have helped companies in achieving that, and to focusing attention on changes in accounting practices (Charalambos and Sylvia, 2004).

Capacity management improvement refers to improvement effectiveness in coordination between finance, marketing, production, engineering, and sales. Also, it has improved in user satisfaction in cooperation between managers and employees (Nah et al., 2007). Moreover, ERP systems provide management accounting managers with the capability to provide almost effortless real-time management accounting information on a daily basis that once took days or weeks to prepare and was based on an aggregate and tedious month or quarter-end closing (Sandino, 2004). This freedom allows

easily calculating and updating cost driver information and using information for planning, controlling, organizing, and directing process.

Value operation effectiveness refers to smoother planning and control of the operation as a result of the application of ERP. Positively affected were the ability in capacity planning, cost estimation, and inventory control, also included were reduction in informal systems for materials management, inventory, and production control (Nah et al., 2007). The resultant higher effectiveness and efficiency in the operation are important factors for improving the decision-making process by appropriate and timely information.

2.2 Antecedents of a Successful ERP Implementation

Antecedents of a successful ERP implementation require that ERP features support information used in reaching organization goals. For the implementation to be successful, it depends on the particular organization configuration: working process, resources, tangible and intangible assets, including farsighted of exclusive. That is, the study proved what antecedents there were and how they contributed to the success of ERP implementation. The variables of this conceptual model consisted of IS resources, IS capacities, executive support, and business strategy and were relevant in guiding ERP implementation.

2.2.1 Information System (IS) Resources

IS resources are information system human resource, information technology (IT) infrastructure, and quality of vendor partnership that lead to success in implementing ERP. Information system human resource refers to the skill, knowledge and experiences required to effectively perform IS functions (Lee et al., 2009). Information technology infrastructure is a set of shared tangible technology resources that provide a foundation enabling present and future business applications (Nyrhinen, 2006). The core component of IT infrastructure includes platforms, network and telecommunications, database, and core data applications (Broadbent et al., 1999 cited by Huang & Hu, 2004). To make IT applications and service feasible, a certain sophistication of the IT infrastructure is required. Moreover, quality of vendor partnership is a composite of IS resource as one of the critical IT resource (Ross et al., 2000). The partnerships with outsourcing vendors may help a firm to reduce unanticipated changes in contracts and investment that might threaten the success of IT projects (Klepper and Jones, 1998 cited by Bahli and Rivard; 2003). The quality of vendor partnership ensures the working harmony and congruity between IS departments and key partners that enhance the success of systems delivery. These IS resources are critical for effective IT use in an organization, and are one of the pillars supporting a successful ERP implementation. Hence, hypothesis 1a was stated:

Hypothesis 1a: Information system resources are positively related to the success of ERP implementation.

2.2.2 Information System (IS) Capacities

The IS capacities are largely determined by the quality and sophistication of a process that consists of IS planning and development capability, IT support maturity, and systems operation capability that lead to success of ERP implementation. This research defines IS planning and development capability as the replacement of IS planning and development process in an attempt to assembling, manage and analyzing information for implementing and developing IS plans for information quality. In addition, IS capabilities consist of IT support

maturity defined as the extent to which the IS support functions are adequately fine-turned and planed for supporting demand of users. IT support maturity reflects the evolution stages of IS activities in providing IT support for customers and users. This research is based on the previous IT support research (Mirani and King, 2004), for indicate, IT support maturity that has five processes consists of planning, formalization, priority criteria, staffing, performance standard control, and user of technology for customer support. Besides, IS capabilities involve system operation capability that is the physical provision of IS services together with the operation of IS functions (Feeny and Willcock2002). Systems operation also refers to traditional data processing activities such as data entry, job scheduling, output production and distribution, and database operation (McLaren et al., 2002). So, systems operation capability is defined as the extent to the systems operation activities are well performed and prepared for both expected situations. Systems operation capability becomes important enabling for providing information quality in the organization. These capabilities lead to a success in ERP implementation because they reflect the four typical IS processes taking place within organizations, planning, development, support, and operation. Therefore, hypothesis 1b was formulated:

Hypothesis 1b: Information system capabilities are positively related to success of ERP implementation.

