Sustainable Supply Chain Management in the Quantitative Framework: Developments, Directions and Economic Analysis in Indonesia

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ABSTRACT: The prime objective of the current study was to investigate the impact of an effective supply chain system on sustainable supply chain management in Indonesia. In addition to that, we have also investigated the impact of information and communication technology on the relationship between the effective supply chain system and sustainable supply chain management. this study adopted PLS SEM to analyze the data. After confirmation of reliability and validity, the SEM was used to analyze the hypothesis. The direct and indirect effect was examined. Indirect effect was examined to check the mediation. In this process, the p-value was considered. While analyzing the data, 0.05 minimum level of p-value was considered to test the hypothesis. According to the direct results, it is shown that all hypothesis has a p-value less than 0.05. Therefore, it accepts H1, H2, H3, H4, H5, H6 and H7 and for all mediation hypothesis, the t-value is above 1.96 and p-value is below 0.05 which accept H8, H9, and H10. Before testing the hypothesis, data reliability and validity was scrutinized. These steps were taken through PLS 3. The results of the study are showing a great deal of agreement with our proposed hypothesis as all of our hypothesis are accepted significantly. The results of the study are will be helpful for policymakers, researchers, and practitioner for formulating policy or carrying out researches on the issue of sustainable supply chain management.

Keywords: *Sustainable Supply Chain Management, Indonesia, PLS-3*

1. Introduction

Sustainability is becoming a more important factor in the processes of organizations [1]. Supply chains management (SCM) has acknowledged a great deal of interest by researchers and practitioners [2]. SCM has become a universal way across industries since its addresses seller-buyer partnerships, shared planning, continuing strategic coalition, control of inventory cross-organizational, information sharing and logistics management. Effective SCM will lead to provides the necessary level of customer service to a specific segment by reduction of the entire amount of resources and enhancing customer services through improved product availability and reduced order cycle time [3].

Supply chain management (SCM) field is expanding the importance decision over the last few decades, increasing reliance on suppliers' performance, and dynamic changes of suppliers [4]. To compete successfully in the global market economy, firms gradually find themselves dependent on having effective supply chains [3]. As a result, performance can no longer be determined exclusively by the decisions and actions that occur within a firm. That is due to in a competitive global environment, the execution of members in the supply chain contributes to the overall results from the chain [4], [5].

In contemporary, the characteristic of competition increasing to global business environments [6] Therefore, it is vital that textile and apparel organizations to cooperate to attain common goals such as minimizing delivery cost, stock holding cost, increase punctuality (Jin, 2006), enhance quality, improved flexibility, and quickly respond to ensure profitability and customer satisfaction [7]. Otherwise, the company will lose competence in extremely varied and fast change market. For instance, Zara, the Spanish apparel organization provides a real illustration of the hybrid supply chain. It is one of Spain's greatest and dynamic apparel organizations, producing trendy apparel to a universal target market of 18 to 35-year old's. Since a major difficulty in most supply chains is lacked visibility in actual demand, so, forecast driven was better than demand driven. Therefore, Zara developed a quick response system for the industry to handle visibility problems.

E-commerce represents the utilization of various networked information technologies, particularly internet technology, in different business practices [8]. It is one of the procedures which consists of transferring, exchanging, buying, or selling different types of products and services by using computer-based networks, usually the internet and intranets. Supply chain process is generally based on several steps. These steps are shown below in Figure 1.

