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# E-Supply Chain Management Value Concept for The Palm Oil Industry

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## Abstract

*The harmony of information technology (IT) and business is an asset and the foundation of the organizations to improve and build business competitive strategies. There is a need to integrate and coordinate all business partners of the organization, particularly those associated with information technology and suppliers, raw materials or resources needed in the supply chain management. The effectiveness of an electronic supply chain management (E-SCM) in the palm oil industry will be the crucial factor to provide the organization with business opportunities and improve competitive position in the marketplace. This study aims to investigate critical factors E - Supply Chain Management in oil palm industry through Theory Resource-Based View (RBV). With RBV theory, this study develops a concept that can be utilized for identifying the critical success factors of E-SCM value in palm oil industry. The quantitative research method is used for collecting data in four Palm Oil organizations in South Sumatera. This research reveals that IT human resources and IT infrastructure are the critical factors and capability to operate E-SCM effectively and efficiently.*

**Keywords:** e-supply chain management, resource-based view, IT infrastructure, IT human resources

## Introduction

Organizations are increasingly concerned about the use of Information Technology (IT) in their operations. This is because IT implementation can help them to meet and compliance standards with a competitive business strategy. In addition, with IT the organizations might develop a foundation for its business process and achieving business and IT harmony. *Supply Chain Management (SCM)* is an approach that is efficiently implemented to integrate suppliers, business partners, and warehouses in order to distribute products are produced with the right quantity, appropriate location, and the right time to minimize costs and satisfy customer needs (Simchi-Levi et al. 2008). The development of *SCM* has changed in line with the development of technology which can be known as the *E-SCM*. *Electronic Supply Chain Management (E-SCM)* is a system developed to meet the stakeholder needs and improve the competitive position in the marketplace that has been supported by an electronic information exchange system, in principle the E-SCM functions the same as *SCM* in general (Blanchard 2010). E-SCM is a platform used to operate *SCM* manually being a digital system, the use

of the E-SCM method will greatly help the behavior business to monitor the turnover of goods that occur under the SCM systems (Lancioni et al. 2000; Soo Wook 2006).

The role of the E-SCM of an organization will be the crucial factor to whether an organization will be competitive in the market (Kasemsap 2015). The oil palm industry / plantation is one of the strategic industries of the agricultural sector (agriculture-based industry) and one of the sectors in Indonesia, has a significant contribution to non-oil and gas exports (Asmani and Si 2014). Recognizing that oil palm industry has shown a significant contribution in the global and national economies and even locally, therefore it is necessary to develop a concept or framework from the analysis of E-SCM capabilities and strategies to address issues faced in an effort to increase added value and competitiveness industry to national palm oil industry by implementing Electronic Supply Chain Management (E-SCM).

The concept of the value of E-SCM is a popular approach to evaluate the performance of E-SCM services (Hu and Hsu 2010; Ninlawan et al. 2010). It provides an inclusive framework for identifying organizational performance. Mukharromah et al. (2017) for example, *Green Supply Chain Management* (GSCM) is one method used to improve the performance measurement method of business units in an organization. GSCM is a performance measurement model that integrates all processes along the supply chain, both ones involve the forward chain or backward chain with considering environmental aspects. Wahyuniardi et al. (2017) discuss performance measurement supply chain with the Supply approach Chain Operation References (SCOR). Supply chain mapping classification is obtained by observation and interview with the supply chain manager classified by five main processes namely plan, source, make, deliver and return at SCOR. Azmiyati and Hidayat (2017) examine the measurement of performance against supply chain management carried out in the process of the residential stage finished product and release finished product to deliver. The method used in measuring performance is a method SCOR which is assisted by the FAHP method (Fuzzy Analytical Hierarchy Process) inside the process of determining the weight in each metric. The results of these calculations will be known organizational performance indicators that are relatively low so that it can be given proposed improvements and known what metrics only that greatly affects the performance of workers. Tanaka and Nurcaya (2012) explain how to assess whether supply chain management is a performance the organization has done well seen from the four balanced scorecard perspectives namely customer perspective, financial perspective, internal business process perspective, and learning perspective and growth. The balanced scorecard is a system where integrated performance management connects various objectives, performance measures and strategies of an organization, with interpreting the strategy into a process that not only became the top management mil but also every individual at every level of the organization.

The purpose of this study is to identify critical factors to evaluate the value of E - SCM in the Palm oil industry. A concept developed by the competitive position of an organization is determined by the main resources of organizations. Most resources require to be analyzed and the most important of its existence before the organization determines the strategy or build internal governance of organization resources compared to external factors (Antoni et al. 2018; Sharma and Vredenburg 1998). Resource-Based View (RBV) is the main theoretical framework for understanding relationship between IT and business value (Wernerfelt 1984). With this theory, this research can identify the capabilities of organization as a set of potential resources and capabilities to improve its performance (Antoni et al. 2016; Antoni and Jie 2013). The aim of this research is to identify IT capacity of E-SCM in organization especially in Palm oil industry for optimizing E-SCM by analyzing internal resources, namely IT human Resources and IT Infrastructure.

