THE USE OF INFORMATION TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT AND ITS IMPLICATIONS

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ABSTRACT
Information technology plays a major role in implementing supply chain. This paper investigates the impact of information technology (IT) on supply chain management (SCM). A survey was conducted in July 2005 in order to examine the current status of IT usage for SCM in Thailand. The survey questionnaire is mailed to six industrial sectors namely textile, food, automobile, software, electronic and chemical industry. The questionnaire is composed of three main sections. Section A is to gather the company profile and information. The question in section B helps us to understand the company directions on implementing IT for SCM and the status of their IT applications. Lastly, section C reflects the company’s future needs and directions on IT for SCM. The survey results show that Thailand’s companies need more effort in strengthening its basic information technology and infrastructure to enhance their business performance.

KEYWORDS
Information Technology, Supply Chain Management, Industrial Sectors

1. Introduction

The Asian supply chain management (SCM) market is poised for robust growth. Annual SCM market growth rates are projected at 15% in Asia [5]. The high growth rate in Asia convinces the high potential of supply chain development in this region, particularly in Thailand. Many organizations are adopting SCM to reduce costs, improve products, shorten lead time and enhance competitiveness for the entire chain [3]. SCM has come to the forefront of organizational practice over the last decade. Companies link to their suppliers electronically, to form inter-functional operations within their organizations and to forge electronic connections with key customers [4].

Information Technology (IT) has become one of the tools for implementing the concept. It provides many essential applications in improving performance in supply chain. Advances in IT have made it possible for companies to develop and maintain a flexible organization that can respond quickly to changing demands and conditions. Besides improving supply chain efficiency, IT which include the application of hardware, software and networks could enhance information flow and facilitate decision-making in supply chain and logistics operations. In fact, the most dramatic and potentially powerful uses of IT involve networks that span across company boundaries that can significantly enhance the productivity, flexibility, and competitive-ness of many companies [6].

McFarlan (1984) [2] emphasized that executives should understand if communication technology could be a core competitive strength or if it will simply play a supporting role. Wigand (1997) [8] also emphasized the importance of optimal organizational fit and alignment in the deployment of information technology. He made it clear that what brings added value to a firm is not information technology itself, but well-tuned coordination between business strategies and technology.

A recent issue of the McKinsey Quarterly reported that some companies that made heavy investments in supply chain management information systems performed worse than companies than those who did not invest in IT, although technological investment in supply chain management is supposed to increase the efficiency of firms[1]. These findings clearly demonstrate what managers have been told repeatedly. To adopt this new communication technology successfully, firms must have their supply chain processes streamlined and understand how to leverage on technology to improve their supply chain performance.

While these lessons are invaluable to managers, there has been little research on how information technology systems can be effectively be deployed to conduct supply chain management. Although emerging communication technology has been used widely for supply chain management, the efforts seem to be lacking two areas that can be crucial for applied research to solve managerial problems and as a research tradition based on cumulative
knowledge. The purpose of this study is to investigate the status of IT in supply chain management in Thailand and attempt to recommend an appropriate direction for implementing supply chain management using IT.

2. Methodology

The survey was conducted by using questionnaire developed previously by Tan (1997)[6]. The questionnaire is divided into three main sections: organizational information, IT applications and company’s achievement and future directions. The questionnaire was sent to six industrial sectors in Thailand namely textiles, food, automobiles, software, electronics and chemicals. Company details are from the database of Department of Business Development, Ministry of Commerce. The questionnaire was distributed by mail to 900 companies and the data collected is analyzed using SPSS software.

3. Results

Ninety-five valid responses were received yielding a return rate of 10.56 percent. The 95 respondent companies can be grouped into two main categories; local enterprise and overseas multi-national corporations. Seventy-one companies (74.7%) are local enterprise and 24 companies (25.3%) are overseas multi-national corporation where their headquarters are in Japan, USA, Taiwan, Germany, China, UK, and Finland. The respondents’ industrial sectors are listed in Table 1.

3.1 Company profiles and information

Most of the respondents are small and medium size, with 62 companies (66%) employing fewer than 200. Approximately 75% of the respondents have less than 10 logistics staffs and 56% of the respondents have less than 5 IT staffs. Approximately 70% has major source of supply and major market share in Thailand. These companies supply chain network is within the country. In investigating company strategy by using five point scales, the top 3 company strategies are: to develop a plan for establish and maintain business partnership (mean = 4.29); measuring logistics performance (mean = 4.01); and customer focus (mean = 3.91). The top 3 measurements for company logistics performance are space utilization (mean = 2.80), number of back orders (mean = 2.80) and employee productivity (mean = 2.64). However, 57.9% of the respondent companies do not have any measurements for their logistics performance and nearly half of the companies (47.9%) do not have an annual logistics budget.

