UNDERSTANDING THE ADOPTION OF ENTERPRISE RESOURCE PLANNING (ERP) AMONG SMALL MEDIUM ENTERPRISES (SMEs) IN THAILAND'S EXPORT INDUSTRY

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ABSTRACT

The major aim of this study was to explore the technological, organizational and environmental factors influencing small and medium enterprises (SMEs) adoption of enterprise resource planning (ERP) among Thailand's export industry. While ERP has been regarded as an important technology that can provide strategic and operational advantages, it has yet to see significant rates of its adoption among SMEs in Thailand's export industry. Hence it was necessary to understand what determines ERP adoption among SMEs in Thailand's export industry. Based on the technological, organizational and environmental (TOE) theoretical framework, this study examined the influence of twelve variables on ERP adoption. The study obtained several key findings and implications about the determinants of ERP adoption in the export industry.

A survey based on quantitative approach was used. The survey was conducted on small medium enterprises (SMEs) in Thailand. The traditional questionnaires were used to gather information from 225 participants (using Yamane formula) by convenience method. In this research, data analysis was done by a Statistical Package for the Social Sciences (SPSS) version 19.0 for Windows. Descriptive analysis was applied to summarize the characteristic of the sample group by using frequency and percentage. Moreover, a logistic regression was applied to test the hypothesis. The result of the study revealed that there was a significant relationship among Relative Advantage, Compatibility, Complexity, Perceived Benefits, Top Management Support, Industry Market Scope, External IT Support and Information Intensity hypothesis in relation to the organization's adoption of the ERP system. On the other hand the study also revealed that there was no significant relationship among Organization readiness, ICT experience, Firm Size and Competitive Pressure hypotheses in relation to the organization's adoption of the ERP system

KEY WORDS: ERP /ERP ADOPTION / TOE FRAMEWORK / SMEs ADOPTION OF ERP IN THAILAND

59 pages

การศึกษาและสำรวจด้านเทคโนโลยีและองค์กรสิ่งแวดล้อม ที่มีอิทธิพลต่อการนำระบบ (ERP) มาใช้ในองค์กรธุรกิจ (SMEs) โดยเฉพาะกลุ่มอุตสาหกรรมส่งออกของประเทศไทย

UNDERSTANDING THE ADOPTION OF ENTERPRISE RESOURCE PLANNING (ERP) AMONG SMALL MEDIUM ENTERPRISES (SMEs) IN THAILAND'S EXPORT INDUSTRY

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บทคัดย่อ

การศึกษาครั้งนี้ เป็นการศึกษาและสำรวจด้านเทคโนโลยีและองค์กรสิ่งแวดล้อม ที่มีอิทธิพลต่อการนำระบบ ERP มาใช้ในองค์กรธุรกิจ SME โดยเฉพาะกลุ่มอุตสาหกรรมส่งออกของประเทศไทย โดยระบบ ERP นั้น ได้รับการยกย่องว่าเป็นเทคโนโลยีที่สำคัญ ซึ่งสามารถส่งเสริมให้การดำเนินงานสร้างความได้เปรียบในเชิงกลยุทธ์อย่างมีประสิทธิภาพและศักยภาพสำคัญต่อกลุ่มผู้ประกอบการ SMEs อุตสาหกรรมส่งออกของประเทศไทย ดังนั้นจึงจำเป็นอย่างยิ่งที่ต้องเข้าใจเกี่ยวกับระบบ ERP เพื่อการนำมาใช้ในกลุ่มประกอบการSMEs อุตสาหกรรมส่งออกของประเทศไทยโดยอยู่ในกรอบของฤษฎี TOE การศึกษาครั้งนี้ได้ศึกษาตัวแปรทั้งหมด 12 ตัวแปรที่มีอิทธิพลต่อการใช้ระบบ ERP ผลการศึกษาครั้งนี้พบว่ามีตัวแปรหลายประการที่สำคัญ และเกี่ยวข้องกับปัจจัยของการนำระบบ ERP มาใช้ในอุตสาหกรรมการส่งออก การศึกษาครั้งนี้เป็นการศึกษาในเชิงปริมาณโดยได้ดำเนินการสำรวจกลุ่มตัวอย่างในกลุ่มวิสาหกิจขนาดกลางและขนาดย่อม(SMEs)ในประเทศไทยโดยใช้แบบสอบถามเป็นเครื่องมือในการการรวบรวมข้อมูล ใช้วิธีการสุ่มตัวอย่างจากบุคคลในองค์กร ได้สุ่มตัวอย่างจำนวน 225 ราย(โดยใช้สูตร Yamane) และวิเคราะห์ข้อมูลทางสถิติโดยใช้โปรแกรมสำเร็จรูป SPSS สำหรับการวิจัยทางสังคมศาสตร์ เวอร์ชั่น 19.0 สำหรับ Windows ใช้วิธีการอภิปรายเชิงพรรณนาเพื่อสรุปลักษณะของกลุ่มตัวอย่าง วิเคราะห์ข้อมูลด้วยความถี่ร้อยละ และวิเคราะห์การถดถอยโลจิสติค ซึ่งนำไปใช้ในการทดสอบสมมุติฐาน

ผลการศึกษาพบว่า ความเข้ากันได้ ความซับซ้อน การสนับสนุนจากผู้บริหารระดับสูง ขอบเขตด้านการตลาด และการสนับสนุนด้านไอทีจากภายนอก และความเข้มของข้อมูลมีความสัมพันธ์ในเชิงบวกต่อการนำระบบ ERP มาใช้ขององค์กร เพื่อสร้างความได้เปรียบจากประโยชน์ที่ได้รับจากการเรียนรู้ ในส่วนของ การเตรียมพร้อมในองค์กร ประสบการณ์ด้านเทคโนโลยีสารสนเทศและการสื่อสาร ความกดดันในการแข่งขันและขนาดขององค์กร มีความสัมพันธ์ในเชิงลบต่อการนำระบบ ERP มาใช้ขององค์กร

59 หน้า

CONTENTS

CONTENTS (cont.)

LIST OF TABLES

LIST OF FIGURES

CHAPTER I
INTRODUCTION

In today's dynamic world it has become increasingly important that different departments in organizations share their resources and knowledge amongst each other resulting in greater flexibility and less redundancy. In this way not only it helps in streamlining the work flow but also helps the decision makers to have the systematic overview of the organization when different departments in the organizations share their resources and information. Most of the organizations today have various strategic business units with each business unit having their own targets to meet and resources to share. But such resources and targets are not known or shared with the other strategic business unit. Information flow becomes difficult and time consuming. These are the issues addressed by "Enterprise Resource Planning" (ERP) software solutions providing a common and consistent system to capture information organization-wide, with minimum redundancy. Most of the organizations in today's world implement ERP to improve their strategic performance but as they do not have complete knowledge and better understanding of ERP which results in the failure of achieving these objectives.

In this chapter of the paper, the researcher would like to give the details of the background of the study, the significance of the study, the objectives of the study, the scope of the study, the limitations and the benefits of the study. Small and medium enterprises (SMEs) have always been having issues with resources but to be at par with the technological advancements that is rapidly taking place in today's world they have to rise up and not remain ignorant. Taking this into consideration the researcher would want to explore and understand the adoption of Enterprise Resource Planning, ERP, among the small medium enterprises SMEs in Thailand's export industry. This paper will therefore propose a model to explain the Enterprise Resource Planning technology adoption among SMEs.

1.1 Background of the Study

ERP, Enterprise Resource Planning, are software packages that have different modules which are integrated together to provide information accessible through different strategic business units across the organization. They have modules for human resources department, sales department, accounting department and finance department that are linked and integrated together across the organization. Furthermore, these different modules can be custom made to suit the needs and requirements of the organization. All this put together provides organizations with framework that is more efficient and less time consuming thus improving the working environment. It is important that there is strategic alignment among all the business units to benefit the organization as a whole resulting in the economic success of the company.

The academician and people involved in making policies believe that technology is important for the economic success of the small medium enterprises (SMEs). In Thailand's manufacturing sector we have seen lot of foreign direct investment (FDI), it has thus become important that we have strong SME culture and base to continue to attract the foreign direct investment and support their large presence.

In Thailand, SMEs, Small Medium Enterprises play a significant role in the country's economic development. They constitute a very important and dynamic part of the Thai economy. The characteristics of Small Medium Enterprises (SMEs) are different from large enterprises. According to Seyel and Rahman (2003), the characteristics of SMEs include small management teams, strong owner influence, lack of staff in specialized areas like information technology (IT), multifunctional management, limited control over their business environment, limited market share, low employee turnover, a reluctance to take risks and avoidance of sophisticated software or applications. Due to these differences SMEs have a slower technology adoption rate and more difficulties realizing the technology's benefits than large enterprises. (Poon and Swatman, 1999).

1.2 Statement of the Problem

This paper aims to explore the understanding of the adoption of Enterprise Resource Planning (ERP) among Small Medium Enterprises (SMEs) in Thailand's export industry. In today's ever competing world and the changes that are taking place rapidly, the organizations have the uphill task to improve the customer service, reduce redundancy, provide the best solution to the customers and at the same time improve their productivity. It has become important for businesses to understand the ERP system such that it matches their way of doing business before they start the implementation of the entire system. The most common reason that companies abandon multi million baht ERP projects is that they find out that the ERP systems is not matching with their ways of doing business and that it is also not linking information across their strategic business unit. Their important business processes is not being addressed.

1.3 Significance of the Study

Organization invests huge sums and resources on the information systems as they understand the value that this would create and help in their business processes. The increase in strategic value of the firm can only come with the efficiencies across different departments whether it is in their operations, in their human resources department, in the accounting department or in their customer service and deliveries. Firms need to implement proper planning process such that their strategic value is enhanced and the consequences are what they want and not what they do not desire.

This research would be helpful for other researchers that will explore further or expand to the related task in this field. It can be observed that how the adoption of the enterprise resource planning, ERP, and its understanding relevant to their industry, not only in the export industry but other industries as well would benefit their workforce thereby benefiting the country as a whole.

1.4 Objectives of the Study

The concerns that have been addressed in the research background make it interesting to propose the study with the following objectives which are as follows:

- To study the extent of technology adoption of ERP among SME's in Thailand's export industry.
- To investigate factors that encourage as well as those that remains barriers to ERP adoption.
- To improve the understanding of how the technology-organization-environment framework can increase the degree of attitude of ERP users toward the ERP system.

1.5 Scope of the Study

This research adopts the quantitative approach. Questionnaires would be filled out from SMEs and used for the purpose of analysis. Survey respondents would represent different group of export industries, including manufacturing, traders, IT and telecommunications. While questionnaires from the top level management represent the viewpoints of the owner or employer; those from the middle of high level management and operational level reflect on the perspective of employees working in the companies. The researcher attempts to study the adoption of ERP in their businesses.

