Success of Enterprise Resource Planning Implementation on Sustainable Performance of Logistics Business in Thailand

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Abstract- **This research aims to investigate the influences of the enterprise resource planning implementation on logistics management efficiency and its impact on the sustainable performance of logistics business in Thailand. The data were collected by sampling methodology. There were 520 samples selected from the registered companies conducting business as an entrepreneur of transportation business including both transporting freight and passengers as of the first quarter of 2019. The data were analyzed with the structural equation modeling (SEM). The findings revealed that the success of enterprise resource planning implementation had direct positive influences on the logistics management efficiency in terms of warehouse management (LME/WH) and transportation management (LME/TM). The direct positive influences were equivalent to 0.42 and 0.60 respectively which were statistically significant at the 0.01 level. The study of casual relation of logistics management efficiency in four aspects showed that the positive influence on sustainable performance were equivalent to 0.16, 0.03, 0.75 and 0.25 respectively which were statistically significant at the 0.05 level.**

Keywords; *Enterprise Resource Planning, Sustainable Performance, Logistics Business.*

1. Introduction

Enterprise Resource Planning (ERP) is a management software that has extensively been applied in organizations and developed for enterprise resource planning implementation. It connects all disperse information systems in various departments and integrates them into one system for any user in an organization to retrieve information as needed. The software will help provide more efficient and effective performance to meet its purposes and goals in maximizing benefits and gaining sustainable competitiveness. Thus, ERP software can help drive an organization in the changing business environment [1]. However, several organizations have to deal with problems and difficulties in using ERP because ERP software is complicated and costly. The significant factor to the success or failure of package ERP software application is personnel in an organization because they have misconception that the software can manage everything including improve work performance and increase more benefits. Besides, adjustment in the working procedures and a business expert are needed in order to apply the ERP software. The adjustment may lead to unacceptability of personnel and consequently failure in application of ERP software. Furthermore, the time in studying, planning, and analyzing ERP is also necessary before ERP Software implementation because it is highly complex and difficult to implement. In addition, there must be a sufficient training for the personnel. The system of ERP used in an organization will combine various systems such as procurement, sales, accounting, finance, and human resource management. Each system links to material flow and information flow. ERP software acts as a data management system that will integrate work management in various activities to achieve the best results and immediately diagnose work status and problems so that any problem of an organization can be handled quickly. Also, ERP software is able to immediately run operations on integrating various systems of the ERP system in real-time due to its logbook database. Using the ERP system makes it possible for a company to close bank accounts and calculate costs, profits and loss on daily basis. Thus, a great development of information systems will help improving performance efficiency and may give the organization an advantage over competitors.[1] [2]

Most organization struggle in competitions in several areas such as products, services, prices, quality, and time management. Logistics becomes a crucial tool to increase competitiveness and manage service time. Hence, large organizations have

established the logistics department to enhance management efficiency. The capability of management is considered in the aspects of time spending, customer needs fulfillment, the balance of attention to suppliers and customers, and uninterrupted operations under customers' requirements. Also, an excellent logistics design in time management will ensure business survival. A sample of automotive companies has created a strategy to connect suppliers, customers, and customers of the customers. They have brought logistics management that requires a combination of techniques in a form of three-way partnership which comprises suppliers who are under the responsibility of the procurement department, logistics and customers who are under the responsibility of the sales and marketing departments. This partnership is supported by financial and HR departments. Every industry has adopted this strategy known as supply chain to build relationships and competitiveness. It collects information of activities from five departments, then, process the information and design logistics systems that suitable for different kinds of industries. Thus, the efficient logistics system has major influences such as increasing revenue in sales and reducing costs. The decrease in costs is mainly from the efficient management of storage and flow of products through alternatives of logistics activities, such as quantities, inventory, and transportation management. If a company demands a low inventory, the round of transportation will be increased . Therefore, the consideration in costs is required in order to keep the cost down and make no impact to the customers.

According to world economic outlook report, the better global economy has an impact on the economic growth in Asia and ASEAN, especially border trades such as the value of border trade between Thailand and neighboring countries (Malaysia, Myanmar, Laos, and Cambodia) in the first nine months (January – September 2018) is 8 3 4 ,3 5 4 . 2 8 million baht. There is expansion compared to the same period of the previous year (2017) separated into value of imported goods which is 3 4 8 ,3 7 7 . 4 9 million baht and value of exported goods which are 4 8 5 ,9 7 6 . 7 9 million baht [3]. The border trade of Thailand is transported through five regions of Thailand which are 1) Southern region through Songkhla, Yala, Narathiwat, Satun and Pattani to Malaysia and Ranong to Myanmar 2) Northeastern region to Laos and Cambodia 3) Northern region to Myanmar and Laos 4) Eastern region to Cambodia and 5) Western region to Myanmar. The value of border trade through each region is in top ten from January to September 2018.