IT infrastructure including systems and technology is a significant factor that coloring business trends today. Technology is designed to complement the human resource capacity and help someone to apply their knowledge (Antoni et al. 2016). In addition, the adoption of technology is employed to support capacity of staff or human resources and replace it (Benitez-Amado and Walczuch 2012; DeLone and McLean 1992). Therefore, the IT infrastructure is the human capacity that used to build on competence of IT.

This research consists of parts, namely: the first part is Introduction. This section describes a comprehensive of the content, issues of this study. The second section contains a literature review,

which includes previous studies that serve as a basis for foundation and strengthening the points of strategic planning ideas. The third section is the research methodology, describing the research method. This includes research design, population and samples, research instruments, data collection techniques and data analysis techniques. The fourth section is a discussion of the results of the study consisting of analyzing and reviewing the readiness of the company. The fifth part is the final or concluding part of this research which contains conclusions from the results of the study as an affirmation of the answers to the research problem.

## Developing E-Supply Chain Management Concept

### *Electronic Supply Chain Management*

According to Indrajit and Djokopranoto (2002), Electronic Supply Chain Management (E-SCM) is a management concept in which organizations effort to utilize information and internet technology to integrate all of their business partners, especially those related to the system of supplying raw materials or resources needed in the production process. According to Chaffey (2009) E - SCM is defined as an approach and strategy that is applied in internet technology as a channel system connecting all organizational natural supply chains to improve service or provide benefits to the customer.

Several previous studies have suggested compulsory components or resources be managed by the company. The research conducted by Ravichandran et al. (2005) states the influence of the information system (IS) resources and capabilities on organizational performance . It contains four elements that connected each other's, namely the organizational performance, IT Support to core competencies of the organizations, IS competence, and IS Resources. Arslan and Ozturan (2011) argue that there are two factors in the process of creating business value, firstly: Complementary resources will provide a sustainable competitive advantage for the company, and secondly, IT investment is in the breed with the company's strategy. Bharadwaj (2000) identify the factors of IT human resources and IT Infrastructure, by using the concept RBV theory. The organization's resources are part of the initial analysis step before the organization determines the strategy or conducts IT governance. Gómez-Cedeño et al. (2015) identify the supply chain management factors namely firstly, the ability of human resources who have the technical skills of IT. It is designed for equipping IT human resources and helps them to apply their knowledge. Hence, the adoption of technology to support capacity's someone and not replace it. Secondly, technology is an adopted to provide facility for the achievement of business objectives of an organization by providing a framework for cooperation between business partners through both electronic media and communication. It can provide benefits in enhancing competitive advantages, reducing operational costs, and achieving better cooperation and coordination between business partners in the supply chain. Table 1. shows the summary of prior research related to the use of IT in E-SCM implementation.

**Table 1. Previous Studies**

Resources / Factors	Ravichandran & Lertwongsatien (2005)	Arslan & Ozturan (2011)	Gómez-Cedeño et al. (2015), Bharadwaj (2000)	Tanaka (2018)	This research
IT Human Resources	✓	✓	✓		✓
IT Infrastructure	✓	✓	✓		✓
IT Partnership Quality	✓				
Complementary Resources		✓			
Information Sharing				✓	
Long Term Relationship				✓	
Cooperation				✓	
Process Integration				✓	

This study uses a model developed by Benitez-Amado et al. (2010), Bharadwaj (2000) Arslan and Ozturan (2011) The model has two factors, namely the IT human resources is the ability of human resources to work on IT competencies; and IT Infrastructure is a technology resource that provides a platform for application systems and technology to organizations. To identify the ability of the IT human resources and IT Infrastructure in E-SCM, this study will use the Theory of Resource-Based View.

### ***Resource-Based View Theory***

Wernerfelt (1984) argues that organizations can obtain and maintain a competitive advantage by developing and using a valuable resource and capability. Barney (1991) states that sustainable design advantages exist in organization only if the efforts of other organizations are unsuccessful to replicate these advantages. Meanwhile, the RBV theory states that organizations are not able to expect to purchase or take the sustainable competitive advantage from another organization. This is because that advantage is rare, difficult to replicate, and irreplaceable resources. Hafeez et al. (2002) define ability as a combination of an organization obtained from a resource that allows to carry out several business processes or activities to achieve competitive advantage.

The *RBV* highlights the importance of resources and capabilities that are valuable, rare, difficult to replicate and are difficult to provide services or produce more economical products (Barney 1991; Ray et al. 2004). Adopting the RBV theory, much research has identified the resources and capabilities in an organization. For example, Kettinger et al. (1994) argue that the ability of an organization to achieve profits is determined by Information Technology (IT) infrastructure. Bharadwaj (2000) argues that IT capability is the ability of an organization that is created precisely by the interaction between the IT Infrastructure, IT human resources and IT intangible assets in an organization to improve the performance of organizations. Tippins and Sohi (2003) argue that IT capabilities are the ability of organizations to use IT resources to improve performance. The following sections are description about factors of *E - SCM* based on Resource Based View Theory approach namely IT human resources and IT Infrastructure.