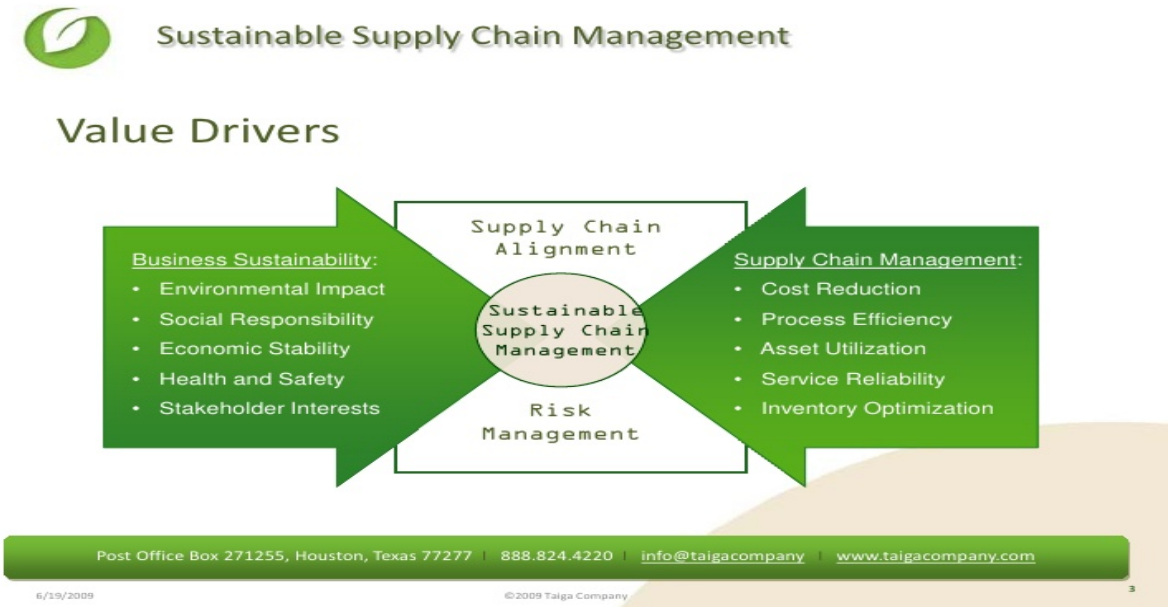

Figure 1. Corporate Supply Chain Model

However, logistics is defined as part of the supply chain that plans, implements and controls effectively the flow and storage of numerous services and goods as well as linked information from the point of origin to the point of consumption to encounter the customer necessities [5]. It is a function by which international and local sub-contractors manage the services by sustaining the quantity, timeliness, quality and cost parameters. When this logistic system handled electronically through internal, similar to e-commerce, then it is called e-logistic. Additionally, the performance of e-logistic is heavily based on customer satisfaction. Customer satisfaction is based on different factors, namely; distribution charges, transit time, payment method and information technology.

RBV becomes an important guide for this study. The RBV deals with the coordination and application of relational assets, internal competencies, heterogeneous resources, and capabilities [9]. The capabilities of RBV are known as the combination of two or more resources (Grant, 1991). The construct of these resources and capabilities helped a particular firm to gain competitive advantages and further transforms the short run competitive advantage into a sustainable competitive advantage [9].

2. Literature Review

2.1. Sustainable Supply Chain Management

Sustainability is a brilliant way of performing a business, and transitions toward sustainable enterprises can be made by developing innovative and constructive corporate culture. These healthy cultures would be able to create high performance and make optimum use of existing assets in ways that have good outcomes for the economic, environment, and society [9], [10].

SCM adopts systems perspective across firms and functions as an absolute system by processes of coordination. Thus, the key to the creation of supply chain value is possible, made through collaboration among participating firms. Companies may engage in information exchange and structural collaboration. Information exchange may include the inventory supervision, forecasting techniques, and delivery. Meanwhile, the structural collaboration may include vendor-controlled inventory, outsourcing, co-locating factories and just-in-time [11]. Luthra et al. [10] identify demand chain collaboration can be referred to as the lifelong affairs with partners in the downstream supply chain to create end-customer value. It is characterized through the information exchange, operations, cross-firm forecasting and shared planning with downstream partners. Meanwhile, [12] highlighted that outsourcing also opens the door to practicing SCM as tools and/or plays a

beneficial role to make SCM more effective and efficient. In SCM in order to serve clients, the upstream company is direct to suppliers and downstream to distributors.