Although there is free trade agreement in logistics among countries in ASEAN, the loopholes in the agreement can still be found. These loopholes lead to trade barriers that cause Thai entrepreneurs not being able to fully develop competitive capabilities in international trade. The trade barriers are from different regulations and laws in each country and laws that do not accord with ASEAN practices such as National Treatment (NT) , vehicle restriction policies, principles on operating time, traffics, city plans, and inconvenient road infrastructure networks. They mainly affect the costs of the transportation. If Thailand prefers to be the top exporter of ASEAN and a part in World Trade, it is necessary to change the business process to self-analyzing, internal and external management, competitions in the form of alliances due to the higher costs of some business transactions or procurement, and the speed in presenting and delivering products to customers. The effort in finding approaches to meet customers' satisfaction and ensure business survival has resulted in companies a turning to technologies. Now, most organizations focus on applying information technology to formulate a strategy, enhance performance efficiency, gain an advantage in competition, reduce complications in working procedures, and share data among departments for quicker access and better decisions.

This research aims to investigate the influences of the enterprise resource planning implementation on logistics management efficiency in the aspect of collecting data and processing financial and non-financial data into information that help planning a strategy to gain competitive advantage and its impact on the sustainable performance of logistics business in Thailand.

2. Literature Review

The Concept of Enterprise Resource Planning System

Organizations have implemented an ERP system to achieve success in both internal and external operations and gain a sustainable competitive advantage [35],[36]. Furthermore, ERP implementation assists in making complicated strategic decisions and providing accurate access to reliable information in order to immediately formulate business strategies. It also reduces redundancy of the working system, decreases overlapped working procedures, facilitates operations, timely reports accurate financial statements to executives, shortens the time in document preparation, analyzes purchase and sale histories, facilitate analysis on debtor and creditor movements, examines cheque status and bank statements, manages all assets systematically, check stocks, allows prompt access to organization analysis report, provides a great data security, maintain the system automatically and raises operational standard of organization. Organizations will obtain all of these if the implementation of ERP is successful. It will lead to effective and systemic management and better performance that brings a sustainable competitive advantage [4], [5], [6]. Thus, the research on supply chain management has

turned to implement ERP more to achieve positive results in an organization. [1],[7]

The Concept of Logistics Management Efficiency

This research focuses on logistics management efficiency in enterprise resource planning system. The meaning of supply chain management is based on the concept of [8] on logistics that it is operations related to the private and government sectors including non-profit organizations. In addition, logistics management comprises management on nine subjects which are (1) logistics (2) business logistics (3) integrated logistics (4) materials (5) physical distribution (6) industrial logistics (7) procurement and supply (8) product flow management and (9) marketing logistics. However, [9] thought that logistics operations are management to achieve the right way, right product, right quantity, and quality, right place at the right time for the right customer at the right cost. Rushton et. al. [10] said that logistics is an efficient product delivery operation from supply to demand through manufacturing source with efficient costs and customers accept deliveries with satisfaction. Moreover, Islam et. al. [11] introduced logistics management' s essential components which are (1) transport management (2) inventory management (3) information processing (4) packaging and unitization and (5) warehousing management. Accordingly, the meaning of logistics management in this study is a process in managing, integrating, coordinating, and controlling product delivery, inventory, material and information system from suppliers to customers in order to gain customer satisfaction and develop operations. In supply chain management, there are several activities which are orchestrated and coordinated to ensure that supply to the product will correspond to the demand at all stages of the chain, data and technology are shared between all relevant parties in order to create innovation to reduce time cycle in product development, utilize the flows of product movements and production factors to meet customers' needs, reduce costs and increase customer satisfaction efficiently, and synthesize logistics management efficiency. The synthesis of logistics management efficiency has four aspects which are 1) logistics management efficiency on resource planning 2) logistics management efficiency on warehouse management 3) logistics management efficiency on transportation methods and (4) logistics management efficiency on data security.