1.6 Limitations of the Study

The limitations of the study consist of both time and budget constraints. The paper analyses only Small Medium Enterprises (SMEs) in Thailand. Another important limitation is the difficulty to interview the stakeholders of the companies as the companies regards this as the secret to their businesses and would not want to reveal the data pertaining to their stakeholders, though it could have provided a more holistic picture of the study.

Nevertheless, the body of knowledge gained from the study is intended to support future academic work and provide real business applications in relation to the adoption of ERP among SMEs in Thailand's export industry for further consideration. The cross-sectional nature of this paper does not allow knowing how the relationship among the hypothesis will change overtime.

1.7 Benefits of the Study

The researcher hopes that this research will benefit academics, practitioners and professional knowledge as a whole. This academic work could be used as an example for future academic research in related topics or as a base model for the future development for other researchers. The benefit of the research to practitioners would be as recommendations or solutions for the Small Medium Enterprises (SMEs) and the ability to translate the emerging economic opportunities into reality.

CHAPTER II
LITERATURE REVIEW

The literature review in this research explores the concepts and theories relating to the Enterprise Resource Planning (ERP) and Small Medium Enterprises (SMEs) in Thailand. The conceptual model that is used in the study will be presented towards the end of this chapter.

2.1 Definition of Enterprise Resource Planning (ERP)

The term Enterprise Resource Planning is originally coined in 1990 by The Gartner Group to describe the next generation of MRP II software. Historically, ERP evolved from material requirement planning (MRP) and manufacturing resource planning MRP II systems of the 1970s and the 1980s, respectively. (Akkermans HA, Bogerd P, Yucasen E, 2003). MRP and MRP II systems were designed to systematically link different aspects of process information within specific business context such as manufacturing (Jacobs FR, Bendoly E, 2003). In different literatures, different authors have defined ERP in a different way, for example according to Jacobs and Bendoly (Jacobs FR, Bendoly E, 2003); ERP can be defined as a concept and as a system.

Its conceptual definition involves the integration of business processes within an organization, with improved order management and control, accurate information on inventory, improved work flow, and supply chain management, and better standardization of business and best practices. ERP as a system is about technological capability required to turn the ERP concept into reality. ERP systems should not be a mere technological artifact; it is a core platform designed to support and levels the capabilities of the tools and processes used by organization (Jacobs FR, Bendoly E, 2003). ERP system is the technological manifestation of the ERP concept, its benefits, capabilities, goals and strategic value.

Akkermanns et al. (Akkermans HA, Bogerd P, Yucasen E, 2003) also state that ERP can be defined from different perspectives such as functional, technical, or from business perspective that provides strategic value encompassing the entire organizations.

Tarantilis et al (Tarantilis CD, Kiranoudis CT, Theodorakopoulos ND, 2008) define ERP as a system that integrates traditional accounting, manufacturing, sales, management, and other management products to offer an “all in one” solution that deals with all business management aspects of organizations.

2.2 Contribution of ERP to strategic value creation

In today’s dynamic economy, continuously generating new knowledge combined with operational efficiency and effective delivery mechanisms increase the strategic value of the firm. (Basu C, Palvia P, 1999) (Gobeli DH, Koeing HF, Mirsha CS, 2002) (Prahalad CK, Krishnan MS , 2008).

As shown in Figure 1, a firm must have the three fundamental value generators (drivers) in place that are critical to a firm to create sustainable strategic value. The combination of new knowledge creation with at least one of the two other value generators is fundamental to a firms sustainable competitiveness. These matched the two stage value creation that is suggested and described by Gobeli et al. (Gobeli DH, Koeing HF, Mirsha CS, 2002) to create sustainable firm value.

Figure 1 also shows that ERP system, if planned, deployed and implemented properly, acts as a value enhancer that empowers all these three value generators (process and operational efficiencies, information delivery and new knowledge creation activities) that in turn contribute to the strategic value creation in a firm (C, Fichtenbauer, 1999) , (Fung VK, Fung WK, Wind YJ, 2008).

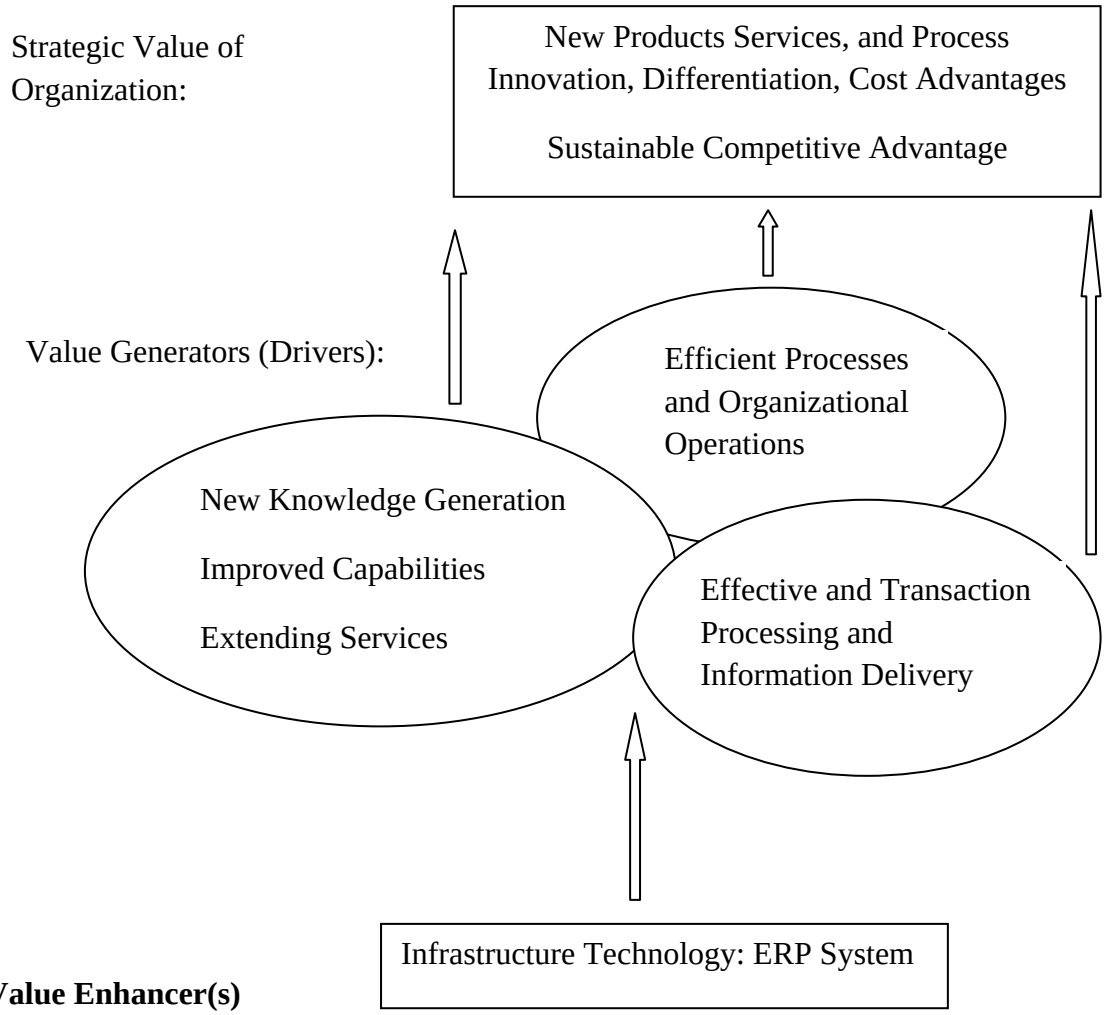

Figure 2.1: The contribution of ERP system to strategic value creation.

Source: (Eslam Nazemi, Mahommd Zafar Tarokh, G. Raja Djavanshir, 25 February 2012)

Similar to planning of any information systems, in planning to acquire ERP systems, a firm should address many questions:

- Why does it need ERP system?
- How does the ERP system contribute to organizational efficiency?
- How long will its implementation take and when is the break -even point?
- How much does it really cost and what are its hidden costs?

- How do a firm's emerging business activities, such as e-commerce, benefit from ERP system?

2.3 ERP Adoption

The literature review in this phase focused on how some types of organizations adopted ERP systems and the associated requirements, risks, costs and benefits. One study is centered in the modeling of organizational culture before selecting and installing an ERP system. Some insights for researchers that want to research are proposed by Oliver and Romm (Oliver D, Romm C, 1999).

Fichman (Fichman RG, 2004) in his seminal research provide a model based on real options that can be used in making decision on ERP adoption. He states that making decisions when uncertainty about the taking the full benefit of the system and irreversibility in the cost and the risk of its implementation are high and complicated. Therefore he has developed a model using concepts from real options to make decisions about the investment and adoption of ERP in a new system.

Iansiti and Levien (Iansiti M, Levien R, 2004) state that ERP success in an organization depends on understanding its eco systems and the organization's role in it. They suggest that an ERP's success depends on understanding of the importance and benefits of a company's ERP systems with its business partner's enterprise systems. Therefore, company's ERP adoption process is influenced by the complex interdependencies among them.

Porter (M, 2001) warns against the cases in which IT works against business strategy. He describes some cases in that: "Package software applications were hard to customize, the companies were often forced to change the way they conducted activities in order to conform to "best practices" embedded in the software. It was also extremely difficult to connect discrete applications to one another. Enterprise Resource Planning (ERP) systems linked activities, but again companies were forced to adapt their ways of doing things to the software."

Ross and Weill (Ross JW, Weill P, 2002) emphasize the fact that making decisions on adoption new technologies such as ERP is a "business-not just technological challenge". They suggest the importance of senior manager's active

involvements in making key technology decisions. Otherwise, when the IT department in an organization is left alone in making decisions on ERP and other technologies adoptions disasters may occur.

Oliver and Romm (Oliver D, Romm C, 1999) discusses the need of further research into the planning phase of the adoption process and outline some of the principles that should form the basis of empirical research in this area.

Rugg and Krumbholz (Rugg G, Krumbholz M, 1999) stress the importance of correctly modeling the organizational culture before selecting and installing a system. They describe a model of culture, which can be applied to ERP context and describes a framework to select an elicitation technique for modeling organizational culture.

2.4 The technology-organization-environment framework

Tornatzky and Fleischer (L.G. Tornatzky, M, 1990) proposed the technology-organization-environment (TOE) framework to study the adoption of technological innovations. They argue that the decision to adopt a technological innovation is based on factors in the organization and the environmental contexts, as well as the characteristics of the technology itself. This framework thus envisions a threefold context for adoption and implementation of technological innovations: technological context, organizational context, and environmental context.

