Implementing Extended Enterprise Resource Planning (ERP) System in Thai Small and Medium Enterprises (SMEs): Opportunities and Limitations

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Abstract

Thailand has been found to be fully aware of logistics and supply chain management in the past few years. It has also promoted a concept of small and medium enterprises (SMEs) across the country to sustain and stimulate economy growth. The cooperation between governmental and banking sectors has assisted the private sectors, especially SMEs. Nevertheless, a few numbers of Thai SMEs have considered information technology being implemented in their organizations. This includes manufacturing resource planning (MRP II) or enterprise resource planning (ERP) software that is anticipated to improve product’s quality, work’s productivity, or customer satisfaction. Enterprise resource planning (ERP) is a system being developed from MRP II that has been partially used in Thailand. It is an umbrella system that ties together a variety of specialized systems. Recently, the extended ERP system has been promoted that is referred to as a collaboration system of different stand alone systems. This system is utilized in cooperation with E-business and E-commerce. With the implementation of this multi-module application software in Thailand, external and internal business activities could be efficiently and effectively integrated. The purpose is to ensure that the operations will be under the same information system. The research study presented here develops a theoretical model, provides a profound comprehension of such limitations, as well as seeks opportunities to expand the use of the extended ERP system that has gradually spread from Thai manufacturing sectors to service sectors. Implementing the extended ERP system has been proven to be a real challenge for many companies that are likely to become a key success of global competitive advantage.

Key Words: Extended Enterprise Resource Planning, SMEs, MRP, Supply Chain

1 Introduction

Recently, logistics and supply chain management have played a key role of driving any commerce or businesses to gain competitive advantage. Thailand is one of the countries where engages into and is fully aware of this concept. Such concept has been partially integrated into the national master plan to reduce logistics costs, improve infrastructure (i.e., transportation, power, and telecommunication), or increase competitive advantage. Thailand is also aiming at becoming a logistics hub of Indo-china due to its strategic location linking countries in ASEAN. Therefore, this strategic
advantage has let a numerous of Small and Medium Enterprises (SMEs) to initiate their businesses (either manufacturing or service sector) to help in sustaining and stimulating economy growth. Especially, the sector of agriculture is found to be a main mainstream of Thai products. Nevertheless, individual SMEs still have obstacles due to its limitations of information technology infrastructure being implemented.

Thai SMEs are thought to use non- or traditional information technology (IT) system because of lacking of start-up investment and its organizational culture. One of the examples in IT for an enterprise is “Enterprise Resource Planning” (ERP) that is used as a tool in supply chain strategy. The ERP system was developed from traditional or legacy Material Requirement Planning (MRP) systems and Manufacturing Resource Planning (MRP II) with being modified to include other functional areas of an organization. The MRP II was that the information system links internal operations to the financial function to sales, purchasing, production, inventory, and cash flow (Wisner et al., 2005). The typical ERP system is an umbrella system that ties together a variety of specialized systems, including production and inventory planning, purchasing, logistics, human resources, finance, accounting, customer relationship management, or supplier relationship management (Wisner et al., 2005). Since the emergence and growth of supply chain management, E-commerce, E-business, and global operations have created the requirement to exchange information with customers or suppliers; thereby the extended ERP system becomes more practical. The extended ERP system is a collaborative system of different stand alone systems, and a backbone of the E-business that integrates into Internet or web based access, This system extends its functions to incorporate with the applications such as supply chain management (SCM), customer relationship management (CRM), supplier relationship management (SRM), or E-commerce, etc. With the implementation of this multi-module application in Thai SMEs, external and internal business activities could be efficiently and effectively integrated to ensure that the operations will be under the same information system. However, there are some limitations of such software implementation due to a higher cost of investment that is not applicable to small businesses within supply chain.

This research study will develop a theoretical model, provide a profound comprehension of such limitations and seek opportunities to expand the use of the extended ERP system that has gradually spread from manufacturing to service sectors in Thailand. Such theoretical model will be extended to and focused on Thai SMEs where may utilize ERP as an idea that ties the entire organization with a new era of E-business, E-commerce, or Electronic Data Interchange (EDI). Thereby, implementing the extended ERP system is anticipated to be a real challenge for many companies that are likely to become a key success of global business competitiveness.