3.2 Information Technology and applications

The top 3 barriers to IT deployment are lack of education and training, unaware of new technology and insufficient IT resources. On the other hand most of the respondents indicate top 3 motivations for adopting IT. These are pressure from their suppliers, the benefits of labor costs reduction, and pressure from their customers. From the five point scale, rank and score are shown Table 2.

IT applications can be broken down into three levels: transaction level (including purchase system, sales order system and inventory system), management control level (including MRP and MPS) and the decision support level (including transportation and finite scheduling system).

![Figure 1: Status of IT Applications in Six Industries](image-url)
Figure 1 shows the status of IT applications in six industries. More than 60% of respondents implement IT applications at the transaction and management control level. Less than 50% of respondents implement the applications at decision support level except on finite scheduling. The results show that many respondents are using various communication technologies to support their business processes. The top 3 of implemented technologies are to reduce operating costs (mean = 3.84), improve quality of data (mean = 3.78), and increase consistency of company’s delivery (mean = 3.70). In order to implement IT successfully in SCM, the results state that they need to acquire logistics skills particularly in ERP software knowledge, EDI, etc. From the five point scale, the key IT and logistics skills acquired are shown in Table 3.

For future plan, from figure 1, the respondents plan to implement logistics network modeling (21.1%), transportation management system (20%), and inventory management system (17.9%). From figure 2, the key communication technologies which respondents plan to implement in two years time are wireless network (17.2%), bar code system (15.4%), and point-to-point/direct connection (14.3%).

### Table 3: Key IT and Logistics Skills

<table>
<thead>
<tr>
<th>Top 3 IT Skills</th>
<th>Top 3 Logistics Skills</th>
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<tbody>
<tr>
<td>Computer networking</td>
<td>Decision support system</td>
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<tr>
<td>(3.94)</td>
<td>(3.93)</td>
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<tr>
<td>Operating system (3.91)</td>
<td>Electronic Data Interchange (3.48)</td>
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<tr>
<td>Spreadsheet (3.83)</td>
<td>MRP II (3.42)</td>
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</table>

### 4. Analysis and Discussion

The study helps to explain how the six industries implement IT in enhancing their supply chain processes and their operations at different stages. The most significant factor in IT implementation is size of business. While large companies implement information and communication technology extensively with their supply chain members, the small and medium size companies is still using their manual systems or plan to implement basic IT at transaction level to support their routine operations. Oversea multi-national corporations are more active in IT implementation to support their supply chain processes than local enterprises. The study also shows that size and company ownership is correlated to their logistics policy and annual logistics budget. Sixty of the respondents outsource their transportation function and less than 40% outsource their IT operations. The reason for outsourcing IT activities are lack of education or training, unaware of new technology, and insufficient IT resources.

The results found that supply chain implementation in Thailand focuses on basic information technology to enhance their business processes. Most respondents implement IT application at transaction and management control level. The respondents see the benefit of adopting IT only in some business processes such as financial management, purchasing management, and production control. Respondents indicated lack of education and training as the main barrier to IT deployment. As IT changes rapidly, training and education on new technologies will be needed for the staff to understand and apply them more effectively to their logistics processes. These barriers could slow down the growth of IT deployment in company.
The communication technologies which the respondents are currently using are internet/email system, fax, and point-to-point connection. The widespread availability of the internet and standardized interfaces has substantially expanded the opportunities and capabilities to exchange information between firms of all sizes. Most companies are using the internet to save time and cost by providing connectivity among supply chain members. The amount of information sharing and connectivity between supply chain members is significant and this could lead to an efficient supply chain. Internet seems to be the most promising network infrastructure for supply chain connectivity according to the survey.

5. Conclusion

This paper has highlighted the application of IT in supply chain in the six industries in Thailand. The readiness of industry in Thailand in adopting IT in SCM is moderate. The results show that IT is an essential tool in reducing operation cost, improving quality of data, and increasing the consistency of company’s delivery. The results also shows that IT for supply chain in Thailand focuses on basic information technology to enhance their business processes.

Most of the respondents plan to improve their business processes and their logistics performances by using IT (hardware, software, and network). This represents the wide-awake trend in Thai industry for implementing IT to improve supply chain performance. By firstly focusing on re engineering the supply chain business process as well as training and educating in basic IT for supply chain, better understanding and readiness in Thai industry can be gained. This should be done step by step. IT applications for facilitating transaction and management activities are appropriate for Thailand today while IT for decision support level and IT applications for virtual enterprise should be adopted in the future to optimize their global supply chain. In addition, their business processes with their suppliers and customers must be ready and well prepared before implementing any IT system.

References