2.2.3 Executive Support

Executive support is management's support, active involvement, vision, and direction Executive support defined as management support that the action involvement, vision, and direction of high-level executives provide the impetus need to sustain the implementation of ERP (O'Leary, 2000). When the executive believe that the organization is supported by information quality, especially accounting information, information quality can reach a success of goal achievement and be able to use for decision making efficiency (Vlahos et al., 2004). The ERP literature (Dong, 2001) has identified top manger support as the top and most crucial factor in ERP implementation. Similarly, Sarker and Lee (2003) identified strong and committed leadership as a necessary condition for success of ERP implementation. In addition, Bernroider (2008), and Ngai et al., (2008) investigated that the relationship between the role of IT governance and success of ERP in terms of significant implementation and the factors as top management commitment drives to success. Liu and Pan (2007) indicate that top management support is employed to key factor in ABC implementation. Executive or top management support is even more important in the case of ERP implementation because of the scale of the project and the amount of resource needed for the enterprise-wide project. For these reasons, hypothesis 1c was proposed:

Hypothesis 1c: Executive support is positively related to success of ERP implementation.

2.2.4 Business Strategy

Quinn (2003) provides a succinct definition that a strategy is the pattern or plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole. A well-formulated strategy helps to allocate an organization's resources into a unique and viable posture based on its relative internal competencies and shortcoming, anticipated changes in the environment, and contingent moves by intelligent opponents. In this research, business strategy defined as a plan to guide an organization to achieve its goals. This guideline plan

focuses on improving the competitive position of a firm's products or services, which serve a specific industry or market segment that lead to success of ERP implementation and through firm performance. An important stream of Information System (IS) and managerial research has been devoted to strategy.Previous research, Ritesh et al., (2007) identified that interorganizational systems availability, online systems efficiency, Information Technology (IT) alignment to organizational strategies and online system quality and effectiveness as the important elements that drive e-commerce business success. Hence, hypothesis 1d was stated:

Hypothesis 1d: Business strategy is positively related to success of ERP implementation.

2.3 Successful ERP Implementation and firm performance

The literature points that assessment of benefits and risks of ERP has remained of strategic interest to the adopting organizations. Achieving operational efficiencies such as improvements in productivity, optimizing inventory and data integration capabilities are some of the prime benefits being sought by ERP adopters (Kamhawi 2008). In investigating adoption motives, Raymond and Uwizeyemungu (2007) conclude in their study of Canadian Small & Medium enterprises (SMEs), that the firms with significant organizational capacities, commercial dependence on major customers and tendency of bringing innovative products are internally predisposed to ERP adoption, whereas those firms which are focused on networking and partnerships with other firms are externally pre-disposed towards adoption of ERP. Given the considerable investment of time, money and resources in ERP projects, the researchers have looked at the performance impacts of ERP implementation. Conducting a survey of Hong Kong based firms, Law and Ngai (2007) find that user satisfactions of ERP and business process improvement positively impact the organizational performance. They claim positive empirical relationship between the strategic intent behind the adoption of ERP and organizational performance. Velcu's (2007) study reinforces the above findings, as the study reveals that firms driven by technologically-led motives versus business-led motives perceive differently towards benefits of ERP implementation. Poston and Grabski's (2001) longitudinal study of pre versus post implementation present mixed financial benefits to the ERP adopters. Hunton, Lippincott and Reck (2003) argue that a decline in financial performance of non-adopters relative to adopters should be anticipated and studied, as adopting firms may not necessarily exhibit financial gains immediately for a number of reasons. Among the studies measuring the non-financial impacts of ERP, O'Leary (2004), using data from companies which had opted for Oracle's ERP, identifies several tangible and intangible benefits of ERP implementation. Considering ERP's multi-directional impact, McAfee (2002) observes significant operational performance improvements in the pre versus post ERP implementation contexts. Supporting these findings, Cotteleer and Bendoly (2006) discover significant performance improvements in order fulfillment lead times in the near-term, as well as over an extended period following the deployment of an ERP system. Interestingly, the time lag has been seen as quite important in assessing ERP performance outcomes. Although the 'normal' time lag has been found to be approximately three or more years, Matolcsy, Booth and Wieder (2005) report sustained operational efficiencies and overall improved liquidity for adopting firms after the second year of implementation. Similarly, Nicolaou's (2004) study supports this view of early impacts on performance and found

