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The Impact of Enterprise Resources System and Supply Chain Practices on Competitive Advantage and Firm Performance: Case of Indonesian Companies

Bambang Leo Handoko^a, Rudy Aryanto^b, Idris Gautama So^c

^aBinus University, Kebon Jeruk Raya No 27, West Jakarta, 11530, Indonesia

^bBinus University, Kebon Jeruk Raya No 27, West Jakarta, 11530, Indonesia

^cBinus University, Kebon Jeruk Raya No 27, West Jakarta, 11530, Indonesia

Abstract

Enterprise resource planning (ERP) is the core of business information processing. ERP becomes one of the most important factor in business, regardless various core of business (financial, human resources, marketing, operations). Supply chain management (SCM) looks beyond the individual company, taking into account that enterprises are increasingly concentrating on their core competencies, leaving other activities to suppliers. ERP System helps companies to achieve its competitive advantages by enhancing information flow of process through connected functional system between supplier, manufacture, distributor, even up to end user. The research was carried out for 148 Indonesia Companies' executives. Hypotheses was tested using multiple regression path analysis. All the constructs or questions of this research were processed quantitatively using Serqual Equation Modelling (SEM). The results indicated that SCM practices has positive impact on competitive advantage ($\beta = .56, p < .05$). SCM practices has positive impact on firm performance ($\beta = .58, p < .05$). ERP systems is positively related to competitive advantage ($\beta = .68, p > .50$). ERP system has positive impact on firm performance ($\beta = .54, p < .05$). Finally, that competitive advantage positively affect the firm performance ($\beta = .64, p > .05$).

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1. Introduction

Industry competitive has grown more intense over the decades. Rivalry among competitors has made each company who willing to survive, enhance their competitive advantages. Several ways were tried to make it possible, among them were improving product quality, and reducing manufacturing costs. Companies are focusing on supply chain strategies as the next frontier in gaining advantages in efficiency and effectiveness. Some other researchers have conducted similar study about this topic in another country. Something that made this factors are important in Indonesia was because Indonesia is a large country by territory that consisted of thousands islands over the seas. That explains why transportation

cost which is part of SCM becomes very crucial to Indonesian companies, to connected one island or region to the others. One of the reasons for this purpose was the substantial cost reductions to be achieved from enhancing logistics performance. In developing country like Indonesia, logistics cost range around 14,08% of total net sales and 25% of GDP (Hartono, 2010), amount that surprisingly large enough, and even can be counted as one of the main cost. The reason behind this numbers was the condition of Indonesian archipelago that consist of many islands which separated by the sea, in total wide of 5.193 million km² or equal to 2.005 million mile² (Hartono, 2010). This fact is triggering profound changes in the scope and impact of supply chain management. In this digital era, information technology become primary needs in all nationwide companies with no exception. Market are becoming more transparent and online, customer demands are being met in a more customized manner, and trend change rapidly in fast culture civilization (Ciptono, 2007). All these developments were the reason why profound impacts on the ways in which supply chain of enterprises were to be managed.

The academic journal and popular review about new business model for the internet age is growing rapidly (Oberman et al., 2012). In particular as the business environment changes, supply chain design as opposed to supply chain coordination is becoming primary competency. Moreover, a second business-driven phenomenon, enterprise resource planning (ERP) is infiltrating across industry at the same time. ERP the extended of material requirement planning (MRP) and manufacturing resource planning (MRP II) system, now is the standard application in industry. ERP is a comprehensive transaction management system that integrates many kinds of management processing abilities and places data from many departments inside a company into a single database. Some researches have proved that lack of information system support caused failure in supply chain management (Lau and Lee, 2000). An ERP system could potentially enhance transparency across the supply chain by eliminating information barriers and improve information velocity by reducing information delays. But despite that close relationship, many supply chain improvement programs and ERP development managed by different people and different department (Akkermans et al., 2003).