The technological context refers to the technologies relevant to the firm. This includes the existing technologies, as well as the emerging technologies relevant to the firm. Many characteristics of the technology can influence its adoption. The organizational context describes the characteristics of the organization. Common organizational techniques include firm size, degree of centralization, formalization, complexity of its managerial structure, the quality of its human resources and the amount of slack resources available internally (L.G. Tornatzky, M, 1990), (P.Y.K. Chau, K.Y Tam, 1997). Organization characteristics can also constrain or facilitate the adoption and implementation of technological innovations. The environmental context is the arena in which the organization conducts its business. This includes the industry and dealings with business partners, competitors and government (L.G. Tornatzky, M,

1990). They are factors external to an organization that can present constraints and opportunities for technological innovations.

The Rogers theory of innovation diffusion (Rogers, 1983) is the most widely applied theories in the prediction of organizational level technology adoption. Rogers identified five technological characteristics as antecedents to any adoption decision: relative advantage, compatibility, complexity, trialability and observability. In addition, he also emphasized three groups of adoption predictors: leader characteristics, internal characteristics of the organization and external characteristics of the organization. The leader characteristic can be viewed as a specific internal organizational property (K. Zhu, K.L. Kraemer, S. Xu, 2003).

Furthermore, findings from innovation adoption research are consistent with the TOE framework. (R.B. Cooper, R.W. Zmud, 1990), (C.L. Lacovou, I Benbasat, A. Dexter, 1995), (Thong, 1999). For example Lacovou et al. found that three major determinants influenced EDI adoption in the small business context. (C.L. Lacovou, I Benbasat, A. Dexter, 1995). These determinants are organizational readiness, external pressure and perceived benefits. The organizational readiness belongs to the organizational context in the TOE framework, while the external pressure is the factor in the environmental context in the TOE framework. The idea of perceived benefits refers to the level of recognition of the relative advantage than an EDI technology can provide to the organization. Therefore, the concept of perceived benefits is part of the technical context in the TOE framework.

The TOE framework has consistent empirical supports and has been found useful in understanding the adoption of technological innovations (P.Y.K. Chau, K.Y Tam, 1997), (K. Zhu, K.L. Kraemer, S Xu, 2006). Table 1.1 provides the summary of the relevant studies based on the TOE framework. The TOE framework can be used to study the organizational adoption of the general IT innovation as well as specific IT innovation such as EDI. (K.K.Y. Kuan, P.Y.K. Chau, 2001)

2.5 Previous studies using the TOE framework in investigation of the adoption of technological innovations

Table 1.1: Previous studies using the TOE framework in investigation of the technological innovations

Study	Innovation	Determinants
Zhu et al. (K. Zhu, K.L. Kraemer, S Xu, 2006)	E-Business	Technology : Technology readiness, Technology Integration Organization: Firm Size, Global Scope, Managerial Obstacles Environment: Competitive Intensity, Regulatory Environment
Zhu et al. (K. Zhu, S. Dong, S.X. Zhu, K.L. Kraemer, 2006)	E-Business	Technology : Relative Advantage, Compatibility, Costs and Security Concerns Organization: Technology, Competence, Organizational Size Environment: Competitive Intensity, Partner Readiness
Zhu et al. (K. Zhu, K.L. Kraemer, S. Xu, 2003)	E-Business	Technology : Technology Competence Organization: Firm Scope, Firm Size Environment: Consumer Readiness, Competitive Pressure, Lack of Trading Partner readiness
Chau and Tam (P.Y.K. Chau, K.Y Tam, 1997)	Open System	Technology : Perceived Benefits, Perceived Barriers, Perceived importance of compliance to standards, Interoperability, Interconnectivity Organization: Complexity of IT infrastructure, Satisfaction with existing systems, Formalization on system development and management Environment: Market uncertainty

Table 1.1: Previous studies using the TOE framework in investigation of the technological innovations (cont.)

Study	Innovation	Determinants
Gibbs and Kraemer (J.L. Gibbs, K.L. Kraemer, 2004)	E. Business	Technology : Technology Resources Organization: Perceived Benefits, Lack of organizational Capability, Financial Resources, Firm Size Environment: External Pressure, Government Promotion, Legislation Barriers
Hong and Zhu (W. Hong, K. Zhu, 2006)		Technology : Technology Integration, Web Functionalities, EDI Use Organization: Web Spending, Perceived Obstacles Environment: Partner Usage
Kuan and Chau (K.K.Y. Kuan, P.Y.K. Chau, 2001)	EDI	Technology : Perceived Direct Benefits, Perceived Indirect Benefits Organization: Perceived Financial Cost, Perceived technical competence Environment: Perceived Industry Pressure, Perceived Government Pressure
Zhang et al (C. Zhang, L. Cui, L. Huang, C. Zhang, 2007)		Technology : IT infrastructure Organization: IT Management Environment: E-Government, Government Regulation and promotion
Xu et al (S. Xu, K. Zhu, J. Gibbs, 2004)	Internet	Technology: Technology, Competence Organization: Firm Size, Global Scope, Enterprise Integration, Environment: Competition Intensity, Regulatory Environment

Source: Developed for this study

Drawing upon the empirical evidence, combined with literature review and theoretical perspectives discussed earlier, I argue that TOE framework is an appropriate foundation for studying Enterprise Resource Planning (ERP) adoption among Small Medium Enterprises (SMEs) in Thailand's export industry.

Despite there are diverse factors affecting ERP adoption, all these factors can be classified either as technological, organizational or environmental contexts. Therefore, it is feasible to utilize the TOE framework to explore the ERP adoption issue.

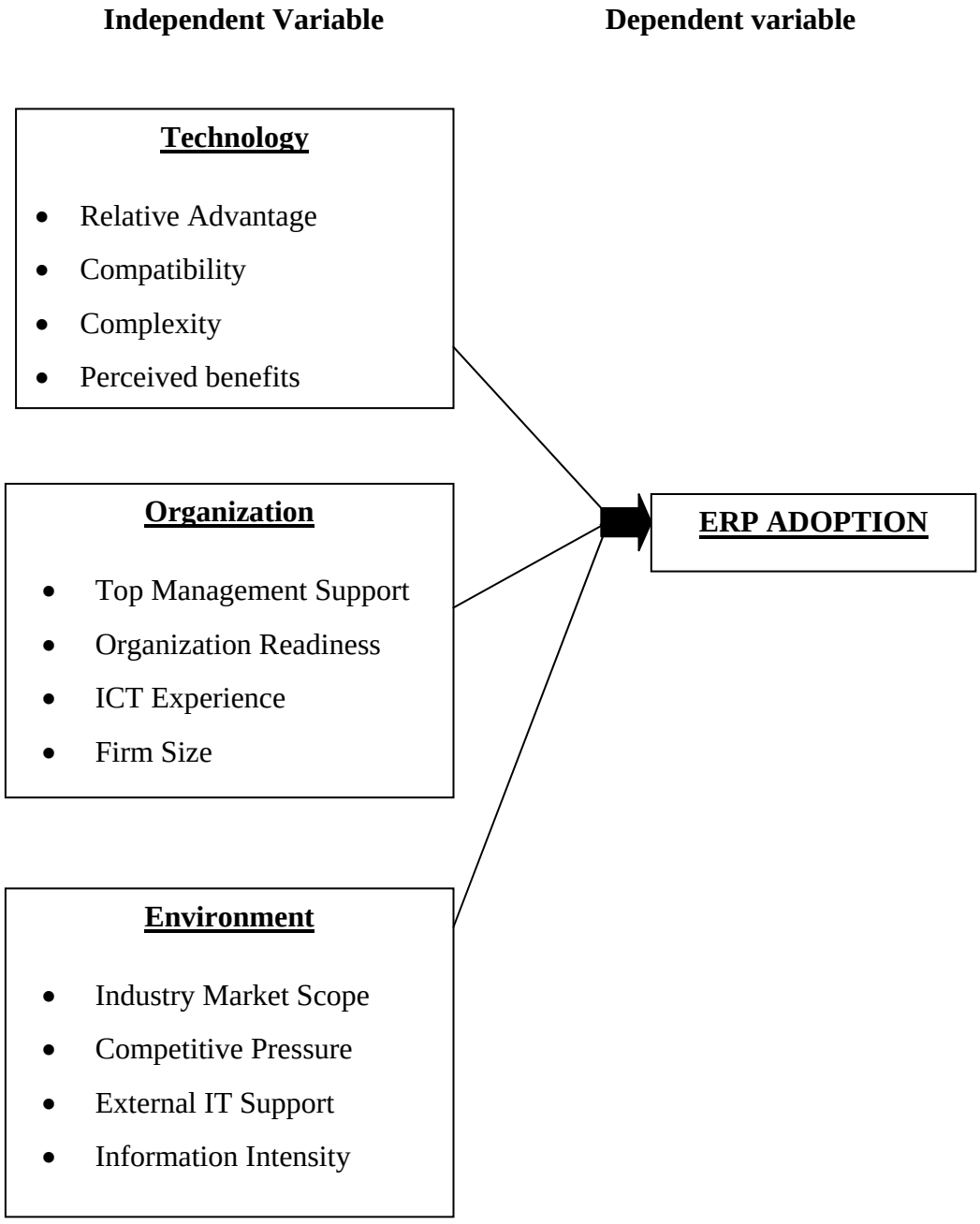

Figure 2.2: The Conceptual Framework of the understanding of the adoption of ERP among SMEs in Thailand's export industry

2.6 Hypothesis Development

In the literature review many factors have been found and therefore I choose to focus on a few factors instead of repeating them. In my view these factors are strategically important in explaining and understanding the adoption of ERP. The research model is proposed as shown in Figure 2.2. It is desirable to use ERP adoption as dependent variable in our study since it adequately captures whether SMEs have adopted ERP technology. The model consists of 12 variables that are hypothesized to have a direct effect of firm adoption of ERP technology

Hypothesis 1: Technology Context

Five technological characteristics have been identified by Rogers as antecedents to any adoption decision: relative advantage, compatibility, complexity, triability and observability (Rogers, 1983). Many studies, including the meta analysis of 75 diffusion articles conducted by Tornatzky and Klein (L.G. Tornatzky, K.J. Klein, 1982) found that only relative advantage, compatibility and complexity are consistently related to innovation adoption. Grover (V. Grover, 2007) and Lee and Kim (S. Lee, K. Kim, 2007) directly excluded the triability and observability constructs in their research models. Chau and Tam (P.Y.K. Chau, K.Y Tam, 1997) studied open system and stated that firms clearly see perceived benefits where technology is concerned. Zhu et al (K. Zhu, S. Dong, S.X. Zhu, K.L. Kraemer, 2006) stated relative advantage as one of the determinants in the technology context. Therefore four technology characteristics – Relative Advantage, Compatibility, Complexity and Perceived Benefits, – are included in the model.