that ERP implementing firm realized performance impacts (ROI improvements) in their 2nd year after implementation. Urging further empirical studies that consider implementation factors and their linkage to performance impacts, Nicolaou (2004) concludes that implementation factors such as vendor selection, implementation goals, scope and time on ERP implementation efforts are significant in affecting a firm's realization of performance impacts.In consideration of the above the following hypotheses were formulated for post implementation success of ERP:

Hypothesis 2a: An organization with business process efficiency will achieve firm performance.

Hypothesis 2b: An organization with capacity management improvement will achieve firm performance.

Hypothesis 2c: An organization with value operation effectiveness will achieve firm performance.

3. METHOD

3.1 Data Collection

The data of this study was gathered from the population of the Thai Industrial Estate Authority of Thailand (I-EA-T). The firms' characteristics were manufacturing firms that used an ERP system. From I-EA-T 2,692 firms were selected from the database and to each a questionnaire for the chief executive officer was sent by mail. Of these 552 complete and six incomplete questionnaires were returned, for a response rate of 20.51%. Moreover, non-response bias was tested with data from the first wave and second wave of questionnaires returned from respondents. The difference of means of demographic variable, firm size, of two waves were tested by t-test, the result was not significant.

3.2 Reliability and Validity

Reliability of collected data was tested by Cronbarch Alpha to measure internal consistency of respondents' answer for all the items in the questionnaires. Each construct was measured by multi-item 5-point

TABLE 1 Factor Loading and Alpha Coefficients of Constructs

Constructs	Factor Loading	Alpha Coefficient	Reference
Success of ERP implementation (SERP)	.88-.92	0.92	
Business Process Efficiency (BPE)	.83-.87	0.84	Riley et al., 2000
Capacity Management Improvement (CMI)	.77-.88	0.89	Fiona Fui-Hoon Nah, and Mathew Tan, 2007
Value Operation Effectiveness (VOE)	.83-.88	0.91	Fiona Fui-Hoon Nah, and Mathew Tan, 2007
Firm Performance (FP)	.72-.85	0.87	Merchant and Vonder, 2003
Information System Resources (ISR)	.70-.81	0.92	Feeny and Willcocks, 1998
Information System Capabilities (ISC)	.79-.87	0.93	Ravichandran and Rai, 2000a
Executive Support (ES)	.88-.93	0.94	Berson et al., 2006; Ussahawanitchakit, 2007
Business Strategy (BS)	.85-.90	0.93	Ko, Kincade and Brown, 2000

Likert scale for the study that consist of 4 part; part 1 were demographics of respondents, part 2 was success of ERP implementation, part 3 were antecedents of a successful ERP implementation, and part 4 was firm performance. Table 1 shows that the alpha coefficients were greater than 0.70, consistent with Nually's (1978) criterion. Alpha coefficients of constructs had values ranging from .84 to .94, the lowest coefficient for business process efficiency and the highest coefficient for executive support. Therefore internal consistency of the measures used in this study could be considered good for all constructs. Factor analysis was employed to test the construct validity to direct the contents in the study. Items were used to measure each construct that was extracted to be only one principal component. Table 1 also shows factor loading of each construct that presented a value greater than .70 (range from 0.70 to 0.93). Thus as theorized, construct validity of this study was tapped by items in the measure. That is, factor loading of each construct should not be less than .4 (Hair et al., 2006). In conclusion, the data was reliable.