2 Review of Literature

Robey and his colleagues (2000) studied the research topic named “learning to implement enterprise systems: an exploratory study of the dialectics of change” that reported on a comparative case study of 13 industrial firms implementing an ERP system. All of the firms were compared based on their dialectical learning process and had to overcome knowledge barriers of those associated with the configuration of the ERP
package and the assimilation of new work process. The resulted indicated that firms focused on the technology and process changes. The learning challenges associated with each of different ERP implementation approaches (piecemeal and concerted) were found to be different.

According to ERP implementation, Allen and his colleagues (2002) attempted to provide an overview of ERP research. It was done with elaborating the strategic and tactical critical success factors for ERP implementations. The research also investigated ERP implementations in four higher education institutions in the UK, as well as the managers’ implementation experiences and the users’ perceptions of the system.

For ERP implementation success, Thavapragasem (2003) proposed the research paper that addresses the notion of cultural influences on user satisfaction with the implemented ERP system in Australian university. It was found that the organizational culture is often over-looked while implementing ERP systems. Due to the diverse nature of such systems, the post-implementation stage of ERP life cycle was identified with its influencing factors.

McGinnis and Huang (2004) presented ERP implementation that stops at system start-up but did not address post-implementation issues. They mentioned that ERP is a continuous improvement effort and a continued work after system start-up. Such effort and continued work would influence the ultimate success of an ERP system. A four phase ERP continued improvement model was proposed that incorporates knowledge management into each major implementation phase. With this research, McGinnis and Huang have provided a guideline for integrating two major information system operations in an organization and improve success rates of the long run ERP implementation.

Additionally, Headmon (2004) proposed the analysis of Accelerated SAP (ASAP) system implementation which was based on the underlying assumptions of information systems development methods. Headmon included four dimensions of the framework: ontology, epistemology, research methodologies, and ethics in the system implementation. The results analysis indicated that there were similarities between information systems development approaches (i.e., info-logical, the information modeling-, the socio-technical-, and the trade unionist approach. The inherent view of information requirement that was summarized as information predetermined was the main difference between ASAP and traditional information systems. He further stated that ASAP could apply a reversed logic of analysis and design in the implementation.

Kritchanchai and Chawan (2004) conducted the study of ERP implementation for SMEs in Thailand which focuses on the success of ERP software providers. It was indicated that there were seven critical factors for success with the results that reflect the status of information technology infrastructure in the SMEs firms.

3 Development and Model of the Extended ERP Model

ERP is broadly used to describe the multi-module application software for managing an enterprise’s suppliers, customers, and functional activities (Wisner et al., 2005). It focuses on integrating the internal business activities of an enterprise. The utilization of ERP is done through the shared and centralized database system in order to bring together the entire organization. As stated earlier, ERP was the next development
and outgrowth of the closed-loop MRP and MRP II systems. Figure 1 illustrates an expansion of MRP to extended ERP.

![Figure 1 Expansion of MRP to Extended ERP](image)

Table 1 illustrates the rational behind of different determinations in which the extended ERP was gradually developed. This includes an era of E-business in growing global markets, as well as market penetration by new ERP software application providers. Technological advance has also combined ERP with other information systems such as SRM, CRM.

**Table 1 Development of Extended ERP**

1) E-Business Era
   - Use to improve efficiency as strategy
   - Use as stand alone (inside) for collaboration between partner and customer
2) Market penetration by new ERP developers
   - Loss of revenue by selling ERP program (big market becomes saturated, but small market has no investment)
   - Use ERP as backbone leading to E-business
3) Advance in technology that combines ERP with other systems
   - Advance in technology to integrate ERP with external system such as Internet, web base access
   - Data in ERP system is interchangeably a close or an open system

1 Figure 1 and Table 1 are drawn from Rittiporn, I. (2004). *Enterprise Resource Planning*. Technology Promotion Association.
Figure 2 below illustrates the strength of extended ERP that represents its characteristics based on supply chain strategy. The first strength is the integration that focuses on traditional ERP, and the second is a linkage of inside and outside value chains. The last determinant is IP based infrastructure and web application that globally connects individual organizations.