2. Theoretical framework

2.1. SCM effectiveness

There are five key processes in the supply chain; purchasing, producing, distribution, storing and selling. Logistic is the way that company use supplier's process, technology, and competence to improve its competitive advantages. SCM was not only focus on external part of logistic, but also in internal part, it has been widely used especially in scope of business and operations management. In this highly competitive integrity environment, it's not enough for the firms to claim the entire growth, by only integrating; the product design, manufacturing, procurement, and distribution process within the new methods and also the management, in accordance with the implementation of advanced technology. In some literature, SCM activities effectiveness was measured by the successful process of: supplier partnership, customer relationship, customer service management, foreign procurement, purchasing, information sharing, information technologies sharing, etc (Ince et al., 2013). Li et al. (2006) has conduct research on five activities; strategic supplier partnership, customer relationship, level of information sharing, information sharing quality and delay.

The technology and information systems that are available to organizations today lead to the collection and storage of vast amount of data, but commonly enough, organizations may not be taking advantage of the abundant data to develop information systems to improve decision making. The accumulation of data unless they are shared horizontally and vertically in the supply chain and used to make better decisions about inventory, customer service, transportation, etc are almost useless and nothing else. Information was a powerful tool when it is timely, accurate, managed, and shared. Information can be a substitute for inventory, because its ability to reduce uncertainty. The new ERP system is based on the TOC concepts, using several management tools, integrating all company areas and always managing with customer

focus. Its operation is a responsibility of the commercial department, to keep the focus on the customer. (Santos et al., 2010).

2.2. ERP Systems

ERP is the core of business information processing. In most companies, an ERP system is the backbone of the information systems landscape. All major business processes are handled with the help of this system, and most business transactions are recorded in the ERP system (Karl and Kurbel, 2013). ERP systems are multi module application software platforms that help organizations manage the important parts of their business. Key success factor for business processes linked via ERP include planning, order processing, purchasing, accounting and finance, engineering, human resources, production, inventory management, and more. This centralized and shared database system ties the entire organization together, allowing information to be entered once and made available to all users. Business process can also be automated for rapid, accurate execution (Langley et al., 2009 p. 203).

Manufacturer can use a combination of ERP and supply chain execution system to manage the production and distribution of its product. A product requisition begins as work order in the ERP system, which creates a master record that is complete and readily accessible. The ERP system routes the product through various processes (assembly, packaging, and sterilization) at multiple facilities and signal the global distribution centre that a delivery is on the way. The warehouse management system receives the signal and prepares for arrival. This system also receives customer orders through the ERP system, fills orders, prepares them for delivery, and updates the ERP system when the order is shipped. These linked tools provide the company with real-time visibility of customer orders, improved fulfilment accuracy and speed, and lot traceability (Langley et al., 2009 p. 203).

2. Hypothesis development

This research framework has premise that ERP system will have an impact on competitive advantage and firm performance. Not only ERP impact on firm performance, but also SCM practices effect the ERP systems and have impact on competitive advantage and firm performance. According to literatures, we can state that SCM practice is defined as a four-dimensional construct, which are strategic supplier partnership, customer relationship, level of information sharing and quality of information sharing. Otherwise, the ERP system is defined as a five-dimensional construct. These are system quality, information quality, system use, individual impact and organizational impact. Firm performance and competitive advantage through effectiveness and efficiency of business process are concept that has been operational in the existing literature (Langley et al., 2009). Based on this literature support, the expected relationship among ERP systems, SCM practices, competitive advantage, and firm performance are discussed, and hypotheses related to these variables are developed.

H1: The SCM practices have positive impact on competitive advantage.

There are several criteria used to measure firm's competitive advantage. Competitive advantages can be building through: product differentiation, cost leadership, and quick respond (Heizer and Render, 2011). SCM as a support tools for operations management conduct a tools for better and faster respond among supplier, manufacture, and distributor. Besides, SCM gives more effective and efficient cost control to ensure firm's competitive advantage via cost leadership.

