



Integrating E-Supply Chain Management for the Competitive Advantages of Early Stage Company

Monika Handojono¹, Caryl Alyona², Agustina Christina Patty³, Frangky Louth⁴, Imelda Dahoklory⁵

Ambon State Polytechnic
Indonesia

¹monika2handojono@gmail.com

Abstract— Integrating information technology and computers to support management is crucial for the company's sustainability. However, integration in the early stages of development is a dilemma. It is necessary and requires a large investment, yet it is not a priority for the company. Therefore, this study aims to develop a system to support the supply chain of companies that is a partner of the Ambon State Polytechnic. By using descriptive analysis method, the study explains the existing condition of the company regarding the supply chain then formulates the SCM model that will be developed.

Keywords—supply chain management; e-supply chain management; competitive advantages; early stage company

I. INTRODUCTION

Business sustainability is an important issue faced by companies that are just operating or entering the market. In this condition, the company is in the early stage of the business development cycle. Companies in this phase are generally in a situation of lack of capital, lack of competent technical workers, unformed brand image, do not have a strategic partner in building business alliances, and business processes have not fully supported competitive advantages. Those make this phase becomes a critical phase for the company. Many companies cannot even afford to go through this phase until it ends in liquidation. Data published by US Bureau of Labor Statistics shows that approximately 20 percent of new companies fail in the first two years of operation, 45 percent during the first 5 years and even more than 60 percent cannot pass the first ten years of their operating activities (Deane, 2022).

The strategic management literature states that business sustainability is determined by the company's ability to create a competitive advantage, especially in similar industries. Porter (1985) defines competitive advantage as the ability obtained by a company through ownership of characteristics and resources that results in higher performance when compared to other companies in the same industry. This competitive advantage is gained by the company when it can offer higher value to customers at a lower price or provide more significant benefits and services when the price offered is higher. The advantage is crucial because competition is an absolute condition every company must face. Competition in obtaining raw materials, achieving economies of scale, and

getting customers are the main drivers for companies to focus performance on innovation, organizational culture, or implementing activities that add value.

One of the keys to a company's success in having a competitive advantage is the implementation of Supply Chain Management (Jamaludin et al., 2020). Supply Chain Management (SCM) is a set of approaches used by companies to efficiently integrate suppliers, production processes, warehousing, and storage so that products can be produced and distributed to a fixed place, in the correct quantity and at the right time to minimize costs and provide products and services that suit customer needs.

The implementation of SCM brings many benefits to the company. A study by Jamaludin (2021) shows that SCM implementation results in higher performance for companies. One of the most significant benefits for the company is the cost savings of up to 25% that are obtained along the company's value chain (Hughes, 2005). These savings are an accumulated impact of increased communication and cooperation among company units responsible for production activities. Moreover, SCM enables inventory reduction and order times as well as improves product quality through innovations that result in a better variety of product designs (Elmuti, 2002).

Today the increasingly massive development of information technology has brought many changes in how companies do business. The company no longer relies on managing business transactions in manual and paper-based transactions. Instead, the use of various information technology (IT) and computer instruments in the form of Electronic Data Interchange (EDI), Automatic Identification Data (Auto ID) to Enterprises Resources Planning (ERP) has been widely carried out by companies. To increase the benefits of SCM, IT implementation has been used to integrate business processes involving suppliers, manufacturers, distributors, and consumers to increase satisfaction related to the provision of products and services. Implementation of IT into traditional SCM is known as e-SCM. The implementation of IT into SCM proved to improve company performance and reduce the risks faced by the company (Varma & Khan, 2014). The need for SCM is not only owned by large companies but all companies of various sizes.

This research is applied research that aims to develop an information technology-based SCM application to be implemented in partner companies. The company's partner in this study was PT Waragonda Minerals Pratama, a company engaging in the mining and processing of garnet rocks. PT Waragonda Minerals Pratama was established in 2020. Thus, the company is still in the early phase of development.

In fact, research on integrating E-SCM in the company's business chain is not a completely new idea. There have been many studies conducted on several types of businesses, including the integration of SCM in the SME business (Jamaludin, 2021); energy companies (Siahaan, Nazaruddin & Saladia, 2020); e-banking (Hamidianpour, Esmailpour, & Daryanavard, 2016); and food industry. Nevertheless, research with the object of research on the mining industry is still very rarely carried out. Thus, the integration of SCM in mining companies engaged in rock processing is still new.