Generally, labor, capital, information, technology, materials, financial assets and other resources through the supply chain. Given that the goal of a company is to capitalize on profits, the companies must reduce costs and exploit benefits along the supply chain [13]. Physical logistics more dependent on information technologies, and these technologies enable of further cooperative arrangements. Mentat and Yusuf [14] states that firms faced an inter-dependence and shared fortune while managing a grown enterprise which required an exceptional growth in technology and integration of networks. Thus, the environment of supply chain management becomes apparent to participating companies with victorious implementation in the dynamic comprehensive environment of the business world, augmenting with risks, and it greatly affects the processes of the decision-making in business management. Therefore, nowadays, SCM becomes a popular management tool in helping firms improve their competitiveness. The concept of SCM has been recognized to be of vital importance for the textiles and apparel industry [15]. The management can utilize the functions of SCM to plan, coordinate, and control logistics knowledge flow, capital flow, and information flow of the business. It enables firms to improved response speed and reduced uncertainty of the supply chain [16].

The supply chain is an important component of world trade. However, a supply chains itself is not enough; it is more critical to understand its features and the role played by each function in the overall supply chain to work efficiently and effectively [14]. Since SCM has been considered as the strategic and systematic coordination of traditional business activities, firms are starting to pay attention to their supply chain to increase competitive advantages [15], [16]. As the twenty-first century begins, SCM has turned into a significant strategic instrument for firms to reduce costs, but also enable firms struggling to enhance quality, improve customer service, and increase competitiveness. Supply chain and SCM have played an important role in the firm efficiency and have attracted scholars' attention in recent years. The real contribution of SCM not only attracted scholars' attention but also received attention from practitioners.

2.2 *Information and Communication Technology, Effective Supply Chain Management System, and Sustainable Supply Chain*

The global business competition has revealed the needs of information technology in securing business competitiveness. Nowadays, the word “IT” or “information technology” is frequently applied by most of the companies and even individual in the world. Therefore, the information technology is playing an important role at the moment and future as well. Information technology consists of a wide range of technologies, including multimedia, telecommunications, computer hardware and software that involved in information handling and processing [17]. The main function of information technology is to store, retrieve, manipulate, and send information and transmit information, especially the development, installation, implementation, and management of the information for conducting business through the integration of telecommunications equipment and computer application [18]. In general, IT can be understood as a set of tools, processes, methods, and related equipment such as office automation and multimedia used to collect, store, transmit, manipulate, process, and present information. Basically, the term is generally used as a substitute for computers and computer network.

Basically, IT also encompasses an information system (IS) and information and communication technology (ICT). IS are the study of hardware and software that usually people and organizations applied to gather, filter, process, create, monitor, control, and distribute data [19]. The final contribution is to support management and operation teams to make the informed decisions [17]. Similarly, ICT is frequently used as a stretched synonym for IT, but it is more focused upon the function of communications and the integration of telecommunications by electronic equipment [18].

ICT has become indispensable as a factor which creates a competitive advantage for business [19]. It is frequently used as a stretched synonym for information technology, but it is more focused upon the function of communications and the integration of telecommunications by electronic equipment [18]. There are a few indicators of ICT, which can be referred to two widely used media of mass communication such as newspapers and televisions; telecommunication facilities such as telephones and mobile telephone density. Based on

the study of Bhatnagar and Schware [20], ICT applications can be generally classified into three, namely decision support to public administrators (i.e. geographical information system), improving service to citizens, and empowering citizens to access information and knowledge. It could make such knowledge and information visible to a vast group of communities. Notwithstanding, the administrators must be open-minded and willing to change their working style to utilize the ICT to accomplish higher performance.

Whilst, Bhatnagar and Schware [20], identified environmental uncertainties are market turbulence and technological turbulence Since technological turbulence implies high rates of change in process, production and service technologies, there is an undesirable impact on operations in the form of increased process unpredictability or greater fluctuations in customer delivery schedules and efficiencies, leading to lower customer service levels [18]." Referring to Melville, Kraemer, and Gurbaxani [21], to overcome the negative impact of organizational performance, IT analytic capabilities may be developed by firms. This contributes to improving collaborative efforts between downstream partners to streamline operations and optimally leverage pooled resources, thus reducing variations. "High technological turbulence drives partners towards increased IT-facilitated collaborative efforts so that operations are more predictable internally in the supply chain. Thus, technological turbulence can enhance the positive association between IT analytic capability and demand chain collaboration."