H2: The SCM practices have positive impact on firm performance.

Most organizations have measures of performance or metrics in place to analyze and evaluate their efficiency and progress over different time periods. Sometimes, such measures are used for setting

baseline performance objectives or expected outcomes, example: orders filled and shipped per day. Supply chain practices provide better performance for that measured activities (Langley et al., 2009)

H3: ERP system has a positive effect on firm performance.

Based on preliminary study, it states that the ERP systems have positive impact on the firm performance (Wieder et al., 2006). Researcher has examined the impact of the ERP system adoption on firm performance by comparing companies using ERP systems and others that do not use them. They stated that both ROI and turnover of the ERP system users significantly improved.

H4: ERP system has a positive effect on competitive advantage.

ERP systems replace complex and sometimes manual interfaces between different systems with standardized, cross-functional transaction automation. Order cycle times (the time from when an order is placed until the product or service is delivered) can be reduced, resulting in improved throughput, customer response times, and delivery speeds (Heizer and Render, 2011).

H5: Competitive advantage has positive effect on the firm performance.

When a firm sustains profits that exceed the average for its industry, the firm is said to possess a competitive advantage over its rivals. The goal of much of business strategy is to achieve a sustainable competitive advantage. A competitive advantage exists when the firm is able to deliver the same benefits as competitors but at a lower cost (cost advantage), or deliver benefits that exceed those of competing products (differentiation advantage). Thus, a competitive advantage enables the firm to increase its performance and create superior value for its customers and superior profits for itself (Stonehouse and Snowdon, 2014)

4. Research methodology

This study has been provided to verify and investigate the impact of SCM practices and ERP systems on competitive advantage and firm performance among the Indonesian public companies. The methodology initially involves the review followed by the identification of a pool of items to measure the constructs forming the research model. The pool itself is used to develop an initial survey and was subject to a pilot study for measurement purification prior to the creation of the questionnaire and the implementation of the main study. The data needed for field research has been collected through survey research method, which is described and analyzed in more detail in these following sections.

4.1 Measures and sampling

To verify the hypotheses, multi-item scales adopted and developed from preliminary studies for the precise measurement of the constructs were used. According to Li et al. (2006), SCM practices have four dimensions: strategic supplier partnership, customer relationship, level of information sharing, and quality of information sharing. Furthermore the ERP system is conceptualized as a five-dimensional construct. These are system quality, information quality, system use, individual impact and organizational impact. These measurement items are adopted from DeLone and McLean (2004). Competitive advantage and organizational performance are concepts that have been operational in the existing literature (Ince et al., 2013).

The overall population of this research was 502 companies that listed in IDX until end of year 2014. The corporation was selected and contacted through executive manager club forum in the listed company forum. The use of key informants as sources of data is standard practice in business and management

research. From the overall of 502 questioners delivered, 187 was agreed to answer. Among the 187 questioners that return, 39 were deleted due to incomplete and inconsistent information. The rest of 148 answered questioners were used for further analysis. The total response rate was 148 divided by 502 that equal to 29.48%.

4.2 Measure validity and reliability

This research use Exploratory Factor Analysis (EFA) to test the validity and reliability for data gathered before further analysis for hypotheses test. The validity and reliability test was conducted including 58 measured items of 9 variables. The Kaiser-Meyer-Olkin (KMO) score measure of sampling adequacy was .93, and the Bartlett test of sphericity was significant at $p < .01$ ($X^2 = 5376.48$), indicating the suitability of these data for factor analytic procedures. In EFA analysis, this research used four factors from ERP systems construct items, that were: system and information quality, system use, individual impact, and organizational impact, and use three factors from SCM practices, which consist of: strategic partnership with suppliers, customer relationship, level of information quality and sharing. The other variable components are both one factor from performance and competitive advantage. The next step we calculate means and standard deviations for each variable and created a correlation matrix. It is shown in Table 1.