### ***Human Resources and Information Technology***

The IT of human resources is the ability of human resources to carry out duties and responsibilities given to them with education, sufficient training, and experience (Antoni et al. 2016; Antoni and Jie 2012). Duncan (1995) defines that human resource power is the main supporting pillar, as well as the drive for organizational activities in business, realize the vision and mission and goals of the organization. This is because the organizations should be ensured that management of human resources done as well as possible to be able contribute optimally within efforts to achieve organizational goals.

The process of planning and managing Human Resources Information Technology, is identify staffing needs, determine the recruitment process, determines the programs and training allocating human resources IT, determine reward, and so on (Gabčanová 2012). It can be concluded IT human resources is human resources with technical capability. IT technical skills are the appropriate technical skills to be updated, which are related to systems both *hardware* and *software* held by employees.

According to (Benitez-Amado et al. 2010), IT human resources consists of two indicators of managerial and interpersonal abilities and technical and analytical skills. Managerial ability and interpersonal skills are required by IT employees in conducting their organizational business processes through knowledge. In conducting business activities and a job in a particular field, requiring the understanding how the resources and capabilities work and interact together. There are two factors of IT human resources within the context of the organizations namely a). Knowledge of business is referred to as knowledge capital or intellectual capital in business. knowledge in this business is an important element that enables organization to operate in the targeted sector as an organization purpose, b). Knowledge of



technology and business processes is utilization of technology Information aligned with organizational structured business plans. The aim of this knowledge is every application of Information Technology can provide value to organization, c). Knowledge of the procedures and regulations for the organization is a work principle professional that should be obeyed by each element in the organization. This is aimed to set each element in the organization to be able to perform its duties professionally, d). Understanding of the main organizational values organization should be able to create conditions where each element can work together effectively and optimally. The main value is also outlined that the purpose of the organization has to be in accordance with the ability of the IT human resource then that organizational goals can be achieved, e). An understanding of the division of duties within the organization is the elaboration of tasks that should be adjusted between the ability and type of work to be handled, besides that it is accompanied by procedures and work discipline to be easily understood by the workers concerned, f). The ability to operate the routines and the system implemented in the IT department is the ability in the field of IT should be owned by IT human resources to conduct the system that applied in organizations.

Technical IT and analytical ability to solve several issues related to IT in an organization. However, a systematic framework is needed to accelerate finding solutions to these issues. Technical ability is the capability of IT human resources in organization that will be able to exploit the existing working methods. This means that organizations that have the technical capability that includes working procedures, working methods, and tools that exist as it has in the value can increase the work maximally and greatly. The ability to learn and apply new technology is an effort to strengthen the carrying capacity of science and technology in increasing the competitiveness of organizations. The skills and knowledge of IT projects are ability of IT human resource particularly for IT projects, project attributes, and describes the various obstacles in the project. The ability to manage and integrate IT into the business is the knowledge, skills in leveraging IT technologies in the organization as a competitive strategy in business.

### ***Information Technology Infrastructure***

Information technology infrastructure (IT infrastructure) is the fundamental IT planning capability in organization. It includes technical and human capabilities that are realized in the form of services and reliable applications. In general, IT infrastructure consists of four main elements, namely hardware, software, databases, and networking. Each element has the complexity of the issue itself that requires good IT governance that is able to generate value for the organization through a reliable package of services (Jogiyanto 2003).

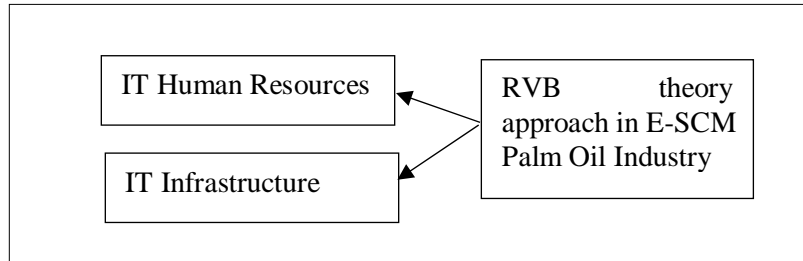
Information technology infrastructure is a shared technology resource that provides a platform for detailed application of company information systems (Antoni et al. 2016; Antoni and Jie 2013). Information technology infrastructure includes investments in hardware, anti-software, and services such as consulting, education and training that are spread throughout the organization or scattered throughout the business units in the organization. According to Powell and Dent-Micallef (1997 IT Infrastructure consists of two indicators, namely Network and Platform, and Data and Application.

In term of network and platform, IT infrastructure consists of the existence of infrastructure to connect business units is the most important objective of Information Technology infrastructure within the organization is to increase the dissemination of information to entire business units; availability of an infrastructure to connect with business partners with the use of the system can reduce costs, unique products and relationships with customers and business partners can be perceived by the organizations; The existence of infrastructure to support business operations is one of the factors that contributed to the operational progress of the organization's business with the support of IT infrastructure; Infrastructure network capacity, IT networks can improve coordination in efforts to develop new products or services for the organizations.