H 1.1: Relative Advantage

Relative Advantage is defined as the degree to which an innovation is perceived as providing greater organizational benefits than the idea it supersedes or the status quo. (Rogers, 1983). When ICT is perceived to offer relative advantage over the firm's current practices, it is more likely to be adopted ((Lee J., 2004). In the previous studies it has been found that this variable is positively related to ICT adoption. In the context of this study I propose the following hypotheses**:**

Relative Advantage will have positive relation to firms adopting ERP.

H 1.2: Compatibility

Compatibility of an innovation is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters" (E.M. Rogers, 2003). High compatibility has been identified as a facilitator for innovation adoption. (R.B. Cooper, R.W. Zmud, 1990). The adoption of new technologies can bring significant changes to the work practices of businesses and resistance to change is normal organizational reaction (Premkumar G, M. Roberts, 1999). The values and beliefs of the organization should be compatible with the changes that the organization tends to go through. Moreover the changes should also take into consideration the infrastructure of the organizations. In the context of this study I propose the following hypotheses**:**

Compatibility will have positive relation to firms adopting ERP.

H 1.3: Complexity

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use. (E.M. Rogers, 2003). The complexity of the technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar G, M. Roberts, 1999). Although this factor has been found to be negatively associated with organizational adoption of ICT ((R.B. Cooper, R.W. Zmud, 1990), it has also been found to be an important determinant of ERP by SMEs. In the context of this study I propose the following hypotheses**:**

Complexity will have negative relation to firms adopting ERP.

H 1.4: Perceived Benefits

Perceived benefits refer to the anticipated advantages that ERP adoption can provide to the organization. Better managerial understanding of the relative advantage of an innovation increases the likelihood of the allocation of the managerial, financial and technological necessary to use that innovation. (E.M. Rogers, 2003) (C.L. Lacovou, I Benbasat, A. Dexter, 1995). Earlier studies argue that firms using e-business may obtain benefits such as sales increase, new market penetration and cost reduction (K. Zhu, S. Dong, S.X. Zhu, K.L. Kraemer, 2006). If the adoption of the

new innovation makes firms see more benefits that it previously has will make them more comfortable in adopting that innovation. In the context of this study I propose the following hypotheses**:**

Perceived benefits will have positive relation to firms adopting ERP.

Hypothesis 2: Organization Context

This context can be claimed to have impact on SMEs adoption of ERP. There are many studies that focus on the factors pertaining to the organizational context seems to be the primary focus of many studies in SMEs (G., 2003). Top management support, ICT experience, organization readiness and Firm Size are considered to be organizational factors that influence ERP adoption by SMEs.

H 2.1: Top Management Support

Top management support is an important factor in the adoption of new technologies and has been found to be positively related to adoption. (V. Grover, 2007). Top management can provide vision, support and a commitment to create a positive environment for innovation. (S. Lee, K. Kim, 2007). Accordingly the above hypothesis is proposed. The support from the top management is important in SMEs as the main decisions are usually taken by them. It is thus important that there is top management support when any new innovation adoption is being addressed in the firm. In the context of this study I propose the following hypotheses**:**

Top Management Support will have positive relation to firms adopting ERP.

H 2.2: Organization Readiness

Organizational readiness is defined as the availability of the needed organizational resources for adoption (Iacovou C.L., Benbasat I, Dexter A.S., 1995). Organizational readiness, as used in previous research on EDI adoption, measures whether a firm has sufficient ICT sophistication and financial resources (Iacovou C.L., Benbasat I, Dexter A.S., 1995). Indeed economic costs and lack of technical knowledge are identified as two of the most important factors that hinder ICT growth in small firms. (Cragg P.B., King M., 1993). ICT sophistication assesses whether a

firm is technologically ready, while financial resources express an organization's capital available to invest in ICT (Chwelos P., Benbasat , Dexter, A.S., 2001). In the context of this study I propose the following hypotheses**:**

Organization readiness will have positive relation to firms adopting ERP.

H 2.3: ICT Experience

ICT experience will determine if a firm is moving away from adopting a new technology because of its limited experience with ICT. Previous studies have found that prior ICT experience influences organizational adoption of new technologies (K.K.Y. Kuan, P.Y.K. Chau, 2001) . (Dholakia R.R., Kshetri N., 2002) suggested that technologies already existing in an organization influence the future adoption of a new technology. They argue that the incremental cost and knowledge required to adopt the Internet, for example, will be much smaller if a firm already owns a computer and a telephone line. This variable has been included in the research model to test whether different categories of firms: SMEs with low-end ICT use, medium-level ICT users, and high-end ICT users (Suthern A., Tilley F., 2000) differ in their adoption of ERP. In the context of this study I propose the following hypotheses**:**

Higher the level of ICT users will have positive relation to forms adopting ERP.

H 2.4: Firm Size

Size has been identified by (Jeyaraj A., Rottmann J.W., Lacity M.C., 2006) as one of the best predictors of organizational adoption of ICT. The typical argument is that larger firms have a greater need, resources, skills and experience and the ability to survive failures than smaller firms (Levenburg, N., Magal, S. R. and Kosalge, P, 2006). Thus, it can be argued that larger SMEs are more likely to adopt ERP. In the context of this study I propose the following hypotheses**:**

Firm Size will have positive relation to firms adopting ERP.

Hypothesis 3: Environmental Context

This context can be claimed to have a high impact on SMEs' adoption of ERP. Industry market scope, competitive pressure, external IT support and Information Intensity are considered to be environmental factors that influence ERP adoption by SMEs.

Industry in which the firm operates has been argued to influence the adoption of ICT (Levenburg, N., Magal, S. R. and Kosalge, P, 2006). Service industries, which rely on the processing of information, depend on ICT (Goode, S. and Stevens, K, 2000). Retail industries, which rely on the transfer of goods, may have a greater dependence on point-of-sale systems (Premkumar, G. and King, W. R., 1994). Manufacturing industry rely more on ERP systems. (Fallon, M., and Moran, P., 2000) showed that ICT usage varies not only across sectors (i.e. across Standard Industrial Classification) but also within constituent sub-sectors.

H 3.1: Industry Market Scope

Industry market scope refers to the market area that a firm chooses to operate in from local to international markets. Working on a wider market area introduces a high level of complexity in dealing with legal and cultural issues (Davenport, 1998). As companies become more global and develop international supply chains, the limitation of MRP have become more apparent (Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D. and Tagliavini, M., 2005). Firms tend to expand their ICT infrastructure beyond their organizational boundaries through the development of inter-organizational business systems. In the context of this study I propose the following hypotheses**:**

Industry Market Scope will have positive relation to firms adopting ERP.

H 3.2: Competitive Pressure

Competitive pressure has been identified by (Jeyaraj A., Rottmann J.W., Lacity M.C., 2006) as one of the best predictors of organizational adoption of ICT. Competition in the adopter's industry is generally perceived to positively influence the adoption of ICT (Gatignon, H. and Robertson, T. S., 1989). This is argued to be even

more evident if the innovation directly affects the competition. (K.K.Y. Kuan, P.Y.K. Chau, 2001), (Premkumar G, M. Roberts, 1999) claim that it can become a strategic necessity to adopt the new technologies to compete in the marketplace.

Competitive Pressure will have positive relation to firms adopting ERP.

H 3.3: External IT Support

External IT support refers to the availability of support for implementing and using IT (Premkumar G, M. Roberts, 1999). This factor has not only been found to be an important determinant of ICT success (Delone, 1988), (Raymond, 1985) but also to be positively related to organizational adoption of IT (Premkumar G, M. Roberts, 1999). With the popularity of outsourcing and the growth of third-party's support, firms are more willing to adopt new IT if they feel there is adequate third-party's support (Premkumar G, M. Roberts, 1999). In the context of this study I propose the following hypotheses**:**

External IT support will have positive relation to firms adopting ERP.

H 3.4: Information Intensity

Information Intensity refers to the degree to which information is present in the product or service (Thong, 1999). Information-intensive products are generally more complicated to order or use and they require more accompanying information. Such products can benefit from the strategic use of IT (M. Poeter, V. Miller, 1985). Firms with more information intensive environments are more likely to adopt new IT than those in less information intensive environments. (Yap, 1990). In the context of this study I propose the following hypotheses**:**

Information Intensity will have positive relation to firms adopting ERP.

In order to summarize I would like to propose that under the technological context, relative advantage, compatibility and perceived benefits will have positive effect on ERP adoption, whereas complexity will have negative effect on ERP adoption.

In organizational context, top management support, organization readiness, ICT experience, firm size and higher the level of ICT users and will have positive effect on ERP adoption.

In environmental context, industry market scope, competitive pressure, external IT support and information intensity will have positive effect on ERP adoption.

CHAPTER III
RESEARCH METHODOLOGY

This chapter outlines the method employed to collect the data and that is used for the research analysis. Based on the previous study, the conceptual model, research objectives and hypothesis are then developed. Chapter III details in the methodology which this paper applies to address the research objectives and verifies the related hypothesis. This chapter is structured into four sections: (I) Unit of Analysis and Target Population (II) Sample Plan (III) Survey Instrument (IV) Data Analysis.

3.1 Unit of Analysis and Target Population

For understanding the adoption of Enterprise Resource Planning (ERP) among small medium enterprises (SMEs) in Thailand's export industry we will target owners/managers of SME's in exporting business throughout Thailand. There have been different criteria that have been used to determine the small medium enterprises. In this study the number of employees will be the principal criteria since other categorizations such as those involving revenue and/or capital can frequently result in misleading classifications of organizations. The number of employees considered in small medium enterprises varies according to the agency providing the definition. (Harrison D, Mykytyn P., Riemenschneider C., 1997) as well as (Iacovou C.L., Benbasat I, Dexter A.S., 1995) utilized a cut off of 200 employees to make comparisons with prior studies involving IT and small businesses. For the purpose of this study, we used the definition suggested for SMEs in Thailand provided by the APEC Center for Technology Exchange and Training for Small and Medium Enterprises (less than 500 employees).

Due to the limitation of the time and resources, the scope of the analysis will specifically pertain to only the small medium enterprises based in Thailand and are in export business.

3.2 Sample Plan

In this research, we will use single cross-sectional design where one sample of a respondent is drawn from the target population and information is obtained from this sample only once. This design is also called sample survey research design.

3.2.1 Defining the Target Population

The targeted population primarily consists of small and medium enterprises in Thailand's export industry. The subject is based only in Thailand and derived from the Directory of Thai National Shippers Council, 2014-2015. The target respondents are the top and middle level management personnel of the companies. Data for my study will be collected using a questionnaire survey administered in Thailand.