E-payment is one of the elements of ICT because the system requires ICT. E-payment has various features such as security, convenience, acceptability, efficiency, and privacy, which increase the satisfaction level of customers. ICT is a system in which companies to make financial transactions with other businesses; it is called the business to business (B2B) commerce. It also facilitates their customers to make payments such as business to consumer (B2C). E-payment has the ability to retain a customer by reducing the time and increasing efficiency. ICT enhances the products as well as services of companies and allow new forms of partnership between different consumers and suppliers through various websites. It is mandatory for e-logistic firms to develop not only useful and secure but also trustworthy with respect to well as security.

However, there is a possibility to overcome all these issues and enhance the e-logistic firm's performance through information communication technology (ICT) and better information technology (IT) capability. Most of the companies are now investing in web-based information traceability system [20] because it has certain advantages. Thus, the issue of traceability can be handled through information and communication technology (ICT). Nonetheless, the firm's IT capability is most significant to manage a website in a better way which can portray the comprehensive information and e-payment system. Moreover, staff service quality can also be enhanced through the firm's IT capability. All these elements are most important in supply chain, because supply chain is most crucial worldwide [23] [24] [25] [26] in which distribution channels are also most important [27]. Thus, in the current study, information communication technology (ICT) is examined as a mediating variable and a firm's IT capability as a moderating variable, as shown in Fig. 2.

H1**:** There is a positive relationship between effective payment System and Sustainable Supply Chain Management.
H2: There is a positive relationship between Staff Service Quality and Sustainable Supply Chain Management.
H3: There is a positive relationship between delivery time and Sustainable Supply Chain Management.
H4: There is a positive relationship between effective payment System and Information and communication technology
H5: There is a positive relationship between Staff Service Quality and Information and communication technology
H6: There is a positive relationship between delivery time and Information and communication technology
H7: There is a positive relationship between Information and communication technology and Sustainable Supply Chain Management.
H8: The Information and communication technology mediates the relationship between effective payment System and Sustainable Supply Chain Management.
H9: The Information and communication technology mediates the relationship between Staff Service Quality and Sustainable Supply Chain Management.
H10: The Information and communication technology mediates the relationship between delivery time and Sustainable Supply Chain Management.