![Figure 2 Strength of Extended Enterprise Resource Planning](image)

The next figure shown below is a proposed model of the extended ERP in which this research study utilizes a concept of E-business, E-commerce, SCM, SRM, or CRM in conjunction with IP based infrastructure and web application in a new era of information technology. According to E-commerce, the Internet enables all electronic commerce transactions taking place over wired networks and provides companies with new channels of communication and interaction that can create, and cost effective relationships with customers in sales, marketing, and customer support. Furthermore, Intranet can support E-business because internal corporate applications are based on the web page model that can be made interactive using a variety of media, text, audio, and video (Laudon and Laudon, 2004). Intranet helps organizations create more responsive information environment, and is inexpensive, scalable to expand or contract as needs changed, and accessible from several computing platforms. Besides from E-commerce and E-business, the cost of products and services can be attributed to handling a transaction including requests for proposals, purchase orders, shipping documents, invoices, or payment approvals, etc. Replacing such paper transactions can be done through the use of electronic data interchange (EDI). Presently, a number of organizations can share information by utilizing telecommunications to exchange electronic data. EDI networks can be divided into two categories: Web EDI and VAN EDI. E-commerce, by its definition, uses web or internet EDI as an instrument of a linkage between enterprises. On the other hand, value added network (VAN) EDI is utilized and instrumental for integrating software applications such as SCM, SRM, or CRM.
4 Extended ERP Implementation Methodology

Implementing extended ERP system can be significantly fruitful for the entire organizations in supply chain. To implement extended ERP, understanding of a process of development and extended ERP package utilization is required. The extended ERP package can be found in software providers such as Oracle, SAP AG, PeopleSoft, J.D. Edwards, or EFACt. Understanding the system means that an organization is looking back to ensure a customer gaining product’s value added and prompted delivery. This will also be a reinforcement to drive the organization forward with the extended ERP concept.

Research methodology used for the data collection was done through an interview and a postal survey. This research study interviewed 5 major ERP providers in Thailand where are currently selling the following brands of ERP software: SAP, Oracle, PeopleSoft, J.D. Edwards, and EFACt. The purpose of interviewing these providers was to fulfill the requirements of the extended ERP implementation. This study also interviewed 30 SMEs that are recently implementing E-Business and E-Commerce in their business activities. Furthermore, the postal study was conducted by allocating 30 sets of questionnaires to Thai SMEs. The questionnaires were sent to different industrial sectors; for instances, foods and beverages (3 subjects), components (5 subjects), clothing (3 subjects), plastic (6 subjects), textile (7 subjects), dairy products (2 subjects), and glass (4 subjects). After collecting data, the results were then used for an analysis that enables to seek opportunities and limitations of using the extended ERP in Thai SMEs.
5 Results

Findings from the interviews

The results from the interviews indicated that a majority of ERP providers have implemented ERP with several industrial sectors; including foods, components, clothing, etc. The cost of implementation was divided into two types. Firstly, implementation costs may include hardware cost, software cost, or cost of putting into operation. The second costs are maintenance cost and system running cost. The cost of ERP software that was implemented in SMEs is ranged from 100,000 baht to over a million baht. There was also server cost that is ranged from 80,000 – 180,000 baht per server. According to training, an operator of the client should participate in the training course taught by expertise of ERP providers. This training cost is ranged from 40,000 – 50,000 baht per application module. As mentioned earlier, several modules of ERP software that are made available by different ERP providers are as followed: finance, accounting, production, global support, information technology, CRM, SRM, distribution, or inventory.