3.2.2 Sampling Procedures

Convenience sampling will be used. This research takes Yamane (Yamane, 1967) formula in determining the appropriate sample size which this study uses the number of SMEs in Thailand. The targeted population primarily consists of about 2,460 companies listed in the Thai National Shipper's Council Directory, Edition 2014-2015 so the targeted population of the study is set to cover such majority.

Formula: $\boldsymbol{n} = \frac{\boldsymbol{N}}{\boldsymbol{1+(N\times e^2)}}$,

Where n = Sample size, N = Population and e = Significant Level

The Thai National Shipper's Council Directory, Edition 2014-2015 indicated that there were about 2,460 companies. The total sample size for this study should be;

$$n = \frac{2460}{1 + (2{,}460)(0.05)^2}$$

$$n = 344.05 \approx 345$$

With the population of about 2,460 and 5% degree of significant level, the optimal sampling size for quantitative research is therefore calculated as where 345 is the sampling size that need to be searched to meet the required number of questionnaire.

3.3 Survey Instrument

Quantitative research is applied in this research. The questionnaire will be developed for collecting empirical measures of ERP adoption in SMEs in Thailand's export industry. All items of factors will be measured on a seven-point Likert scale, ranging from 'strongly disagree' to 'strongly agree' taken from relevant prior research and adapted to relate to the context of ERP adoption.

3.3.1 Validity

A typical definition of validity could be that a test is valid for anything with which it correlates. Validity refers to the degree of a measure which is associated with other measures in a manner that is consistent with theoretically based concepts or an ability of the measurement instrument to measure a concept or construct. A validity assessment applicable to this research is construct validity. Construct validity was an indirect method of validation to be used when no criterion variable or content domain can indicate the degree to which a test measures what it is intended to measure. Malhotra in year 1981 recommends that the scale items, whether or not they cover the entire domain of the construct being measured, have to be assessed by the researchers or someone else. In other words, the scale items should be reviewed by experts and the pool of items for each construct should be corrected through a pre-test in the early

stage of research. The construct validity in the present study will be ensured, since all of the scales employed were borrowed from the existing or established scales which have been subject to tests of construct validity. (Cavana, 2001)

3.3.2 Reliability Analysis

Reliability is when a particular technique always yields the same result, when applied repeatedly to the same object. In the research context, reliability is defined as the extent to which measurements of a test are repeatable. That is, the measurement procedure should give the same outcome on repeated tests. The higher the reliability of measurement procedure, the more consistent the results provided by repeated measurements. The higher value of α toward 1 means the greater of the measurement reliability. It is recommended that a coefficient alpha of 0.70 or higher is desirable whilst a coefficient of less than 0.60 is considered as unreliable. (Cavana, 2001)

Cronbach's α coefficient alphas of each construct are used to measure the reliability. As shown in Table 3.1, all coefficients for the constructs in this study are higher than the threshold value of 0.7

Table 3.1: Reliability of scales

Constructs	Number of Items	Cronbach's α coefficient
Factor I (Technology) • Relative Advantage (Ra- item 1-3) • Compatibility (CM - item 4-7) • Complexity (CX -item 8-10) • Perceived benefits (BP-item 11-14) • Top Management Support (TM-item 15-18)	22	0.98

Table 3.1: Reliability of scales (cont.)

Constructs	**Number of Items**	**Cronbach's α coefficient**
• Industry Market Scope (IM - item 28,30) • External IT Support (ET-item 34) Information Intensity (II –item36) **Factor II (Organization)** ▪ Organization Readiness (OR-item 19-22) ▪ ICT Experience (IE –item 23-25) ▪ Firm Size (FS – item 26-28) • Competitive Pressure (CP-item31)	11	0.96
Factor III (Environment) • Industry Market Scope (IM - item 29) • Competitive Pressure (CP-item32) • External IT Support (ET-item 33) • Information Intensity (II –item37 -38)	5	0.91

Source: Developed for this study

3.4 Data Analysis

The Statistical Product and Service Solutions (SPSS), it is well known as professional statistical software with widely applications in many fields, such as market research, scientific research and education, etc. (Hongming Chen, 2012).

In this research, the tool used for data analysis is Statistical Package for the Social Sciences (SPSS) version 19.0 for Windows. Descriptive statistical analysis will be applied to summarize the characteristic of sample group by using frequency and percentage. Moreover a logistic regression will be applied to test the hypothesis.

CHAPTER IV
RESULT AND DISCUSSION

This chapter presents the results of the data analysis of the understanding of the adoption of the Enterprise Resource Planning (ERP) among small and medium enterprises (SME's) in Thailand's export industry by using the quantitative method.

Data for this study were collected using a questionnaire survey administered in small and medium enterprises in Thailand's export industry. The questionnaire consists of four parts: one for general information that included asking whether the company was the supporter of ERP adoption and another for assessing the twelve variables. Two thousand and thirty two firms of owners and also managers of SME's in the export business throughout Thailand were randomly selected. The study questionnaire was mailed to the two thousand firms and thirty two firms were personally visited to get their manager's response. In total two hundred and thirty six responses were received. Eleven responses were incomplete and could not be taken into further study and analysis. Two hundred and twenty five responses were received and taken in for further data analysis. The response rate was 11.07 %. The analysis methods can be categorized into 2 parts.

Part 1. Descriptive Statistical Analysis

Descriptive analysis is the initial analysis which summarizes the qualification of the target population or information regarding the demographic of the sample.

Part 2. Hypothesis Testing

Hypothesis Testing is the examination process of the conceptual framework by logistic regression method.

Symbols in the Analysis

$\overline{X}$ =Mean of the independent variable (predictor).

SD =Standard Deviation

n = number of sample

β = coefficients used to estimate direction impact of the independent variable to dependent variable.

Sig. = statistical significance

4.1 Descriptive Analysis

The 225 respondents included 128 (56.9%) female and 97 male (43.1%). For the age proportion, most of the respondents were 36-45 years old which comprised 85 of respondents or 37.8% 53 of the respondents were of the age group between 26-35 years or 23.6%. Majority of the respondents had attained Bachelor degree which was 128 respondents or 56.9%. 76 of the respondents have Masters Degree of 33.8%. Only 3 of the total respondents had Doctorate Degree which accounted to 1.3%. Type of Business of the respondents was Chemical Products 15.1%, Agricultural Products 13.8%, Manufacturing 14.2%, Automotive and Parts 10.7%, Consumer Products 14.7%, Gems and Jewellery 12.0%, Food and Beverages 11.6% and others about 8.0%. 56.9% had the average income between 25,001 – 50,000 baht a month. Less than Baht 25,000 per month salary constituted about 18.7% of respondents. 21.3% had income of Baht 50,001 to 100,000 per month. 3.1% of the respondents had salary of more than Baht 100,000 per month. For the drivers for implementing/adopting ERP, respondents 32.4 % indicated customers, 22.7% indicated Competitors, 27.6 % indicated Internal Business Process while others remain at 17.3%. Meanwhile, 42.7 % of the respondents said that initiator of ERP systems should come from Top Management. Finally, respondents 57.8 % decided to support ERP adoption. All details shown in Table 4.1

4.1.1 Result of General Information of Participants

In Table 4.1 the qualification of respondents with sample profile of n=225 is shown.

Table 4.1 Qualification of Respondents, Sample profile (n = 225)

Category	Number	Percentage
Sex		
● Female	128	56.9
● Male	97	43.1
Age		
● 19 – 25 years	16	7.1
● 26 – 35 years	53	23.6
● 36 – 45 years	85	37.8
● Above 45 years	71	31.6
Education		
● High school or equal	18	8.0
● Bachelor Degree	128	56.9
● Master Degree	76	33.8
● Doctorate Degree	3	1.3
Type of Business		
● Agricultural Products	31	13.8
● Manufacturing	32	14.2
● Automotive and Parts	24	10.7
● Chemical Products	34	15.1
● Consumer Products	33	14.7
● Gems and Jewellery	27	12.0
● Food and Beverages	26	11.6
● Others	18	8.0

Table 4.1 Qualification of Respondents, Sample profile (n = 225) (cont.)

Category	Number	Percentage
Income		
● Less than 25,000 baht a month	42	18.7
● 25,001 – 50,000 baht a month	128	56.9
● 50,001 – 100,000 baht a month	48	21.3
● More than 100,000 baht a month	7	3.1
Drivers for implementing/adopting ERP		
● Competitors	51	22.7
● Customers	73	32.4
● Internal Business Process	62	27.6
● Others	39	17.3
Initiator of ERP systems		
● Top Management	96	42.7
● Middle Management	71	31.6
● Employees	58	25.8
Support ERP adoption		
● Yes	130	57.8
● No	95	42.2

Source: Developed for this study

The composite score of the twelve variables were calculated by averaging the original item scores. For the supporters of ERP adoption in the organization the means were between 4.90 and 4.99 points from 7.00 which imply that they mostly agree but for the non-supporters of ERP in the organization , they somewhat disagree (means 2.51 to 2.59).

Table 4.2 Means $(\overline{X})$ and Standard Deviation (SD) of all independent variables

Independent Variables	Sample					
	Support_ERP		Non Support_ERP		All	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Factor I (Technology)	4.99	0.41	2.51	0.50	3.95	1.31
Factor II (Organization)	4.90	0.42	2.59	0.56	3.93	1.24
Factor III(Environment)	4.90	0.55	2.55	0.57	3.90	1.29

Source: Developed for this study

4.2 Hypothesis Testing

Exploratory Factor Analysis was conducted to assess the construct validity of the measurement. The 225 responses were examined using Principal Component analysis as the extraction technique and varimax as the orthogonal rotation method. In order to determine the factor structure, all of the primary factor loadings should be greater than 0.5. In this study, three factors of 38 items were used to predict support ERP.

Cronbach's α coefficient alphas of each construct are used to measure the reliability. As shown in Table 4.3, all coefficients for the constructs in this study are higher than the threshold value of 0.7.

Table 4.3 demonstrates a good match between each factor and related items. The symbols used are abbreviated and details also shown.

Table 4.3 Loadings for Principal Components and Common Factors using Varimax orthogonal rotation

Variables	Factor I	Factor II	Factor III
1. RA1	.74		
2. RA2	.65		
3. RA3	.59		
4. CM4	.74		
5. CM5	.73		
6. CM6	.70		

Table 4.3 Loadings for Principal Components and Common Factors using Varimax orthogonal rotation (cont.)