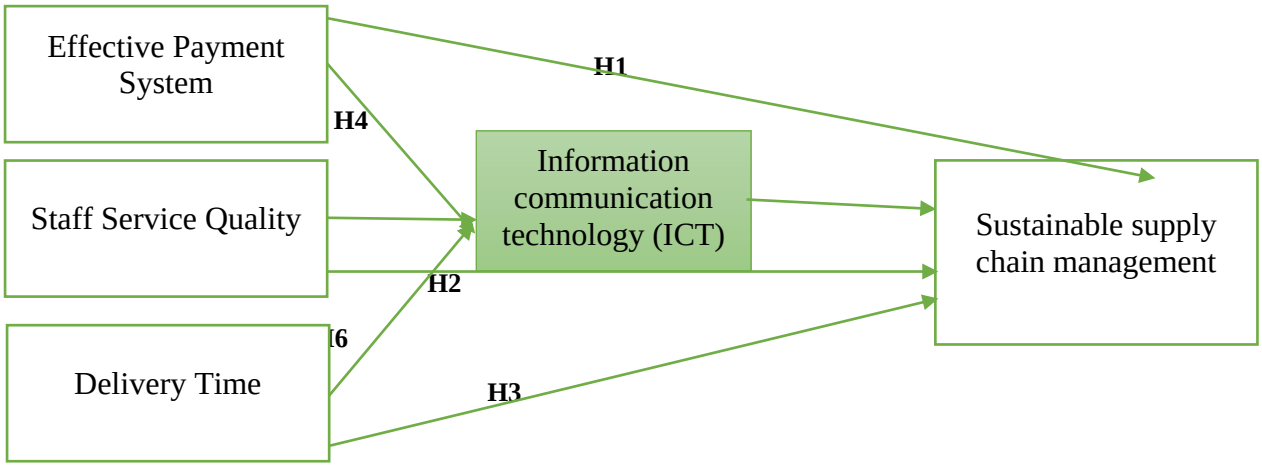

Figure 2: Research Framework

3. Research Analysis

Structural equation modeling is one of the most acceptable techniques in social science. It is a most acceptable technique to test the hypothesis. As it is recommended by different prominent studies [22]. Therefore, this study adopted PLS SEM to analyze the data. Before testing the hypothesis, data reliability and validity was scrutinized. These steps were taken through PLS 3. It is revealed in Table 1 which shows that factor loading is more than 0.5, average variance extracted (AVE) is more than 0.5 and composite reliability is also more than 0.7. Therefore, it is revealed that the current study attained the convergent validity.

Table 1. Convergent and Discriminant Validity

Construct	Indicators	Loadings	Composite Reliability	AVE
Effective Payment system (EPS)	EPS1 EPS2 EPS3 EPS4 EPS5	.622 .755 .8022 .625 .741	0.755	0.512
Research supplier (SSQ)	SSQ 1 SSQ 2 SSQ 3 SSQ 4	.700 .680 .881 .826	0.810	0.571
Delivery Time (DT)	DT1 DT2 DT3 DT4 DT5	.625 .785 .753 .845 .756	0.721	0.582
Information communication technology (ICT)	PPP1 PPP2 PPP3 PPP4	.721 .882 .628 .840	0.855	0.519
Sustainable supply chain management (SSCM)	SSCM1 SSCM2 SSCM3 SSCM4	.740 .796 .890 .721	0.721	0.505

The discriminant validity is shown in Table 2. Discriminant validity is attained through the square root of average variance extracted (AVE). It is shown in Table 2 that square root in bold form is more than all other values.

Table 2. Discriminant Validity

	1	2	3	4	5	6
EPS	0.948					
SSQ	0.731	0.798				
DT	0.518	0.550	0.801			
ICT	0.507	0.621	0.735	0.818		
SSCM	0.702	0.694	0.721	0.764	0.802	

After confirmation of reliability and validity, the SEM was used to analyze the hypothesis. The direct and indirect effect was examined. Indirect effect was examined to check the mediation. In this process, the p-value was considered. While analyzing the data, 0.05 minimum level of p-value was considered to test the hypothesis. According to the direct results, it is shown that all hypothesis has a p-value less than 0.05. Therefore, it accepts H1, H2, H3, H4, H5, H6 and H7.

Moreover, Table4 highlights the mediation effect of information communication technology between the independent variable (effective payment system, staff service quality, delivery time) and the dependent variable (sustainable supply chain management). These results of mediation show that for all mediation hypothesis, the t-value is above 1.96 and the p-value is below 0.05 which accept H8, H9, and H10.

Table 3. Direct Effect

Hypotheses	Relationship	(β)	SD	T-value	P-Values	Decision
H1	EPS -> SSCM	0.111	0.035	3.161	0.002	Supported
H2	SSQ -> SSCM	0.207	0.043	4.810	0.000	Supported
H3	DT -> SSCM	0.447	0.109	3.999	0.025	Supported
H4	EPS -> ICT	0.332	0.108	3.051	0.003	Supported
H5	SSQ -> ICT	0.151	0.013	11.580	0.000	Supported
H6	DT-> ICT	0.113	0.022	5.119	0.000	Supported
H7	ICT-> SSCM	0.210	0.105	1.999	0.048	Supported

Table 4. In-Direct Effect through Mediation

Hypotheses	Relationship	(β)	SD	T-value	P-Values	Decision
H8	EPS -> ICT ->SSCM	0.109	0.017	6.399	0.000	Supported
H9	SSQ -> ICT ->SSCM	0.217	0.105	2.031	0.035	Supported
H10	DT -> ICT -> SSCM	0.325	0.111	2.909	0.003	Supported

Moreover, the variance extracted is shown in Table 5. R-square value is 0.661 which is mediated according to Hair [22]. It indicates that all the independent variables are expected to bring 66.1% change in a dependent variable, namely; sustainable supply chain management.