Previous researches on logistics management mentioned the utilization of information technology in logistics industry and supply. Gunasekaran et. al. [12] pointed out how information technology provides a competitive advantage in the logistics and supply chain, based on the application of information technology systems and discussed its benefits in the aspect of management science. Hazen and Byrd [13] studied a sample of logistics companies who applies information systems to increase positive performance to the organization. Besides, Barreto et al. [14] highlighted that logistics and industry 4. 0 need technologies to meet customers' demands and invent innovation to promote comprehensive transportation service. Because technology is changing rapidly, every industry must be prepared. Barreto et al. [14] has defined logistics 4. 0 that is the integration of applications to create logistics innovation such as Smart Service and Smart Product to deliver excellent performance and customer satisfaction. Hence, this research investigated implementation of ERP software in logistics management for further the researches on this area.

Firm Performance Sustainability

Several preceding researches were conducted on efficient supply chain activities in management, manufacture and performance improvement by working on related theories such as resource-based view of the firm [37], transaction cost theory, agency theory institutional and network theory [15],[16]. Moreover, since organization' s performance is measured by organization's utilization of technological resources, Barney' s resource-based view of the firm theory [17] has been used to explain how utilization of technological resources delivers excellent performance. The firm that combines resources and capability will gain a special advantage over the competitors and the ability to lead the organization to achieve success. Besides, the resources in the organization consist of competency, assets, capability, information, and knowledge [17],[18]. Moreover, the information technology resource, comprising hardware and software, is considered to be an asset under the information system infrastructure. This asset is a tool that helps developing the capability in the working process Pérez-López and Alegre [19] and the technical capability of the information technology that leads to rapid improvement in performance under organization adaptation to the drastically changing business environment [20]. Thus, the different resources that an organization has will bring growth opportunities and chances in creating beneficial performance to gain different competitive advantages. According to the research, a successful enterprise resource planning system implementation becomes an organizational resource that provides useful information to executives of the logistics industry in a highly competitive era. Hence, the information is a crucial resource that improves entire logistics management efficiency. However, there was a previous research on investment in resources to build capability for the logistics business mentioned that the investment could help develop the capability of the operational performance [21],[22].Furthermore, the performance

can be measured by profitability and sales growth [23],[24],[25],[26]. Moreover, the efficient capital management and fulfillment of customers' satisfaction are also significant issues that boost a competitive advantage. The concept of competitive advantage is the capability to generate more profits than competitors in the same industry and a significant common business goal is the ability to attain sustainable competitiveness. The competitiveness occurs when an organization meets customers' demands by using lower cost or more unique and superior manners to the competitors [27]. The research focused on performance measurement that leads to sustainable competitive advantages in three aspects which are (1) profit growth (2) customers' satisfaction and (3) transportation reliability.

According to the literature review mentioned above, it leads to the conceptual framework for this research as in Figure 1 Structural Equation Model (SEM). The model is an advanced statistics used in data analysis. The important components of the structural equation model are the structural model that shows the causal relationship between external variables and internal variables which may be recursive and linear additive or non-recursive and linear additive and measurement model that shows the relationship between latent variables and manifest variables. Therefore, the structural equation model can point to factor analysis and path analysis. The approach to verify or examine whether the model is consistent with empirical data is statistics compliance with criteria by Hair et al.[28], [29]. Figure 1 describes the application of an enterprise resource planning system which is considered to be a capability-based concept that provides useful financial and non-financial information, reduces costs, increases benefits, is a crucial tool in business competition that transforms works, increases cost-effective, improves logistics management efficiency, and is a fundamental process of joint operations from upstream to downstream. Thus, the capability of the enterprise resource planning system has a significant influence on the sustainable performance of logistics management in building a competitive advantage.