In term of data and application, IT infrastructure indicators in the corporate context consists of; Infrastructure network speed, software development, and development can expand the network throughout the business unit and stakeholders; Data distribution in the organization, information technology is used to process data, including processing, obtaining, compiling, storing, manipulating

data to produce quality information and then distributed; Modularity of application systems, utilization of IT as a strategy for how organization place IT for review, monitoring and evaluation ;Standardization of infrastructure components, information technology help analyze business processes and the development of enterprise information architecture wider.

Based on the description above, this research develops a conceptual framework to clarify how theories relate to various factors that have been identified as important issues. Frameworks in this study can be illustrated in Figure1. below.



**Figure1. Conceptual Framework**

In this study, this research is identified two factors *E-SCM* utilized in the palm oil industry, namely, IT human resources and IT Infrastructure. Table 2 shows a summary of the critical factors of IT human resources and IT infrastructure within the organization in accordance with the RBV theory approach that the organization’s competitive advantage for conducting several business processes or activities is derived from unique resources and capabilities.

**Table 2. Research Variables**

Variable	Dimension	Indicator	Item	
<b>IT human Resources</b> is one of the most important and influential things in the success of an organization in utilizing information technology. human resources, especially those in charge of IT competencies, have a significant role in developing in the organization, and therefore they must have strong technical, analytical, managerial and interpersonal skills.	Managerial	Managerial and Interpersonal Ability (A)	A1	Knowledge of business process
			A2	Knowledge of the organization’s technology and business processes
			A3	Knowledge of procedures and regulations in the organization
			A4	Understanding of the organization’s main values
			A5	Understanding of the division of tasks within the organization
			A6	Ability to run routines and systems that are implemented in the IT department
	Analysis	Technical Ability and Analysis (B)	B1	Technical Ability
			B2	Ability to learn and apply new technology
			B3	IT project skills and knowledge
			B4	The ability to manage and integrate IT into business
<b>IT infrastructure</b> is a resource that plays a significant role in organizations in the utilization of information technology, IT infrastructure such as computers, additional equipment, software, procedures, and services. All of these resources are used to collect, store, analyze and distribute data within the organization.	Network	Network and Platform (C)	C1	The existence of infrastructure to connect business units
			C2	The existence of infrastructure to connect with business partners
			C3	The existence of infrastructure to support business operations
			C4	Infrastructure network capacity
	Data	Data and Application (D)	D1	Infrastructure network speed
			D2	Data distribution within the organization
			D3	The modularity of application systems
			D4	Standardization of infrastructure components

## Research Method

This research is designed to find out a situation regarding the application of a research model to real conditions in an organization that is used as a case study by researchers. The study used a survey method, where data were collected from a sample of the oil palm industry population using questionnaires as a tool for primary data collection by distributing questionnaires to 200 respondents to organization and its stakeholders. Secondary data is a collection of data previously collected from documents and literature studies, both published and unpublished relating to the palm oil industry. The population in this study is organization in the palm oil industry that fulfills the characteristics of the Palm Oil organizations and uses the benefits of information technology / *E-SCM* in the palm oil industry. The selection of respondents is done by means of *purposive sampling (Non-Probability Sampling)*, namely selection with consideration of respondents based on industry in the Musi Banyu Asin (Muba) district of South Sumatra province. Based on data from the South Sumatra Plantation Service in 2011, the Province of South Sumatra is one of the largest palm oil producers in Indonesia with an area of 866,763 hectares (Asmani and Si 2014).

To adequately address the research question, the proposed framework has to be validated first. A survey is conducted for collecting the data. The questionnaire includes three types of questions for capturing (a) the demographic profile of the participants, (b) the IT Infrastructure, and (c) the overall perceptions about the IT Human Resources. The questionnaire uses a five-point Likert-type scale where the value “1” represents “not important at all” and the value “5” represents “highly important.” Prior to the distribution of the questionnaire, a pilot study was conducted to test the appropriateness of the questionnaire items.

The paper-based survey was conducted in South Sumatera between January 2017 and March 2017. The target population from the Palm Oil industry has used IT in their daily business operations. Approximately 300 questionnaires are distributed. To enhance response rate, 350 questionnaires with a hardcover letter. 36 questionnaires are undeliverable and 44 are identified as incorrect addresses from follow up mobile phone calls. Most of the undeliverable questionnaires are caused by organization out of business. A large number (70) of respondents refuse to participate in the survey. The reasons for non-response could be respondents' lack of interest in the research topic, their level of education (low education level), or some other social and economic factors. A total of 200 responses are received with a 50.7 % response rate. Six responses are unusable; therefore, they were removed from data analysis. The remaining 200 responses were retained. Table 3 shows the demographic profile of the respondents. Data are stored and screened using SPSS Statistics for addressing the missing values, validity, reliability, outliers, normality.