7. CM7	.68		
8. CX8	.73		
9. CX9	.57		
10. CX10	.63		
11. PB11	.62		
12. PB12	.59		
13. PB13	.76		
14.PB14	.77		
15.TM15	.70		
16. TM16	.53		
17. TM17	.56		
18. TM18	.60		
19. IM28	.56		
20. IM30	.64		
21.ET34	.59		
22.II36	.61		
1. OR19		.69	
2. OR20		.67	
3. OR21		.71	
4. OR22		.70	
5. IE23		.67	
6. IE24		.58	
7. IE25		.62	
8. FS26		.68	
9. FS27		.71	
10. FS28		.76	
11.CP31		.55	
1. IM29			.67
2.CP32			.63
3.ET33			.78
4. II37			.62
5.II38			.64
Cronbach's	**0.98**	**0.96**	**0.91**

Source: Developed for this study

RA: Relative Advantage ; CM: Compatibility; CX: Complexity; PB: Perceived Benefits; TM: Top Management Support; OR: Organization Readiness ; IE: ICT Experience; FS: Firm Size; IM: Industry Market Scope ; CP: Competitive Pressure; ET: External IT Support; II: Information Intensity

Table 4.4 shows the goodness of fit of the logistic regression model. A well – fitting model has a small value for -2LL research model. The -2LL of the null model was 284.227. The -2LL research model that consisted of the three factors (predictors) were 22.223. The chi-square test for the reduction in the -2log likelihood value provided one measure of improvement from the null model to the research model; the chi-square test was significant ($p<0.000$) and the two Pseduo R^2 Z (Cox and Snell $R^2 = 0.717$), Nagelkerke $R^2 = 0.964$) proved satisfactory. Therefore the research mode exhibits a very good fit with the data.

Table 4.4 Goodness of fit of the logistic regression model

	values	Significance
-2LL null model	284.227	
-2LL research model	22 223	
Change in -2LL	262.004	.000
Cox and Snell R Square	.717	
Nagelkerke R Square	0.964	

Source: Developed for this study

Table 4.5 shows how good the research model classified the Support_ERP and non -Support_ERP . The model correct 98.5 % for Support_ERP and 97.9 % for non-Support_ERP, for an overall accuracy rate of 98.2 %. These three accuracy ratios exceed than 90 % levels, ensuring that the prediction model was more accurate than random guessing.

Table 4.5 Classification Table

Observed	Predicted		Percent correct
	Non –Support_ERP	Support_ERP	
Non –Support_ERP	93	2	97.9
Support_ERP	2	128	98.5
Overall Percentage			98.2

Source: Developed for this study

The significance of the regression coefficients (β) of the hypothesized predictors were examined using the Wald statistics to determine support. As Table 4.6 shows, Factor I-Technology was significance at the 0.05 level. However, Factor II Organization and Factor III Environment were found to be non - significance predictors in ERP adoption.

The sign of the regression coefficients (β) represents the positive or negative impact of the independent variable on organization's Support_ERP. Therefore, we may state that Relative Advantage, Compatibility, Complexity, Perceived Benefits, Top Management Support, Industry Market Scope, external IT Support and Information Intensity are positively related to organize ERP adoption but results show that some hypothesis are not supported as shown in Table 4.7

Table 4.6: Results of the logistics regression analysis

Predictors	β	Wald Statistics	Sig.
Factor I (Technology)	**3.257**	**6.935**	**.008***
Factor II (Organization)	1.841	2.074	.150
Factor III (Environment)	0.537	0.362	.547

* $p < .05$

Source: Developed for this study

Table 4.7: Result of Research Hypotheses

Item	Hypothesis	Result
H1.1	Relative Advantage will have positive relation to firms adopting ERP.	Supported
H1.2	Compatibility will have positive relation to firms adopting ERP.	Supported
H1.3	Complexity will have negative relation to firms adopting ERP.	Supported
H1.4	Perceived benefits will have positive relation to firms adopting ERP.	Supported
H2.1	Top Management Support will have positive relation to firms adopting ERP..	Supported
H2.2	Organization readiness will have positive relation to firms adopting ERP.	Not Supported
H2.3	Higher the level of ICT users will have positive relation to firms adopting ERP.	Not Supported
H2.4	Firm Size will have positive relation to firms adopting ERP.	Not Supported
H3.1	Industry Market Scope will have positive relation to firms adopting ERP.	Supported
H3.2	Competitive Pressure will have positive relation to firms adopting ERP.	Not Supported
H3.3	External IT support will have positive relation to firms adopting ERP.	Supported
H3.4	Information Intensity will have positive relation to firms adopting ERP.	Supported

Source: Developed for this study

The following chapter which is the last chapter will provide the summary, discussion for the business and academic perspectives from the result and limitation of the study.

CHAPTER V
CONCLUSION AND RECOMMENDATION

This chapter provides result and summary of the investigation. This chapter begins with the conclusion of the research which has been experimented and developed throughout the course of this study. In proposing a profile of small medium enterprises (SMEs) predisposition to adopt an enterprise resource planning (ERP) system, the present study offers a framework of analysis that can serve ERP vendors and consultants, as well as SME owners-managers, the first to better target their offer of products and services and the second to better position their firm before contemplation the adoption of the Enterprise Resource Planning system. Last but not least, this study recommends the area of future research which constitutes one of the most important parts of the study.

5.1 Conclusion

5.1.1 Objectives of the Study

In light of the concerns addressed in the research background, this study proposes the following objectives to cover an empirical study across two hundred and twenty five, 225, SMEs in Thailand's export industry, which are as follows:

- To study the extent of technology adoption of ERP among SME's in Thailand's export industry.
- To investigate factors that encourage as well as those that remains barriers to ERP adoption.
- To improve the understanding of how the technology-organization-environment framework can increase the degree of attitude of ERP users toward the ERP system.

5.1.2 Subject, material and procedures

The research's subjects are 225 samples of the owners/managers of SME's in exporting business throughout Thailand. The research instruments are distributed to conduct the survey within Thailand. The questionnaires are then collected by convenience sampling during April to June 2015. After that, SPSS is used to analyze raw data

5.1.3 Major findings

Exploratory Factor Analysis was conducted to assess the construct validity of the measurement. The 225 responses were examined using Principal Component analysis as the extraction technique and varimax as the orthogonal rotation method. In order to determine the factor structure, all of the primary factor loadings should be greater than 0.5. In this study, three factors of 38 items were used to predict support ERP.

Cronbach's α coefficient alphas of each construct are used to measure the reliability. All coefficients for the constructs in this study are higher than the threshold value of 0.7. Loadings for principal components and common factors using varimax orthogonal rotation demonstrates a good match between each factor and related items.

The significance of the regression coefficients (β) of the hypothesized predictors was examined using the Wald statistics to determine support. As Table 4.6 shows, Factor I-Technology was significance at the 0.05 level. However, Factor II Organization and Factor III Environment were found to be non - significance predictors in ERP adoption.

The sign of the regression coefficients (β) represents the positive or negative impact of the independent variable on organization's support of the ERP system. Therefore, we may state that Relative Advantage, Compatibility, Complexity, Perceived Benefits, Top Management Support, Industry Market Scope, external IT Support and Information Intensity hypothesis are supported in terms of organizations adoption of the ERP system. Organization readiness, ICT experience, Firm Size and Competitive Pressure hypothesis are not supported.

The two hundred and twenty five (225) respondents included 128 (56.9%) female and 97 male (43.1%). For the age proportion, most of the respondents were 36-

45 years old which comprised 85 of respondents or 37.8% 53 of the respondents were of the age group between 26-35 years or 23.6%. Majority of the respondents had attained Bachelor degree which was 128 respondents or 56.9%. 76 of the respondents have Masters Degree of 33.8%. Only 3 of the total respondents had Doctorate Degree which accounted to 1.3%. Type of Business of the respondents was Chemical Products 15.1%, Agricultural Products 13.8%, Manufacturing 14.2%, Automotive and Parts 10.7%, Consumer Products 14.7%, Gems and Jewellery 12.0%, Food and Beverages 11.6% and others about 8.0%. 56.9% had the average income between 25,001 – 50,000 baht a month. Less than Baht 25,000 per month salary constituted about 18.7% of respondents. 21.3% had income of Baht 50,001 to 100,000 per month. 3.1% of the respondents had salary of more than Baht 100,000 per month. For the drivers for implementing/adopting ERP, respondents 32.4 % indicated customers, 22.7% indicated Competitors, and 27.6 % indicated Internal Business Process while others remain at 17.3%. Meanwhile, 42.7 % of the respondents said that initiator of ERP systems should come from Top Management. Finally 57.8% respondents decided to support ERP adoption.

5.2 Discussion

This study demonstrated the value of using the technological, organizational and environmental (TOE) framework to understand the adoption of the Enterprise Resource Planning (ERP) among small medium enterprises (SMEs) in Thailand's export industry. The discussions about each variable affecting ERP adoption were obtained as follows.

5.2.1 Technology Context

In the technology context all the four hypotheses were supported. ERP adoption would provide firms with greater organizational benefits thereby enabling them to generate new business opportunities and help them make effective decisions. Relative advantage was found to be a factor that is significant to the firms adoption of the ERP system.

Compatibility was found to have positive relation to firm's decision to adopt ERP. If firms existing experiences with information systems are compatible with ERP systems, ERP application match existing information infrastructure and the changes introduced by ERP adoption will be consistent with existing practices. In that case positive impression of ERP adoption is likely to occur and favorably felicitate ERP adoption. Therefore compatibility is positively related to ERP adoption. High compatibility has been identified as a facilitator for innovation adoption. (R.B. Cooper, R.W. Zmud, 1990). The adoption of new technologies can bring significant changes to the work practices of businesses and resistance to change is normal organizational reaction. (Premkumar G, M. Roberts, 1999). Therefore, it is important that the changes are compatible with its infrastructure, values and beliefs.

Complexity was observed to have negative relation on ERP adoption. The difficulty in integrating ERP with the existing systems and business processes contribute to the complexity of the ERP adoption. Therefore the complexity of the ERP implementation is an important barrier to ERP adoption. The complexity of the technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision. (Premkumar G, M. Roberts, 1999).

Perceived benefits is also found to have positive effect on ERP adoption. It is a statistically significant facilitator for ERP adoption. This would result in the increase in the availability of the products or services to the customers and process transactions at a lower cost. This also would help in better access to information.

The findings of this study suggested that firms pay more attention to the potential problems of risks of ERP adoption that is complexity and compatibility and also to the potential competitive advantage of ERP systems that is relative advantage and perceived benefits, in deciding whether or not to adopt the new technology.