3.3 Statistical Technique

Regression analysis analyzed the relationship between dependent and independent variables. Ordinary least squares (OLS) regression analysis tested the hypotheses. From the relation model and the hypotheses, the equation models were formulated:

where, SERP is success in ERP implementation, FP is firm performance, ISR is information system resources, ISC is information system capabilities, ES is executive support, BS is business strategy, FS is firm size, FA is firm age, FC is firm capital, TU is time of using ERP, β_i are regression coefficients, ε_i are error terms.

4. RESULTS AND DISCUSSION

Table 2 shows the correlation matrix for all variables. To check for multicollinearity problems among independent variables, variance inflation factors (VIF) were used that ranged from 1.13-3.73. Their values were well below the cut-off value of 10 recommended by Hair et al., (2006). Thus, this study had no significant multicollinearity problems.

4.1 Effects of Antecedents of Success of ERP Implementation on a Successful ERP Implementation

Table 3 shows the result of effect of IS resources (ISR), IS capacities (ISC), executive support (ES), and business strategy (BS) as antecedents related to a successful ERP implementation (SERP). Model 1 presents the relationship of IS resources and IS capacities on successful ERP implementation. The result showed that IS resources and IS capabilities positively and significantly related to success of ERP implementation (Model 1: β_1 = 0.091, p<0.05, β_2 = 0.470, p<0.01). The result indicated that firms with higher degree of IS resource and IS

$$\text{Equation 1 : SERP} = \beta_{01} + \beta_1 \text{ISR} + \beta_2 \text{ISC} + \beta_3 \text{ES} + \beta_4 \text{BS} + \beta_5 \text{FS} + \beta_6 \text{FA} + \beta_7 \text{FC} + \beta_8 \text{TU} + \varepsilon_1$$

$$\text{Equation 2 : FP} = \beta_{02} + \beta_9 \text{BPE} + \beta_{10} \text{CMI} + \beta_{11} \text{VOE} + \beta_{12} \text{FS} + \beta_{13} \text{FA} + \beta_{14} \text{FC} + \beta_{15} \text{TU} + \varepsilon_3$$

capacities had a greater effect a successful ERP implementation. Thus, *hypothesis 1a and 1b were supported.* This was consistent with Barney (2001) who described that resources and capabilities, knowledge and skills, including controlling them lead to a sustainable competitive advantage. IT resources, hardware, software, people, knowledge and skill, as applied to capability ensure the success of ERP implementation because they provide information as accurate, responsive, relevant, and flexible as possible. High quality information can then be used in strategic decision making (Riccardo and Suresh, 2006; Sutton, 2000).

Moreover, the results of Model 1, table 3, show that executive support and business strategy have a significantly, positively effect on successful ERP implementation (Model 2: β_7 = 0.195, p<0.01, β_8 = 0.254, p<0.01). The results showed that firms with higher degree of support from executive and business strategy had greater effect a successful ERP implementation. Therefore, *hypothesis 1c and 1d were supported.* That is consistent with previous research that support from leaders has the intrinsic value to drive and motivate the various organizational mechanisms to attain goals (Berson et al., 2001). Therefore, if top management believes that information quality can improve operation and management functions, they will offer the resources for developing ERP system. That is, top management sights critical management information usefulness leading to be obtained capital, people, infrastructure, knowledge training to continuous improvement of success of ERP implementation (Masquefa, 2008). Whenever the executives have belief on information quality that it can help to improve their management and they will promote ERP implementation to succeed by offering resources and capability for increasing competitive advantage (Barney, 2005). Therefore, leader supporting is a critical factor for establishing ERP system. Likewise, Liu and Pan (2007) find that top management support is inspiration to drive ABC implementation to gain success. Moreover, business strategy is a plan to guide an organization to achieve