**Table 3 Profile of Respondents**

No.	Respondents	Num.	%	No.	Respondents	Num.	%
1	Sex			4	Experience		
	Male	130	65		<5 years	50	25
	Female	70	35		6-10 years	80	40
2	Education				11-15 years	35	17.5
	High school	110	55		16-20 years	27	13.5
	Diploma	20	10		> 20 years	8	4
	Bachelor	50	25		5	Position	
	Postgraduate	20	10	director		4	2
3	Age			The manager		8	4
	<30 years old	30	15	Marketing		40	20
	31 - 35 years old	87	43.5	Production employees		88	44
	36 - 40 years old	50	25	Administrative Staff (Finance, R & D staff, and those who understand the condition of the company)		40	20
	41 - 45 years old	25	12.5	Supplier	20	10	
	46-50 years old	8	4				

Statistical analysis as showed in Table 3 indicates that the demographic characteristics of questionnaire respondents. Our survey is targeted at several industries and managers above the middle management level. There are two main reasons for this. Firstly, the capability of IT infrastructure and IT human Resources contribute to greater effectiveness in a wide range of industries and organizations. Secondly, for increasing the generalizability of these research findings, we utilize a diverse sample of person who generally understands their organizational capabilities and has the capability utilizing IT resources to perform business operations in their organization. Therefore, the respondents could effectively provide correct responses for our questionnaire survey.

The collected data are analyzed using SEM techniques for identifying the critical factors for evaluating value of e-supply chain management in the Palm Oil Industry. Such a technique is required in this research for testing the relationships between measured variables and unobserved constructs, and for estimating the relationships between unobserved constructs. SEM uses various types of models to depict the relationships among observed variables (Hair 2010). To assess the initial conceptual constructs, confirmatory factor analysis (CFA) and analysis of Moments structures (AMOS) version 21 are used. CFA tests a measurement theory by providing evidence on the validity of individual measures based on the model's overall fit and other evidence of the construct validity (Hair 2010). To assess the model's overall fit, various goodness-of-fit (GOF) measures were used including chi-square ( $\chi^2$ ), the ratio of  $\chi^2$  to degree of freedom ( $\chi^2/df$ ), the GOF index (GFI), root mean square error of approximation (RMSEA), Tucker–Lewis index (TLI), and comparative fit index (CFI). The maximum likelihood estimation technique is used for estimating the parameters in the model.

## Data Analysis

Figure. 1 shows the initial measurement model developed for evaluating value of e-supply chain management in Palm Oil Industry. The measurement model for IT human resources and IT infrastructure. IT human resources determined by managerial and analysis capability and IT infrastructure consists of network and data capability.

Managerial capability consists of Knowledge of business process (A1), Knowledge of the organization's technology and business processes (A2), Knowledge of procedures and regulations in the organization (A3), Understanding of the organization's main values (A4), Understanding of the division of tasks within the organization (A5), Ability to run routines and systems that are implemented in the IT department (A6). Analysis ability is determined by Technical Ability (B1), Ability to learn and apply new technology (B2), IT project skills and knowledge (B3), The ability to manage and integrate IT into business (B4).

In terms of IT infrastructure, network is determined by the existence of infrastructure to connect business units (C1), The existence of infrastructure to connect with business partners (C2), The existence of infrastructure to support business operations (C3), Infrastructure network capacity (C4). Data capability consists of Infrastructure network speed (D1), Data distribution within the organization (D2), Modularity of application systems (D3), Standardization of infrastructure components (D4). None of the indicator variables in either model is cross-loaded on multiple constructs.

To analyze and evaluate the framework, construct and related indicators, convergent, discriminant and factorial validity are conducted in this research. Convergent validity is conducted by considering; (a) loading factor (SFL) in each indicator, (b) construct reliability (CR) and (c) average variance extracted (Hair et al. 2010). Loading (SFL) in each indicator should be more or equal to 0.5 for use in further analysis. Construct reliability for each is calculated as the squared of the loading factors sum divided by the squares sum of summing factor loading and the sum of error (Hair et al. 2010). Acceptable CR values must be between 0.6 and 0.7 (Hair et al. 2010). The average variance extracted (AVE) is calculated by dividing the total of all SFL squares by the number of indicators or items (Hair et al. 2010). AVE value received must be more than 0.5. All indicators in each construct that met the above requirements are re-examined with discriminant validity. It measured the extent of the differences in each construct in the e-government model. To obtain the satisfactory value of discriminant validity, the

AVE quadratic roots for each construct must be greater than the correlation between them (Hair et al. 2010). Furthermore, the validity factor test is performed for each construct an indicator that meets the value in the convergent and discriminant to represent the same value level.