5.2.2 Organization Context

Top Management support will have positive relation to firms ERP adoption. This means that managers and policy makers should be aware that organizational readiness is constituted both by physical infrastructures an intangible knowledge such as IT skills. For managers, investments in physical infrastructures and the hiring of employees with IT skills should be made, for current employees training

programs should be promoted. It is recommended that top management should clearly define the business plan and vision so that it can set the direction of ERP project. There should be a justification of the ERP investment and the change should be tied directly to the strategic alignment of the company. Once the business plan and vision are in place, the commitment of top management is recognized as one of the most influential items for ERP adoption.

Unexpectedly the organizational characteristics of firm size, organization readiness, higher the level of ICT users did not have positive effect on ERP adoption. This also reveals that ERP is not phenomenon dominated by large firms, this is especially important for managers that think their firm is too small to benefit from any ERP activities.

5.2.3 Environment Context

Industry market scope, information intensity and external IT support has positive relation to firms ERP adoption. Firms may feel that once there is scope of growth in their industry it will be worth investing in ERP systems. Firms with a broader market scope view ERP adoption as a way to serve their markets more efficiently. The vendors who provide services are indeed an important factor for companies to decide the adoption of ERP in their firm. This is consistent with the previous held notions that firms in more information intensive environments are more likely to adopt ERP than those is less information intensive environments. (Yap, 1990)

Unexpectedly competitive pressure does not have positive effect on ERP adoption. It is not a strategic necessity among Thai SME's to adopt ERP to compete in the marketplace. There product and services play a more important role as far as competition is required.

5.3 Implication

The major contribution of this study is to explore the technological, organizational and environmental factors influencing SME's adoption of ERP among Thailand's export industry. While ERP has been regarded as an important technology that can provide strategic and operational advantages, it has yet to see significant rates

of adoption among SMEs in Thailand's export industry. Hence it is necessary to understand what determines ERP adoption among SMEs in Thailand's export industry. Based on the TOE theoretical framework, this study examined the influence of twelve variables on ERP adoption. The contribution of this study is fourfold.

First the study obtains several key findings and implications about the determinants of ERP adoption in the export industry. These key findings are as follows.

- Whether the firm adopt ERP depends on the firms technological, organizational and environmental contexts.
- Eight variables relative advantage, compatibility, complexity, perceived benefits, top management support, industry market scope external IT support, information intensity hypotheses were supported.
- Four variables organization readiness, higher the level of ICT users, firm size, and competitive pressure hypothesis were not supported.

This study empirically verifies and supports the applicability of the TOE framework in understanding enterprise resource planning (ERP) adoption by small medium enterprises (SMEs) in Thailand's export industry.

5.4 Limitations

The limitations of the study consist of both time and budget constraints. The paper analyses only Small Medium Enterprises (SMEs) in Thailand. Another important limitation is the difficulty to interview the stakeholders of the companies as the companies regards this as the secret to their businesses and would not want to reveal the data pertaining to their stakeholders, though it could have provided a more holistic picture of the study.

Nevertheless, the body of knowledge gained from the study is intended to support future academic work and provide real business applications in relation to the adoption of ERP among SMEs in Thailand's export industry for further consideration. The cross-sectional nature of this paper does not allow knowing how the relationship among the hypothesis will change overtime.

Owing to the study limitation, the result of this study could not be applied or generalized to other products or services or across other industries in Thailand as the researcher only examined Thailand's export industry. Furthermore, time constrains and limited areas are the main restriction on the study. Additionally, the consistency of the result may vary overtime.

5.5 Recommendation for Future Research

Enterprise resource planning systems are large and complex integrated software packages that require large outlays of financial resources from SMEs. Small and medium sized businesses by their very nature lack resources, which effectively raises a barrier to ERP adoption. This study develops measurement to assess the enterprise resource planning, ERP, adoption of small and medium sized enterprises in Thailand's export industry.

The results of the variables effecting ERP adoption show that compatibility, organizational readiness, higher the level of IT users, industry market scope and external IT support has positive effects on ERP adoption while complexity has negative effect on ERP adoption.

Future studies can simultaneously examine a series of dependence relationships. Enterprise resource planning, ERP, studies have focused primarily on transaction processing. The data in enterprise resource planning, ERP systems are likely to provide the platform for supply chain management, customer relationship management, knowledge management, strategic management and decision support systems. They are also called extended enterprise resource planning (EERP). Along with the implementation of the enterprise resource planning, ERP, in small and medium enterprises, SMEs, in Thailand's export industry, studies dealing with the adoption of enterprise resource planning, ERP, in other industries and the adoption of extended enterprise resource planning, EERP's, in small and medium enterprises, SMEs, could be the subjects of future research directions. The proper planning and implementation of ERP is necessary to enhance the strategic value of an organization otherwise it may create unintended consequences.

The researcher also hopes that future studies may also be conducted not only for the adoption of the Enterprise Resource Planning, ERP, among small and medium enterprises, SMEs, in Thailand's export industry but also expands further into different fields involving different innovations which involves big corporations, multinationals not only in Thailand but in Association of South East Asian Nations (ASEAN).

The future research may also focus on the other factors influencing the adoption of various technological innovations. In this paper we have identified twelve hypotheses using the technological, organizational and environmental framework.

The twelve hypothesis are relative advantage, compatibility, complexity, perceived benefits, top management support, organization readiness, higher the level of OCT users, firm size, industry market scope, competitive pressure, external IT support and information intensity.

Future research may focus on various other variables too which may affect businesses and provide them with real business applications in relation to the adoption of other innovations apart from enterprise resource planning. In this vast expanding technological world different innovations and their studies can indeed be a turning point about the ways business is being conducted today.

Owing to study limitation the result of this study could not be applied or generalized to other industries or services across other industries in Thailand as the researcher only examined the small and medium enterprises, SMEs, in Thailand's export industry. This can be expanded further across other industries and services such as hospitality, manufacturing, telecommunications, to name a few.

This research would be helpful for other researchers that will explore further or expand to the related task in this field. It can be observed that how the adoption of the enterprise resource planning, ERP, and its understanding relevant to their industry would benefit their workforce thereby benefiting the country as a whole.

The researcher hopes that this research will benefit academics, practitioners and professional knowledge as a whole. This academic work could be used as an example for future academic research in related topics or as a base model for the future development for other researchers. The benefit of the research to practitioners would be as recommendations or solutions for the Small Medium

Enterprises (SMEs) and the ability to translate the emerging economic opportunities into reality.

REFERENCES

Akkermans HA, Bogerd P, Yucasen E. (2003). The Impact of ERP on supply chain mangement. *Exploratory Findings from a European Delphi Study* , 284-301.

Basu C, Palvia P. (1999). Towards developing a model for global bsuiness process reengineering. *Americas Conference on Information Systems AMCIS.* USA: Milwaukee.

Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D. and Tagliavini, M. (2005). Factors affecting ERP system adoption: A comparative analysis between SMEs and large companies. *Journal of Enterprise Information Management, Vo. 18 No. 4* , 384.

C, Fichtenbauer. (1999). *International Workshop on Enterperise Management Resource and Planning System.* Venice, Italy: EMRPS.

C. Zhang, L. Cui, L. Huang, C. Zhang. (2007). *Exploring the role of government in Information technology diffusion : An Empirircal Study of IT Usage in Shangai Firms.* Boston: Springer.

C.L. Lacovou, I Benbasat, A. Dexter. (1995). Electronic Date Interchange and small organizations: adoption and impact of technology. *Manage Sci.* , 465-485.

Christensen et al. (1987). *Business Policy: Text and Cases.* 6th Edition Homewood, IL: Irwin.

Chwelos P., Benbasat , Dexter, A.S. (2001). Research Report: Empirical test of an EDI adoption model. *Information Systems Research* , 304-321.

Cragg P.B., King M. (1993). MIS Quarterly. *Small Firm Computing: Motivators and Inhibitors* , Vol. 17.

Davenport, T. H. (1998). Davenport, T. H. Putting the enterprise into the enterprise system. *Harvard Business Review, July/August,* , 121-131.

Delone, W. H. (1988). Determinants of success for computer usage in small business. *MIS Quarterly, Vol. 12 No. 1* , 51-61.

Dholakia R.R., Kshetri N. (2002). Factors impacting the adoption of the Internet amoing SMEs. *Business Economics, Vol 23 No. 4* , 311-322.

E.M. Rogers. (2003). *Diffusion of Innovations.* New York: 5th Edition Free Press.

Eslam Nazemi, Mahommd Zafar Tarokh, G. Raja Djavanshir. (25 February 2012). ERP a Literature Survey. *Springer-Verlag LondonLimited 2012* .

Fallon, M., and Moran, P. (2000). Information communication technology (ICT) and manufacturing SMEs Conference Proceedings: The 2000 Small Business and Enterprise Development Conference. *Conference Proceedings: The 2000 Small Business and Enterprise Development Conference,Manchester University*, (pp. 100–109.).

Fichman RG. (2004). Real Options and IT Platform Adoption. *Implementations for Theory and Practice* , 132-154.

Fung VK, Fung WK, Wind YJ. (2008). *Competing in a Flat World, Building Enterprises for a Borderless World.* Upper Saddle River: Wharton School Publishing.

G., P. (2003). A meta-analysis of research on information technology implementation in small business. . *Journal of Organizational Computing and Electronic Commerce Vol. 13 No. 2* , 91-121.

Gatignon, H. and Robertson, T. S. (1989). Technology diffusion: An empirical test for competitive effects. *Journal of Marketing, Vol. 53 No. 1* , 35-49.

Gobeli DH, Koeing HF, Mirsha CS. (2002). *Strategic Value Creation.* Greenwich: McGraw Hill.

Goode, S. and Stevens, K. (2000). An analysis of the business characteristics of adopters and non-adopters of world wide web technology. *Information Technology and Management, Vol. 1 No. 1-2* , 129-154.

H. Mintzberg. (1990). Strategic Formation: Schools of Thought. *J.W. Fredrickson (ed.), Perspectives on Strategic Management* , 105-236.

Harrison D, Mykytyn P., Riemenschneider C. (1997). Executive Decisions about adoption of Information Technology in Small Business. *Information Systems Research, 8, 2* , 171-195.

Helson, M. K. (2011). Wiley.

Hirt G, Swanson E. (1998). Adopting SAP at Siemens Corporation. *Information Conference on Information Systems.* Helsinki, Finland: ICIS.

Iacovou C.L., Benbasat I, Dexter A.S. (1995). Electronic Data Interchange and small organizations: adoption and impact of technology. *MIS Quarterly* , 465-485.

Iansiti M, Levien R. (2004). *Strategy as Ecology.*

J.L. Gibbs, K.L. Kraemer. (2004). A cross country investigation of the determinants of scope of e-commerce use: an institutional approch. *Electron Markets* , 124-137.

Jacobs FR, Bendoly E. (2003). Enterprise Resource Planning. *Developments and Directions for operations management research* , 233-240.