<table>
<thead>
<tr>
<th>Company</th>
<th>Database</th>
<th>Software</th>
<th>Operating System</th>
<th>Cost of Software (Baht)</th>
<th>Cost of IT Infrastructure (Baht)</th>
<th>Total Implementation Cost (Baht)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Windows NT, Unix</td>
<td>Oracle</td>
<td>Oracle</td>
<td>400,000</td>
<td>4 – 6 million</td>
<td>4.4 – 6.4 million</td>
</tr>
<tr>
<td>2</td>
<td>Windows</td>
<td>SAP AG</td>
<td>Oracle, SQL</td>
<td>2.4 million</td>
<td>4 – 6 million</td>
<td>6.4 – 8.4 million</td>
</tr>
<tr>
<td>3</td>
<td>Windows</td>
<td>PeopleSoft</td>
<td>DB2, SQL</td>
<td>1.5 – 4.5 million</td>
<td>4 – 5 million</td>
<td>5.5 – 9.5 million</td>
</tr>
<tr>
<td>4</td>
<td>AS 400</td>
<td>J.D. Edwards</td>
<td>DB2, SQL</td>
<td>1.5 – 4.5 million</td>
<td>4 – 5 million</td>
<td>5.5 – 9.5 million</td>
</tr>
<tr>
<td>5</td>
<td>Windows</td>
<td>EFACT</td>
<td>SQL</td>
<td>1.2 million</td>
<td>4 – 5 million</td>
<td>5.2 – 6.2 million</td>
</tr>
</tbody>
</table>

Findings from the survey

Sixty four percent of the respondents are small size entrepreneurs with the revenue more than 10 million baht, whereas forty six percent is medium size with the revenue approximately 100 million baht. Only 15% of the respondents are currently using ERP in their operations, and 3% of the respondents extending its operations to extended ERP. By implementing a generic ERP system, cost of investment is ranged from 1 million up to 10 million baht depending on a size of supply chain. On the other hand, implementing extended ERP system may cost more than 10 million due to integrating universal technology platform such as internet technology or web based application for buying and selling goods and driving important business processes inside the firm.

Additionally, forty six percent of the respondents use Windows 2000 and eighteen percent use Windows XP as their operating system. The rest of the respondents use several platform of Windows software (i.e., Windows 98, Windows Millennium, etc.). It should be noted that both Windows 2000 and Windows XP are anticipated to be capable of sharing information over wired networks.
6 Opportunities and Limitations

The use of extended ERP can be beneficial to both business process reform and business structure reform. In business process reform, a system is more flexible and integrated, quicker and necessary work system for new business, or being subject to change in reform. Other the other hand, the advantages of business structure reform include reducing production cycle time, expanding business resulted from relationship between retailer and manufacturer, reducing inventory cost, reducing waste, and increasing customer satisfaction, improving work efficiency of wholesale, and improving relationship and sharing data among manufacturer, transport service provider, agency and supplier.

Limitations of implementing extended ERP can be various starting from lacking Internet based information systems infrastructure, being inaccessible to Internet portal point, higher cost of system implementation, complexity of program, lengthy time of program customization that is applicable to enterprises’ work process. Such limitations could deter the development of integrated supply chain network by employing the extended ERP system. The implication of these limitations may be undesirable in which coordination and communication between two enterprises in supply chain can be impeded.

It was anticipated that a foundation of IT and investment capability of Thai businesses are still minimal and need to be altered. A strategic plan of implementing this program must be prepared and an action plan must be preceded. It is anticipated that this would stimulate an awareness of Thai organizations within supply chain, and maintain business competitiveness and sustainability in the long run.

7 Summary

Research on ERP implementation is thought to be a fundamental of the extended ERP implementation. The extended ERP virtually stems from a traditional ERP that use the same concept, except for being implemented in conjunction with E-commerce, E-business, or other logistics supply chain information systems. Some of the Thai SMEs have recently implemented the extended ERP such as ORACLE, SAP AG, etc. Nevertheless, Thai SMEs still experience major obstacles of employing the extended ERP system due to lacking Internet based information systems infrastructure, being inaccessible Internet, higher cost, complexity of program, and lengthy time of program customization. Such limitations have proven that the improvement of the information systems/technology infrastructure in Thailand needs to be rapidly done so as to accommodate the extended ERP implementation. It is, however, recommended that implementing such systems in Thai SMEs could be done through the use of inexpensive and more user friendly software in parallel to promised Internet web based information systems and web application. This is critical to the complete integration of companies or enterprises along supply chain resulting in communication and coordination improvement.
References