When ERPS is Success of Enterprise Resource Planning Implementation

LME/ RP is Logistics Management Efficiency on Resource Planning

LME/WH is Logistics Management Efficiency on Warehouse Management

LME/ TM is Logistics Management Efficiency on Transportation

LME/ DS is Logistics Management Efficiency on Data Security

FPS is Firm Performance Sustainability

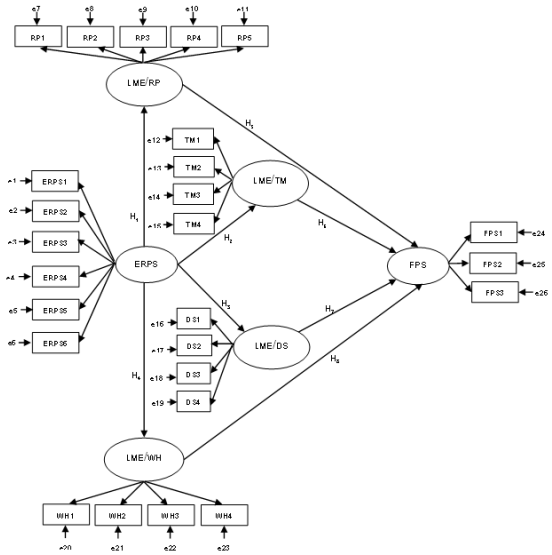

Figure 1. Conceptual Model

3. Methodology

The participants of this research from the registered companies conducting business as an entrepreneur of a transportation business including both transporting freight and passengers as of the first quarter of 2019 are 12,976 persons [30]. The registered companies consist of 7,843 Limited Company and 5,128 Limited Partnership. The suitability for data analysis with AMOS for data collection is considered; therefore, a sample of 10-20 companies per observed variable which is following the rules of clarity (Rule of Thumb) [28], [29] is specified. Thus, the sample is 520 companies selected by random sampling with proportion sampling method. According to the collected questionnaires, there are 414 complete questionnaires for data analysis which is 79.62%. Then the data is analyzed using a structural equation modeling (SEM) to investigate the hypothesis.

The data were collected by distributing the questionnaire to the qualified participants. The quality assessment of research instruments begins with the content analysis by sending to five experts to check the accuracy, the clarity of language, the content coverage, and the consistency between the questions and the objectives to find the Index of Congruency (IOC). The evaluation results of five experts are between 0.75-0.90 which is qualified. Then, the questionnaire is revised following the experts' recommendations and distributed to fifty participants who are not the sample participants to find Item-Total Correlation that holds its value more than 0.4 [29]. Some questionnaires considered by the obtained scored are selected in order to analyze the reliability. It is found that the reliability has an alpha coefficient based on the Cronbach method between 0.85-0.90, which is more than 0.7. The result indicates that all factors are reliable [29]. Besides, the composite reliability is between 0.85-0.89, which is more than 0.7. It indicates that the set of manifest variables could measure latent variables

in the structure with high reliability including the average variance extracted between 0. 42 - 0. 54 which is more than 0.4. The variance from the error is lower than the variance in the manifest variable group. Thus, the measurement model in this research has a good level of structural reliability.

4. Results

The goodness–of–fit index analysis of the causal factors model of the accounting information system quality on supply chain management potential and sustainable competitive advantage is indicated by the index that is used to examine the goodness–of–fit with the criteria in identifying the model that fits the empirical data obtained from the Afthanorhan sample [31] as shown in Table 1. Considering all criteria, it can be said that the level of consistency between the empirical data and the component analysis model is high.

According to the analysis of the relationship between latent variables with standard coefficient and the consideration of the relationship between latent variables and manifest variables by factor loading which is statistically significant for all variables ($p < 0.01$) with a value between 0.75-0.90, the result shows that the model can explain the variation of variables well [32]. Furthermore, the result of the study of the causal relationship model of factors affecting the logistics management efficiency in four aspects found that the success of enterprise resource planning implementation has direct and positive influences on logistics management efficiency on warehouse management (LME/WH) and transportation (LME/TM). The direct positive influences were equivalent to 0.42 and 0.60 respectively which were statistically significant at the 0.01 level.

Table 1. The result of consistency analysis of model

Quality of fit measure	Model's Fit Based on Criteria	Statistics	Results
Chi-square/df	Less than 3	2.45	Passed
p-value of Chi-square	More than 0.05	0.08	Passed
GFI	More than 0.9	0.989	Passed
AGFI	More than 0.9	0.940	Passed
CFI	More than 0.9	0.980	Passed
RMSEA	Less than 0.05	0.032	Passed

The result of the study of the causal relationship of logistics management efficiency in four aspects revealed that it has positive influences on sustainable performance. The study of casual relationship of logistics management efficiency in four aspects showed that the positive influences on sustainable performance were equivalent to 0.16, 0.03, 0.75, and 0.25 respectively which were statistically significant at the 0.05 level.