Jeyaraj A., Rottmann J.W., Lacity M.C. (2006). Jeyaraj, A., Rottman, J. W. and Lacity, M. C. (2006), "A review of the predictors, linkages, and biases in IT innovation adoption research", , . *Journal of Information Technology, Vol. 21 No. 1* , pp. 1-23.

K. Zhu, K.L. Kraemer, S Xu. (2006). The process of innovation assimilation by firmsin different countries. *A technlogy diffusion perspective on e business* , 1557-1576.

K. Zhu, K.L. Kraemer, S. Xu. (2003). Electronic Business Adoption by Europena firms. *A cross country assessement of the facilitators and inhibitors* , 251-268.

K. Zhu, S. Dong, S.X. Zhu, K.L. Kraemer. (2006). Innovation Diffusion in global contexts. 601-616.

K.K.Y. Kuan, P.Y.K. Chau. (2001). A perception based model for EDI adoption in small businesses using TOE framework,. *Inform & Manage* , 250-265.

K.K.Y. Kuan, P.Y.K. Chau. (2001). Infomation and Management. *A perception based model for EDI adoption in small business using TOE framework* , 507-521.

Klaus G. Grunert et al. (1992). The Concept of Key Success Factors: Theory and Method. *MAPP working Paper No. 4* .

L.G. Tornatzky, K.J. Klein. (1982). Innovation Characteristics and innovation adoption implementation: a meta analysis of findings. *IEEET* , 28-45.

L.G. Tornatzky, M. (1990). *The process of technological innovation.* Lexington Books.

Levenburg, N., Magal, S. R. and Kosalge, P. (2006). An exploratory investigation of organizational factors and e-business motivations among SMFOEs in the US. *Electronic Markets, Vol. 16 No. 1, pp. 70-84.* , 70-84.

M, P. (2001). *Strategy and the Internet.* Harv Bus Rev 79.

M. Poeter, V. Miller. (1985). How information gives you firmlevel value. *Harvard Business Review* , 149-160.

Marshall/Johston. (2011). *Marketing Management.* McGraw Hill.

Oliver D, Romm C. (1999). Enterprise Resource Planning systems: motivations and expectations., (pp. 119-226). Vanice, Italy.

P.Y.K. Chau, K.Y Tam. (1997). Factors affecting the adoption of open systems. *An exploratory study.* , 1-24.

Prahalad CK, Krishnan MS . (2008). *The New Age of Innovation, Driving Co-Creating value through Global Networks.* New York: McGraw Hill.

Premkumar G, M. Roberts. (1999). Adoption of new information technologies in rural small businesses. *Omega : The international Joournal of Managment Science* , 467-484.

Premkumar, G. and King, W. R. (1994). Organizational characteristics and information systems planning:An empirical study. *Information Systems Research, Vol. 5 No. 2* , 75-109.

R.B. Cooper, R.W. Zmud. (1990). Information Technology Implementation Research, a technological diffusion approach. *Manage Sci.* , 123-139.

Raymond, L. (1985). Organizational characteristics and MIS success in the context of small business. *MIS Quarterly, Vol. 9, No. 1* , 37-52.

Rogers, E. (1983). Diffusion of Innovations. *The Free Press, New York* .

Ross JW, Weill P. (2002). *Six decisions your IT people shouldn't make.* Harv Bus Rev.

Rugg G, Krumbholz M. (1999). Determining culture for effective ERP installation. *International Workshop pn ERP* (pp. 299-310). Venice, Italy: EMPRS.

S. Lee, K. Kim. (2007). Factors affecting the implementation success of Internet based information system. *Comput. Hum. Behav.* , 1853-1880.

S. Xu, K. Zhu, J. Gibbs. (2004). Global Technology, local adoption: a cross country investigation of Internel adoption by companies in the United States and China. *ELectron Markets* , 13-24.

Suhaiza Sailani and Sivabaln Sasthrivyar. (2011). Investigation on the Six Sigma Critical Success Factors. *European Journal of Scientific Research* , 124-132.

Suthern A., Tilley F. (2000). Small Firms and information and communication technologies (ICTs): Toward a typology of ICTs usaage. *New Technology Work and Employment, Vol 15 No. 2* , 138-154.

Tarantilis CD, Kiranoudis CT, Theodorakopoulos ND. (2008). A Web based ERP system for business services and supply chain management. *Application to real world process scheduling* , 1310-1326.

Thompson et al. (2011). Crafting and Executing Strategy. In *Crafting and Excecuting Strategy*. McGraw Hill International Edition.

Thong, J. (1999). An integrated model of information systems adoption in small businesses. *J. Manag. Infor. Syst.* , 187-214.

Triandis, H. C. (1972). *The Analysis of Subjective culture.* Oxford: Wiley Interscience.

V. Grover. (2007). An empirically derived model for the adoption of custmer based organizational systems. *Deci. Sci.* , 603-640.

W. Hong, K. Zhu. (2006). Migrating to internet based ecommerce: factors affecting e-commerce adoption and migration at the firm level. *Inform & Manage* , 204-221.

Yap, C. (1990). Distinguishing characteristics of organizations using computers. *Harvard Business Review* , 97-107.

APPENDIX

Questionnaire

The questionnaire is part of academic research.

Description: This questionnaire aims to understand the adoption of ERP (Enterprise Resource Planning) among SME's (Small and Medium Scale Enterprises) in Thailand's export industry. **This is for academic use only.**

This research project aims to explore the understanding of the adoption of Enterprise Resource Planning (ERP) among Small Medium Enterprises (SMEs) in Thailand's export industry.

Firms are spending large sums of money on information systems such as ERP but the benefits of spending on information systems are expected to have strategic values. In today's dynamic economy, continuously generating new knowledge, combined with operational efficiency and effective delivery mechanisms increase the strategic value of the firm. The proper planning and implementation of ERP is necessary to enhance the strategic value of an organization otherwise it may create unintended consequences.

This research would be helpful for other researchers that will explore further or expand to the related task in this field. It can be observed that how the adoption of the ERP and its understanding relevant to their industry would benefit their workforce thereby benefiting the country as a whole.

Notice: Please fill in the blank or choose the most appropriate answer.

Part 1: General Information

1. Sex: ☐ Female ☐ Male
2. Age: ☐ 19-25 years ☐ 36-45 years
   ☐ 26-35 years ☐ Above 45 years
3. Education:
   ☐ High school or equal ☐ Master degree
   ☐ Bachelor degree ☐ Doctorate degree
4. Type of Business
   ☐ Agricultural Products ☐ Manufacturing
   ☐ Automotive and Parts ☐ Chemical Products
   ☐ Consumer Products ☐ Gems and Jewellery
   ☐ Food and Beverages ☐ Others ……..

5. Income

   ☐ Less than 25,000 baht a month ☐ 25,001 – 50,000 baht a month

   ☐ 50,001 – 100,000 baht a month ☐ More than 100,000 baht

6. In your opinion what are the drivers for implementing / adopting ERP

   ☐ Competitors ☐ Customers

   ☐ Internal Business Process ☐ Others …….

7. Initiator of ERP systems

   ☐ Top Management ☐ Middle Management

   ☐ Employees

8. Would you support ERP adoption in your organization

   ☐ Yes ☐ No

Part 2: Questionnaire on technological characteristics as antecedents to your ERP adoption decision

Explanation Please fill in ✓ into scale of the check box per your agreement

7 Entirely Agree
6 Mostly Agree
5 Somewhat Agree
4 Neither Agree nor Disagree
3 Somewhat Disagree
2 Mostly Disagree
1 Entirely disagree

Please choose one of the boxes per the degree of your evaluation.

No.	Degree of agreement	1	2	3	4	5	6	7
	Relative Advantage							
1	ERP adoption would provide me with greater organizational benefits.							
2	ERP adoption would enable my organization to generate new business opportunities.							
3	The ERP system can help me make effective decisions.							
	Compatibility							
4	The adoption on ERP will bring significant changes to the work practices of businesses in my company.							
5	I will adopt ERP if it is compatible with other systems that my company uses.							
6	ERP is compatible with the needs of our business.							
7	ERP is compatible with our organization values.							
	Complexity							
8	The more matched ERP system is an important factor in ERP adoption.							
9	My company believes that ERP is complex to use.							
10	My company believes that ERP adoption is a complex process.							
	Perceived Benefits							
11	Enable my organization to generate new business opportunities.							
12	Increase the availability of our products or services to our customers.							
13	Enable my organization to process transactions at a lower cost.							
14	Enable my organization to have better access to supplier information.							

Part 3: Questionnaire on Organization characteristics as antecedents to your ERP adoption decision

Please choose one of the boxes per the degree of your evaluation.

No.	Degree of agreement	1	2	3	4	5	6	7
	Top Management Support							
15	Management understands the strategic importance of ERP							
16	My managers / co workers would support my decision to adopt / implement ERP							
17	My top management is willing to take risks involved in the adoption of ERP.							
18	My top management is likely to invest funds in ERP system.							
	Organization Readiness							
19	My organization has financial resources to support ERP adoption.							
20	My organization has the personnel resources to support ERP adoption.							
21	A higher cost of ERP training may deter my company's adoption of ERP.							
22	My organization has the technological resources to support ERP adoption.							
	ICT Experience							
23	The difficulty in maintaining information systems with my available resources is an important factor in ERP adoption decision.							
24	The technology infrastructure of my company is available for supporting ERP related applications.							
25	My company is dedicated to ensuring that employees are familiar with ERP.							
	Firm Size							
26	The capital of my company is high compared to the industry							
27	The revenue of my company is high compared to the industry							
28	The number of employees of my company is high compared to the industry							

Part 4: Questionnaire on environment characteristics as antecedents to your ERP adoption decision

Please choose one of the boxes per the degree of your evaluation.

No.	Degree of agreement	1	2	3	4	5	6	7
	Industry Market Scope							
29	In order to be a leader in my organization's industry, we need to implement ERP							
30	Many organization within our industry have implemented ERP							
31	Demands of large customers and /or suppliers have influenced the decision to adopt ERP.							
	Competitive Pressure							
32	Competition will make it necessary for our organization to implement ERP.							
33	My company would have experienced a competitive disadvantage if ERP had not been adopted.							
	External IT Support							
34	Our government is generally supportive of ERP							
35	Better vendor technological support is an important factor in the ERP adoption decision.							
	Information Intensity							
36	The product/service in my industry generally requires a lot of information to sell.							
37	The product/service in my industry is complicated or complex to understand or use.							
38	The ordering of products in my industry by customers is generally a complex process.							

Part 5: Suggestion and recommendation

……

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Thank you for your participation in this survey.

BIOGRAPHY

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