Table 1. Mean, Standard Deviation, and Correlation Coefficient

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. System and Information Quality	3.86	.76	$\alpha = .88$								
2. System Use	4.06	.82	.68**	$\alpha = .87$							
3. Functional Impact	4.02	.94	.78**	.67**	$\alpha = .92$						
4. Organizational Impact	3.56	.86	.72**	.83**	.86**	$\alpha = .85$					
5. Strategic Relationship with Supplier	3.64	.64	.85**	.75**	.69**	.76**	$\alpha = .94$				
6. Customer Relationship Management	3.84	.75	.65**	.64**	.79**	.65**	.79**	$\alpha = .82$			
7. Information sharing quality	3.71	.85	.58*	.79**	.71**	.63**	.87**	.78**	$\alpha = .84$		
8. Firm Performance	4.00	.87	.62**	.69**	.77**	.74**	.63**	.75**	.68**	$\alpha = .85$	
9. Competitive Advantage	3.98	.92	.71**	.82**	.69**	.84**	.89**	.73**	.65**	.76**	$\alpha = .91$

Reliability of each variable are tested using Cronbach’s Alpha value. All variable’s Cronbach’s Alpha value on this research are more than .700, means that all variables are reliable and eligible to test hypotheses. From the table 1, it can be seen that means and standard deviations are within the expected ranges too. It is also seen as a result of the correlation analysis that all of the constructs each differing from each other as a factor, are significantly related to each other when one-to-one correlations are considered. The results of this statistical validity and reliability tests has proved that the factors of the variables are eligible, valid and reliable to further of hypotheses test.

4.3. Hypotheses testing

Hypotheses test on this research is using Structural Equation Modelling (SEM) method. We constructed the composite scores of 9 variables. We used Path (SEM) analysis by the use of AMOS version 22. We found that the covariance between ERP systems and SCM practices were significant, as

shown in Fig 1. The results indicate that both SCM practices and ERP system happen simultaneously and affect each other. Fig 1 demonstrates the relationships among ERP systems, SCM practices, competitive advantage and firm performance. The results indicated that SCM practices ($\beta = .56, p < .05$) has positive impact on competitive advantage, supporting H1. SCM practices has positive impact on firm performance ($\beta = .58, p < 0.5$). We concluded that H2 is supported.