The concept of the E-SCM value model (Figure 1.) has been tested and evaluated for validity test by performing CFA (Confirmatory Factor Analysis) with GFI value (0.763), RMSEA (0.075), TLI (0.875), CFI (0.856), and p-value 0,000). These initial results indicated that the model is inadequate. Hence, it is essential to conduct the congeneric factor test model for each individual construct. Its findings show that there is one item removed. The item deleted on IT human resources is A4. Meanwhile, there is no item deleted in IT infrastructure. The results of this congeneric factor analysis test can be seen in Tables 4 and 5. This model is redefined by standardized factor loading, standardized residual covariance matrix, and modification Indies. Table 6 shows the GOF results from e-SCM value model testing. The GOF results showed that the test results are received with RMSEA (0.05), GFI (0.95), TLI (0.98), AGFI (0.92) and CMIN/DF (1.23). To complete the convergent validity test, CR value is calculated in every construct. As shown in Table 7, all constructs have values within the accepted range. This can be seen by the AVE value of each greater than 0.5. The SFL value for each indicator of the final model test showed above a critical value of 0.5.

**Table 4. Evaluation Criteria for Goodness of Fit variable IT Human Resource**

The goodness of fit index	Cut-off Value	Model Results	Information
$X^2$ - Chi-square	Expected to be small	10.842	Pretty good
Probability	<0.05	0.004	Well
CM IN / DF	≤ 2.00	1.221	Well
GFI	≥ 0.90	0.975	Well
AGFI	≥ 0.90	0.973	Well
TLI	≥ 0.95	0.949	Well
CFI	≥ 0.95	0.983	Well
RMSEA	≤ 0.08	0.014	Well

Source: Primary Data After Processing

**Table 5. Evaluation of the criteria for Goodness of Fit Indices of IT Infrastructure**

The goodness of fit index	Cut-off Value	Model Results	Information
$X^2$ - Chi-square	Expected to be small	24,168	Pretty good
Probability	<0.05	0.000	Well
CMIN / DF	≤ 2.00	1.08	Well
GFI	≥ 0.90	0.94	Well
AGFI	≥ 0.90	0.92	Well
TLI	≥ 0.95	0.98	Well
CFI	≥ 0.95	0.96	Well
RMSEA	≤ 0.08	0.06	Well

Source: Primary Data After Processing

All constructs of this model that have passed the convergent validity test are validated for discriminant validity test. Discriminant validity among other factors of this model is examined by using Farrell (2010) model. The results reveal that the discriminant validity in each pair of constructs with AVE square root is greater than the estimated correlation between them.

Factorial validity test is conducted to assess whether the factors passing the convergent and the discriminant ones showed the same level of the construct, and to detect and remove items that having

cross-loading (Molla et al. 2009). The results verify that the factorial model has sufficient validity. The GOF of the final measurement model is also within an acceptable range. CMIN (X2) of 154.435 with and CMIN / df 1,23 indicated that it is quite in accordance with the value suggested by Hair, et al. [38]. In addition, the p-value for the model is 0.05 very closed to an acceptable p-value (Pb 0.08). Furthermore, the fact that GFI (0.95) reached 0.95 indicated that this model is an adequate match. Similarly, both TLI (0.98) and CFI (0.97) are greater than 0.95, indicating that it is near perfect. Moreover, RMSEA (0.05) is equal to 0.05.

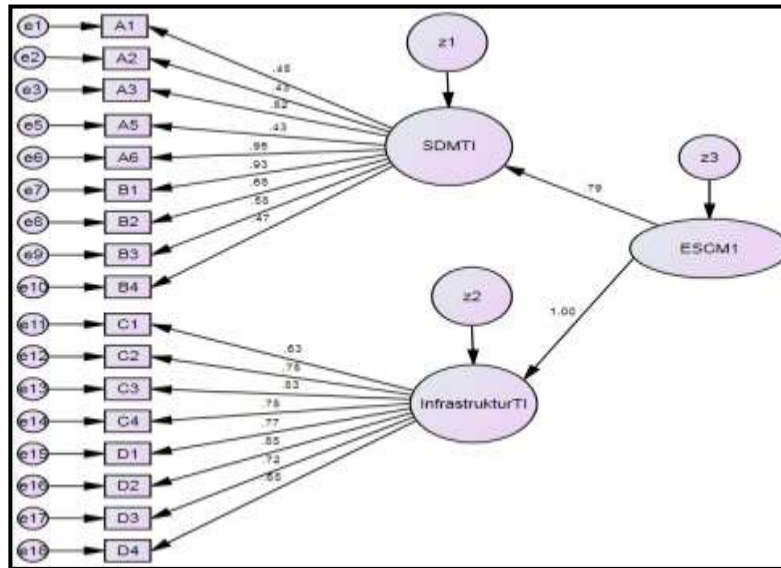


Figure 2. Final measurement model

This is strong evidence as an appropriate final model and could be maintained. Figure 2 shows the final measurement model. The structural model of Figure. 2 indicates that strong support is essential for evaluating factors for E-SCM value through IT human resources and IT infrastructure. In addition, the result also shows the relationship between the E-SCM value → IT human resources and E-SCM → IT infrastructure paths with coefficient values of 0.79 and 1.00 lines in each. Models account for 79% of variance in IT human Resources and 100% in IT infrastructure. This shows that IT human resources and IT infrastructure are critical factors in evaluating E-SCM value.