TABLE 2 Descriptive Stratistics and Correlation Matrix

Constructs	SERP	BPE	CMI	VOE	FP	ISR	ISC	ES	BS
Mean	2.18	2.20	2.23	2.23	2.39	2.34	2.13	2.32	2.32
Standard Deviation Success of ERP Implementation (SERP)	0.52	0.58	0.57	0.58	0.62	0.52	0.60	0.71	0.69
Business Process Efficiency (BPE)	0.92***								
Capacity Management Improvement (CMI)	0.91***	0.79***							
Value Operation Effectiveness (VOE)	0.88***	0.73***	0.75***						
Firm Performance (FP)	0.46***	0.41***	0.45***	0.46***					
Information System Resources (ISR)	0.36***	0.33***	0.36***	0.33***	0.43***				
Information System Capacities (ISC)	0.53***	0.45***	0.48***	0.50***	0.54***	0.58***			
Executive Support (ES)	0.39***	0.32***	0.38***	0.39***	0.58***	0.47***	0.72***		
Business Strategy (BS)	0.40***	0.34***	0.45***	0.41***	0.55***	0.53***	0.61***	0.74***	

*** Correlation is significant at the .01 level (2-tailed)

** Correlation is significant at the .05 level (2-tailed)

* Correlation is significant at the .10 level (2-tailed)

TABLE 3 Results of Ordinary Least Squares Regression Analysis[a]

Independent Variables	Depend Variables	
	SERP 1	FP 2
Information System Resources (ISR)	.091** (.044)	
Information System Capabilities (ISC)	.470*** (.045)	
Executive Support (ES)	.195*** (.058)	
Business Strategy (BS)	.254*** (.058)	
Business Process Efficiency (BPE)		.198*** (.064)
Capacity Management Improvement (CMI)		.210*** (.067)
Value Operation Effectiveness (VOE)		.284*** (.060)
Firm Size (FS)	.035 (.085)	.015 (.039)
Firm Age	-.038 (.082)	-.015 (.038)
Firm Capital	.079 (.079)	.012 (.033)
Time to use ERP	-.062 (.080)	.018 (.042)
Adjusted R^2	.277	.253

* $p < .10$

** $p < .05$

*** $p < .01$

[a]Bata coefficients with standard error in parenthesis

its goals. This guideline plan focuses on improving the competitive position of a firm's products or services, which serve a specific industry or market segment that leading to success of ERP implementation and through to firm performance. An important stream of Information System (IS) and managerial research has been devoted to strategy. Additionally, Ritesh (2004) identified that interorganizational systems availability, online systems efficiency, Information Technology (IT) alignment to organizational strategies and online system quality and effectiveness are important elements that drive e-commerce business success.

4.1 Impacts of Success of ERP implementation on Its Consequences

Table 3, in Model 2 shows the result of the relationship between a successful of ERP implementation that have dimensions are business process efficiency, capacity management improvement, value operation effectiveness and firm performance, as stated in hypotheses 2a-2c. (Model 3: β_{13} = 0.198, p<0.01, β_{14} = 0.210, p<0.01, β_{15} = 0.284, p<0.01). All these had a significantly, positive effect on firm performance. This implied that firms with the greater business process efficiency, capacity management improvement, and value operation effectiveness have higher firm performance. Therefore, *hypothesis 2a-2c was supported.* This is consistent with Law and Ngai (2007), who found that business process improvement positively impacts the organizational performance. Also, Nicolaou's (2004) found that firms implementing ERP realized positive performance impacts (ROI improvements) in their 2nd year after implementation. Nicolaou (2004) concluded that implementation factors such as vendor selection, implementation goals, scope and time on ERP implementation efforts are significant in affecting a firm's performance impacts.

5. CONTRIBUTIONS

5.1 Theoretical Contributions

The conceptual model of a successful ERP implementation is explained by a resource-based view (Barney et al., 2001) that focuses on the influences of resources to competitive advantage. The resources are the assets, capabilities, processes, information and knowledge that the firm can control. In this research, the antecedents of an ERP implementation use the critical resources called antecedents of a successful ERP implementation: IS resources, IS capabilities, executive support, and business strategy. The results showed that the all these antecedents were positively related to a successful ERP implementation. The success of ERP implementation is a valuable factor of the managing firm's assets such as IS resources to capability, people, strategy of firm, and executive support to be efficient and effective. ERP implementation gives managers the ability to differentiate those assets that other firms may find difficult to duplicate, rare and non-substitutable resources, giving them a competitive advantage. Thus, this study explained why using the four critical resources was necessary for the success of ERP implementation, and in turn, provided management with quality information to improve firm performance.