Table 2 shows the direct influence (DE), indirect influence (IE) and total influence (TE) of causal variables that have an influence on logistics management efficiency and sustainable performance of logistics business group in Thailand

	LME/RP			LME/WH			LME/TM			LME/DS			FPS		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
ERPS	-	-	-	0.42**	-	0.42**	0.60**	-	0.60**	-	-	-	-	-	-
	-	-	-	(0.89)		(0.89)	(0.90)		(0.90)	-	-	-	-	-	-
LME/RP	-	-	-	-	-	-	-	-	-	-	-	-	0.16*	-	0.16*
	-	-	-	-	-	-	-	-	-	-	-	-	(0.08)	-	(0.08)
LME/WH	-	-	-	-	-	-	-	-	-	-	-	-	0.30*	-	0.30*
	-	-	-	-	-	-	-	-	-	-	-	-	(0.14)	-	(0.14)
LME/TM	-	-	-	-	-	-	-	-	-	-	-	-	0.75*	-	1.35*
	-	-	-	-	-	-	-	-	-	-	-	-	(0.43)	-	(0.43)
LME/DS	-	-	-	-	-	-	-	-	-	-	-	-	0.25*	-	0.25*
	-	-	-	-	-	-	-	-	-	-	-	-	(0.15)	-	(0.15)
R^2				0.75			0.78						0.88		

5. Conclusion and Discussion

According to the consistency analysis of the model based on theory, the result found that the model and the empirical data are consistent. It is a confirmation that the causal factors of the success of the enterprise resource planning system implementation has positive influences on logistics management efficiency on the sustainable performance of the logistics business. The finding indicated that the enterprise resource planning system implementation is related to the accounting information system. The quality of the accounting information system is coordinately responsible for processes such as collecting, recording, storing, and revising the business events that are commercial transactions or business activities to input the data into processing process stored as information that is useful for decision making, planning, and ordering. After those processes, it will control and maintain the security of data as a type of business asset which is equivalent to the other assets in order to guarantee the accuracy, completeness, and reliability of information and be responsible for preparing the necessary information for users in logistical management decisions in each area. Furthermore, the result shows that the success of the enterprise resource planning system implementation has direct and positive influences on logistics management efficiency on warehouse management and transportation methods. This finding corresponds to an academic article stating that effective supply chain management needs a system that can link the data accurately, completely and promptly. It is another factor that helps completing the logistics management process [1]. The planning information technology which is the first priority for logistics management consists of (1) material requirement planning (MRP) (2) enterprise resource planning (ERP) and (3) advanced planning and scheduling (APS). It can be seen that both the material requirements planning (MRP) and the enterprise

resource planning (ERP) are systems in the accounting information system. Also, the implementation of information technology in media, presentation, and application and the database in Pongchai Chittamai's work and Boonyanusit's research [33] affects the logistics costs. However, according to the previous research of Mantana Romamwong [34] discovered in the logistics management which is considered to be one of the activities in the supply chain, it indicated that the efficiency of logistics management is caused by various factors, such as the quantity of products, the operating time, the quality, and costs, both fixed and variable costs. Moreover, the information of the costs is the information obtained from accounting information systems. The results of the analysis also support that the efficiency of the four aspects of logistics management has direct and positive influences on the business group's sustainability. In other words, the investment in information technology is a great organizational resource that will lead to rapid organizational performance under the necessity for an organizational adaptation to the drastic changes in business environment [2], [20].The organization that has effective management in the different enterprise resource planning systems will lead to growth opportunities and the opportunity to deliver a satisfactory performance that gain different competitive advantages as well. Thus, the success of the enterprise resource planning system implementation has created a technology providing useful information for executives in the logistics industry in a highly competitive era. The information is also an important resource in an organization that enhances comprehensive logistics management efficiency. Moreover, there has been preceding research on the investment in resources to enhance the capability of the logistics business said that investment will help developing the capability to increase performance [21],[22].

Suggestion

Suggestions for applying research findings

The finding of this research is an application of accounting information knowledge to logistics management in order to help organizations deliver a sustainable performance to gain a competitive advantage. Thus, the knowledge from the study will inform logistics business to acknowledge the significance of an excellent quality of information obtained from new technology. In this case, the accounting information system leads the activities of supply chain management from relationships building with customers, continuity of manufacture to create innovation to products, timely delivery, and procurement of efficient raw materials to create sustainable competitive advantage in terms of costs, products quality, good responses, revenue growth, and reliable transportation.

Suggestion for further research

1. Conduct comparative study by collecting data with neighboring countries to acknowledge whether neighboring countries in the ASEAN Economic Community are different from the country and described detailed comparison.
2. Analyze the situation in which there was a period of price fluctuations on the hypothesis that it would create a competitive advantage with the causal factors from a kind of relationship structure.

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