All constructs that had assessed the convergent validity test are validated for the discriminant validity test. Discriminant validity among other factors of this model is examined by using Hair et al. (2010) model. The findings reveal the discriminant validity in each pair of constructs with AVE square root is greater than the estimated correlation between them.

**Table 6. Evaluation of criteria for a Goodness of Fit Indices for all variables**

Goodness of fit index	Cut-off Value	Model Results	Information
$X^2$ - Chi-square	Expected to be small	156,435	Pretty good
Probability	<0.05	0 000	Well
CMIN / DF	≤ 2.00	1. 23	Well
GFI	≥ 0.90	0. 95	Well
AGFI	≥ 0.9 0	0. 92	Well
TLI	≥ 0.95	0. 98	Well
CFI	≥ 0.95	0. 97	Well
RMSEA	≤ 0.08	0, 05	Well

**Table 7. Convergent Validity Test Results**

Construct	CR	AVE	Indicators	SFL
IT human resources	0.60	0.51	A1	0.45
			A2	0.43
			A3	0.52
			A5	0.43
			A6	0.95
			B1	0.93
			B2	0.68
			B3	0.58
			B4	0.47
IT infrastructure	0.66	.055	C1	0.63
			C2	0.75
			C3	0.83
			C4	0.75
			D1	0.77
			D2	0.85
			D3	0.72
			D4	0.65

From the evaluation of the proposed model n shows that the evaluation of the model for the construct as a whole turns out that there are no critical violations from various criteria so that it can be stated that the model is relatively acceptable

**Finding and Discussion**

IT Human Resources are human resources with technical skills. Especially in the field of IT Relates to both hardware system and employee software and the important factors for E-SCM organization, from the result of testing IT human resource variables qualify as an E-SCM factor using the RBV theory. The variables have nine indicators switch will be explained in the next section.

Business knowledge (A1) ; Lee et al. (1995) and Benitez-Amado et al. (2010) reveals that the organization's business knowledge is very important because the knowledge of an organization can develop a strategy for the success of the organization. Each person in the organization either superiors or subordinates obliged to share their knowledge. All ideas contained will produce an input of information and become information that must be implemented or applied. Knowledge management can help organization to gain knowledge about business process, the problem that occurs in each work unit plays on business important role in the progress of the organization because of the superior knowledge of organization and human resources, the higher competitiveness of organization in the global market. By organization knowledge technology and business process (A2) A knowledge to help organization determine the technology designed to complement human resource capabilities and help someone to apply their knowledge so that technology adoption in the organization can support one's skills in the business competence in the organization. Knowledge regarding producers and regulations in the organization (A3) also needed to determine and decide on IT investment in the organization, must be supported by all elements, by communicating, learning or training, involving employees or individuals in the latest application of procedures, human resource management organization to place and assign employees to positions and project according to ability and vice (Chaffey 2009; Ray et al. 2004). Understanding the division of tasks in the organization (A5); the organization will be good if the human resources in it have been able to carry out their respective work, specifically, and do not have a dual role that can hinder the process of archiving. Task analysis needs to be done in order to design the organization and determine the division of work, job specification, and job evaluation (Karimi et al. 2004; Saunders 1995). The ability to carry out routines and system that are implemented in the IT department (A6). It intends the ability of human resources in IT competencies to run a system requires to have a level of expertise in the organization in implementation and operational practices such as

product development, management of raw material suppliers, production control planning and distribution through the system that has been implemented (Soo Wook 2006; Stephan and Robert 2006).

The other side of the IT human resource factor is Technical Ability (B1) which is an important point in implementing e-supply chain management in the organization. This is because technical ability is the skill of using knowledge of methods, techniques, and equipment needed to carry out tasks, and organization in accordance with the work units of each so that the ability of this technique is in line with the organization strategic goals (Ravichandran et al. 2005). Ability to learn and apply new technology (B2). Berkhout and Hertin (2004) and Worley et al. (2010) argue the importance of studying and implementing new technologies, the demands of work that can change due to changes in the work environment, strategies and emergence of new technologies or the emergence of new methods. For organization to increase competitiveness and improve productivity, organization can no longer rely solely on assets in the form of capital they have but must be the most important element of Human Resources, because Human Resources are the main determinant aspects of competitiveness. IT project skills and knowledge (B3). It is an important capability for Human Resources in supporting the operational performance of organization that have integrated business processes with technology. Activities that include management and planning of development of application systems, infrastructure, computer networks, workstation units or any entity related to IT applications are implemented by organization, with the ability to describe various obstacles in IT projects and IT Strategies that are good for building products and services (Liu 2002; Zinaida 2005). The ability to manage and integrate IT in business (B4) the technical ability of Human Resources that is capable of carrying out the tasks / procedures of E-SCM work as the integration of business processes from end-users through suppliers that provide products, services, information, and even increase in value for consumers and employees.