Table 5. Expected Variance

	R^2
Sustainable supply chain management (SSCM)	66.1%

4. Discussion

The prime objective of the current study was to investigate the impact of an effective supply chain system on sustainable supply chain management. In addition to that, we have also investigated the impact of information and communication technology on the relationship between the effective supply chain system and sustainable supply chain management. The results of the study are showing a great deal of agreement with our proposed hypothesis as all of our hypothesis are accepted significantly.

The relationship between effective payment system and sustainable supply Chain management. Is positive and significant. The findings of the study are consistent with the prior findings of [5], [6], and [9] and providing support to resource-based view. The results of the first hypothesis indicate that the effectiveness of payment system enhance the sustainability of any supply chain

The Staff Service Quality system and sustainable supply Chain management are in positive and significant relation, which indicates that staff service quality is a determinant of sustainable supply chain management. The findings of the study are consistent with the prior findings of [6], [7], and [8] and providing support to resource-based view. The relationship between delivery time and sustainable supply Chain management. Is positive and significant. The findings of the study are consistent with the prior findings of [5], [7], and [9] and providing support to resource-based view. The results of the first hypothesis indicate that the effectiveness of delivery time enhance the sustainability of any supply chain

The effective payment system and Information and communication technology are in positive and significant. The regression result of the hypothesis indicates that effective payment enhances the effectiveness of information and communication technology. The findings of the study are consistent with the view broached by the resource-based view and also showing consistency with the prior findings of [12], [14], and [19], [28]-[32]. The relationship between Staff Service Quality system and Information and communication technology. Is positive and significant. The findings of the study are consistent with the prior findings of [13], [14], [16] and [33] [35] [36] [37] [38]. and providing support to resource-based view. The results of the first hypothesis indicate that the staa ff service quality enhances the sustainability of any supply chain. The relationship between delivery time and Information and communication technology is also positive and significant. The findings of the study are consistent with the prior findings of [15], [17], [34] [39] [40] [41] [42] and providing support to resource-based view. The results of the first hypothesis indicate that the delivery time enhances the sustainability of any supply chain.

Information and communication technology appear in appositive relation with sustainable supply chain management. In addition to that, it is also evident, from the findings of the study that information and communication technology is mediating the relationship between effective supply chain system and sustainable supply chain management.

5. Conclusion

The main purpose of this study is examining the role of effective supply chain system on sustainable supply chain management in Indonesia. In addition to that, we have also investigated the impact of information and communication technology on the relationship between the effective supply chain system and sustainable supply chain management. Supply chains management (SCM) has acknowledged a great deal of interest by researchers and practitioners. SCM has become a universal way across industries since its addresses seller-buyer partnerships, shared planning, continuing strategic coalition, control of inventory cross-organizational, information sharing and logistics management. Effective SCM will lead to provides the necessary level of customer service to a specific segment by reduction of the entire amount of resources and enhancing customer services through improved product availability and reduced order cycle time. ICT enhances the products as well as services of companies and allow new forms of partnership between different consumers and suppliers through various websites. It is mandatory for e-logistic firms to develop not only useful and secure but also trustworthy with respect to well as security. This study adopted PLS SEM to analyze the data. After confirmation of

reliability and validity, the SEM was used to analyze the hypothesis. The direct and indirect effect was examined. Indirect effect was examined to check the mediation. In this process, the p-value was considered. While analyzing the data, 0.05 minimum level of p-value was considered to test the hypothesis. According to the direct results, it is shown that all hypothesis has a p-value less than 0.05. Therefore, it accepts H1, H2, H3, H4, H5, H6 and H7 and for all mediation hypothesis, the t-value is above 1.96 and p-value is below 0.05 which accept H8, H9, and H10. Before testing the hypothesis, data reliability and validity was scrutinized. These steps were taken through PLS 3. The results of the study are showing a great deal of agreement with our proposed hypothesis as all of our hypothesis are accepted significantly. Information and communication technology appear in appositive relation with sustainable supply chain management. In addition to that, it is also evident from the findings of the study that information and communication technology is mediating the relationship between effective supply chain system and sustainable supply chain management.

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