5.2 Managerial Contributions

A successful ERP implementation positively related to firm performance. Thus, managers need to develop the ERP implementation to fit to provide information quality, accuracy, speed, relevance, and easy of understanding to support the strategies of improving firm performance. Moreover, the four antecedents of a successful ERP implementation gave a positive benchmark when they were applied before the ERP system was implemented. The four antecedents of ERP implementation successful also can be used as indicators of what resources would

be requires in a firm if an ERP system is contemplated by management. The more information available to an executive will allow the making of informed decisions that drive an organization to achieve goals, such as support of new technology. Management systems (ERP) that are supported by IS resources and IS capabilities lead to success in their implementation.

5.3 Practical Contributions

The antecedents of success of ERP implementation (IS resources, IS capabilities, executive support, and business strategy) influence success of ERP implementation, the development of IT-based competitive advantages involves a number of organizational parameters, including a set of IS resources and capabilities. These strategic resources and capabilities cannot be created. The resources and capabilities have to be properly invested, developed, and maintained over a long period of time. A firm improves ERP implementation through information technology when users IT to support that are dependent on IS resources and capabilities. Firms improve ERP implementation into competitive advantage if firms can respond quickly to competition by launching strategic IT applications through influencing a platform of IS resources and capabilities already developed and in place. In addition, This research framework points to a significant role of vision and supporting from executive play leadership role in building and creating IT support for core competencies requires cooperation and coordination of other business peers. These require a focus upon IT vision not only with any department but also with other business units. Firms should put emphasis on communicating and building consensus around the IT vision in not only the IS department but also in to other parts of the organization. Moreover, Firms still need to plan and implement business strategy. Firms should be close to customers, demands of customers, engross in market activities developing and planning, and analyze competitor activity for planning in ERP package software to building competitive advantage and relate to success of ERP implementation in the firm.

6. LIMITATION AND FURTHER RESEACH

6.1 Limitation

This research has some limitations that should be mentioned. Firstly, the focus of the research model has been on the relationships among constructs identified in this study. The findings should be viewed with caution insofar as other potentially important factors have been excluded.Secondly, this research uses the Ordinary Least Squares (OLS) regression analysis to test all hypotheses following the conceptual model. Although OLS is an appropriate method for examining the hypothesized relationships to test factors affecting firm performance, but the overall testing of conceptual model by using other methods of regression analysis may yield more effective findings. Third, the conceptual model was tested only for firms in the Industrial Estate Authority of Thailand (I-EA-T). Finally, all constructs in the conceptual model are developed from new scales based on the definition of each construct. Accordingly, the results may be impacted from the inappropriate measures by using these scales. Thus, an interpretation of the results should be carefully made.

6.2 Future Research Directions

The conceptual framework should be tested with various industries whether the influences of success of ERP implementation on firm performance are different. That is, the framework should use the dummy variables to estimate parameters to interpreter the differences. Intervening managerial quality may be added with other variables, such as effective budgeting, strategic

performance, and strategic planning. The causes of success of ERP implementation are explained by various factors, its antecedents. In the same way, this research expands variables which positively and significantly affect the success of ERP implementation. Thus, antecedents of success of ERP implementation could examine other variables, for instance, planning, user attitude, consults, and others. However, the conceptual framework may be explained by other theories such as, contingency theory when it is influenced by exogenous variable, for example.

7. CONCLUSION

This research pointed out that a firm implementing an ERP system was able to manage all their resources more effectively. Yes, ERP software is costly, complex and often fails in implementation. But, the failure factor was why this study focused on the antecedents of a successful ERP implementation to find what variables reduced the failure possibility, namely, business process efficiency, capacity management improvement, and value operation effectiveness. The results showed that the antecedents, IS resources, IS capacities, executive support, and business strategy were significantly and positively linked to a successful ERP implementation. Moreover, all dimensions of the successful of ERP implementation were positively associated with subsequent firm performance.

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