The second variable is the IT infrastructure that a sharing technology resource that provides a platform for detailed application of organization information systems (Liu 2002). Information technology infrastructure includes investment in hardware, software, and services such as consulting, education and training that is spread throughout the organization or spread throughout business units within the organization. Based on the results of variable testing and analysis IT Infrastructure fulfills the requirements as an E-SCM factor using the RBV variable theory has 8 indicator items including, as follows;

Availability of IT infrastructure to connect business units (C1). By the supply chain, an organization can build cooperation through the creation of computer networks coordinated in providing information on goods and services to consumers efficiently (Guiyi and Hanxiao 2008). The next factor is the existence of an IT infrastructure to connect with business partners (C2). This information technology media is one of important technology that plays the role in creating business networks, Transactions in business partnerships include the exchange of information between suppliers, sellers and distributors that including order management, inventory and sharing documents (Antoni et al. 2018; Becher et al. 2001). The existence of infrastructure to support business operations (C3), according to Adela et al. (2008) IT infrastructure as part of the organization's strategy to transform business processes towards a more efficient. Furthermore, it also needs changes and the creation of a new business model for a business organization by utilizing the opportunities of existing technology to create something new and can be accepted by the customers through IT. The application E-Supply Chain Management is a suitable value applies because its system has an excess value which is that able to manage the flow of goods or products in the supply chain such as the process of purchasing raw materials, fulfilling customer orders and distributing finished goods. Infrastructure computer network capacity (C4), according to Dao et al. (2011), The information technology existences is the part of information of technology as a means or organization media in operations, Monitoring and Control, Planning and Decision, Communication, and Inter organization that improving coordination in developing new products or organization services.

Infrastructure network speed (D1), the use of information technology incorporate activities is an alternative opportunity for organization because through the application of technology organization can save costs and operating time of the organization, create high work productivity, accelerate the delivery of products and services to customers, and the ability to produce valuable products and services for customers (Ngai et al. 2014).



Data distribution within the organization (D2), Jakkhupan et al. (2011) describe Is a manifestation of the implementation of the business network system strategy in building relationships between organizations based on coordination or dissemination of information on work units in the organization. The implementation of information technology is very important to facilitate the exchange of information in the flow of information both in terms of scheduling, production, demand estimates, and sales estimates. Modularity of application systems (D3), Antoni and Jie (2012) The modularity system that organization applies in the Organization in the utilization of information technology provides a framework, the strategy of organization in using IT to review, monitor, evaluate and collaborate between business partners through both electronic media and communication, so that can be provided benefits increasing competitive advantage, reducing operational costs, and more cooperation and coordination among business partners in the supply chain. Standardization of infrastructure components (D4), Information technology provides a framework for cooperation between business partners through both electronic media and communication, so that it can provide benefits in increasing competitive advantage, reducing operational costs, and achieving better cooperation and coordination among business partners in the supply chain. The development of inter-organizational information systems has shifted the role of information technology from competitive weapons into weapons to achieve good cooperation (Lee at al., 2000). The implementation of information technology is very important to facilitate the exchange of information in the flow of information both in terms of scheduling, production, demand estimates, and sales estimates.

## **Conclusion**

Based on the results of the E-Supply Chain Management factor analysis using the Resource-Based View Theory, a number of things can be summarized as follows:

This study produces two critical factors E-SCM using the theory of RBV in the Palm Oil Industry, namely the factors of IT Human Resources and IT Infrastructure. That the main concern of the organization is the resources and capabilities to achieve competitive advantage, by identifying factors Human Resources IT and IT Infrastructure are interrelated and mutually supportive, factors Human Resources IT is the ability of human resources to do work on IT competencies, and infrastructure factors IT is a technology resource that provides a platform for information system applications in organization.

IT Human Resource Factors consist of Managerial dimensions and Analysis based on research data of qualified Human Resources, especially those in charge of IT competencies has an important role in the development of the organization. On indicators of managerial and interpersonal abilities with criteria for items namely (A1) Knowledge of business, (A2) knowledge of technology and business processes of the organization, (A3) Knowledge of procedures and regulations in the organization, (A5) Understanding of the division of tasks within the organization, and (A6) Ability to run routines and systems applied in the IT department. On the Technical Ability indicator and Analysis with item criteria, namely (B1) Engineering Capability, (B2) Ability to learn and apply new technologies, (B3) IT project skills and knowledge, and (B4) Ability to organize and integrate IT into the business. This is evidence that IT Human Resources are important factors in the success of a business unit in implementing information technology, especially in the supply chain (E-SCM).

IT Infrastructure Factors consisting of Network and Data dimensions based on research data that IT Infrastructure resources play an important role in the organization in the use of information technology. On Network and platform indicators with item complexity, namely (C1) Existence of infrastructure to connect business units, (C2) Existence of infrastructure to connect with business partners, (C3) Presence of infrastructure to support business operations, and (C4) Infrastructure network capacity. On the Data and Application indicators with the item frequency, namely (D1) Infrastructure network speed, (D2) Data distribution within the organization, (D3) Modularity of application systems, and (D4) Standardization of infrastructure components improves that Technology is an adopted facilitator in achieving the organization's business goals and achieve competitive advantages

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