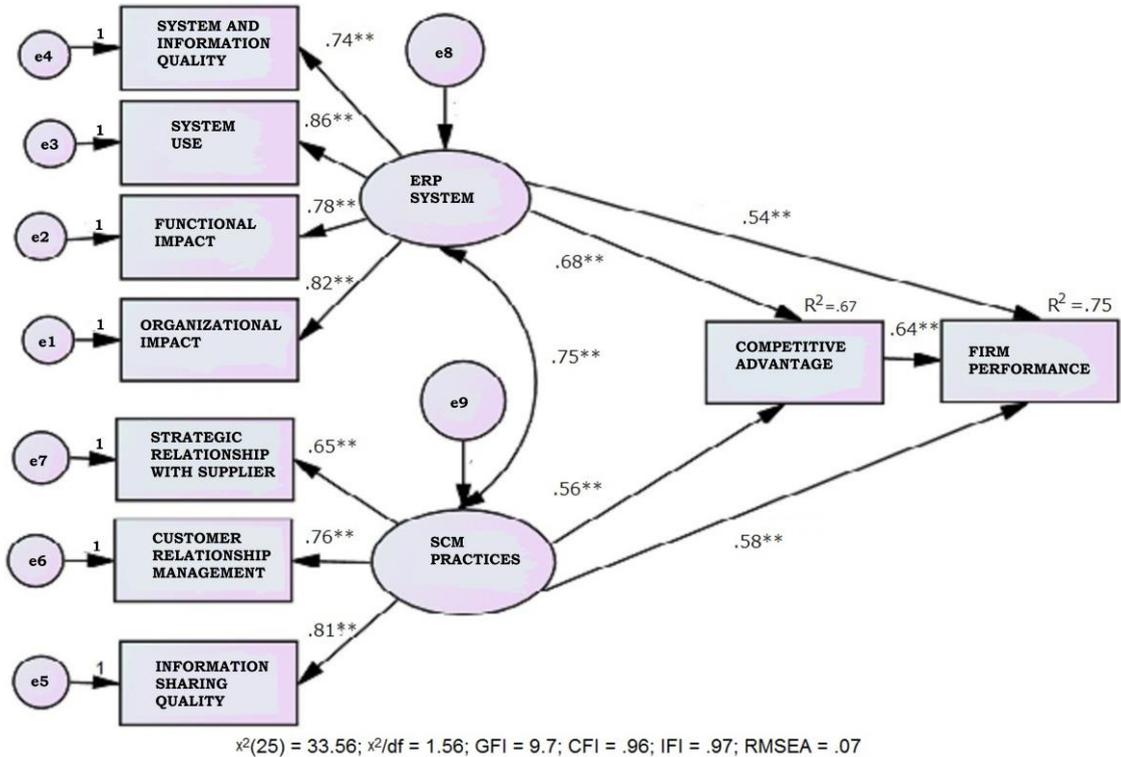


Figure 1 Result of the Path Analysis

According to the hypotheses test result ERP systems on competitive advantage, we found that ERP systems is positively related to competitive advantage ($\beta = .68, p > .50$). Therefore, research hypothesis H4 is supported. On the other hand, ERP system has positive impact on firm performance ($\beta = .54, p < .05$), supporting hypothesis H3. Finally we found that competitive advantage positively affect the firm performance ($\beta = .64, p > .05$), is supporting H5. Also this research checked the quality of the SEM analysis. The results exhibit that all the measurements have significant loadings to their corresponding second-order constructs. Overall, model has a satisfactory fit with $\chi^2(25) = 33.56$ and $\chi^2/df = 1.56$; Goodness of Fit Index (GFI) = 9.7; Comparative Fit Index (CFI) = .96; Incremental Fit Index (IFI) = .97; Root Mean Square Error of Approximation (RMSEA) = .07

5. Discussion and conclusion

5.1. Discussion

This research has precisely tested a framework identifying the impact of SCM practices, ERP system to competitive advantage and firm performance among 148 public companies that listed in Indonesia Stock Exchange. This research used path analysis via application of SPSS AMOS 22 program for testing the hypotheses. ERP system has positive impact on both competitive advantage and firm performance.

The standardized path coefficients for ERP system on competitive advantage was .68, while on firm performance was .54. SCM practices have positive impact on competitive advantage and firm performance. The standardized path coefficients for SCM practices on competitive advantage was .56, while on firm performance was .58. Other than that competitive advantage has impact on firm performance, which can be seen on standardized path coefficients .64. The results from these hypotheses testing indicates that all premises on this research were tested and accepted, each variables becomes a cohesive factor for another factors

5.2. Conclusion

The result of this research fully supported our entire hypothesis. This study provides organization a proved reason to improve and extend the SCM practices and ERP System, through the innovation, investment, and development of these systems. The efficiency and effectiveness of ERP System and SCM practices have positive impact on both competitive advantage and firm performance. Have one or more competitive advantage made company has better performance. Nowadays the business competition has moved from among organization to between the supply chain (Ince et. all, 2013). Organization used SCM practices and ERP System to minimize the error on process and lower cost production on gain competitive advantage in cost leadership and increase the firm's performance. It must be noted that SCM practices and ERP system may influenced by such contextual factors like: firm size, distance, quantity of transaction, type of industries, buyer preference and etc. For next research that might conducted by other researchers, hopefully can accommodate another factors that has not been explored on this research

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