II. LITERATURE REVIEW

A. The Concept of Supply Chain Management

Supply Chain is a series of activities starting from acquiring raw materials, handling raw materials, planning and controlling production, controlling inventory and warehousing, distribution and shipping (Turban, Aronson, Liang & McCarthy, 2007). This set of activities is intended to create and deliver products, information and services to end users. Several activities are done to meet these objectives, starting from purchasing and handling raw materials, production and manufacturing, inventory handling and storage, and distribution to delivery to consumers. The supply chain has three important parts, namely: 1) Upstream, which consists of suppliers and suppliers and suppliers; 2) Internal SC, which is all the processes that occur within the company from the time the raw materials are received until the product is ready to be delivered to consumers; 3) Downstream, is a process relating to the delivery of products to the end consumer (Turban, Aronson, Liang & McCarthy, 2007).

To produce an effective supply chain requires an approach to planning, organizing, and coordinating the activities contained in the supply chain. This approach is known as Supply Chain Management. Mentzer et al. (2001) define Supply Chain Management (SCM) as:

“a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer”.

Based on the complexity of the entities involved, they further divide SCM into three levels: 1) direct supply chain, 2) extended supply chain, and 3) ultimate supply chain. All three SCM models are shown in the following figure.

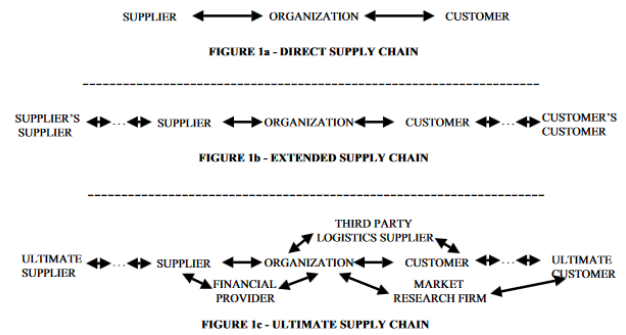


Figure 1
Types of Channel Relationship (Mentzer et al., 2001)

The direct supply chain involves the flow of companies, suppliers, and customers as the three main entities in providing products, services, finance, and information. The supplier who provides materials for the company may obtain them from other suppliers. Besides that, customers are also likely to sell products and services to their follow-up customers. The relationships built with suppliers of the company's suppliers and customers of the company's customers are described in the extended supply chain model. The SCM model is known as the ultimate supply chain in more complex relationships where various organizations are involved in the flow of product, service, financial, and information movements, such as financial institutions, capital markets, etc. SCM continuously integrates customer needs, internal processes, and supplier performance. The purpose of implementing SCM is to make the company efficient and cost-effective in the entire system and cost as the whole system, starting from transportation and distribution of raw material inventory, goods in progress, to finished goods so that costs can be minimized (Banerjee and Mishra, 2017; Lee, 2015; Simchi-Levi et al., 2008).

B. E-Supply Chain Management

Introducing IT and computers into the business world encourages companies to update their business management by integrating IT into all their systems, including SCM. Integration is the company's effort to improve the quality of operations, delivery, and technology used to meet customer expectations. The use of bar codes and scanners, Radio Frequency Identification (RFID), EDI, and ERP Systems is a form of integration known as E-SCM

Several studies have acknowledged the benefits of SCM for improving company performance. Horvath (2001) explains that SCM utilizing information technology will produce SCM that significantly increases the company's abilities to respond according to customer desires, improves customer service and satisfaction, rises flexibility to change market conditions, and improves customer retention, and more effective marketing functions.

Pulesvska-Ivanovska and Kaleshovska (2013) stated that several companies have recognized the benefits of integrating e-SCM into their value chain management, including Dell, Lanier Worldwide Inc, Wal-Mart, Cisco, and Forc Motor

Company (Pulesvska-Ivanovska & Kaleshovska, 2013). Many benefits are gained by the company through the implementation of e-SCM, mainly related to information sharing and communication among parties involved in the supply chain, the ability to trace transactions, faster delivery, and cost savings to increase customer satisfaction (Pulevska-Ivanoska & Kaleshovka, 2013). Although success is not solely determined by implementing information technology in business processes, using the internet and information technology in the company's value chain system can increase the speed of information processing and delivery speed which become essential factors in creating competitive advantage (Lankford, 2004).

C. E-Supply Chain Management and Competitive Advantages

Porter (1985) defines competitive advantage as an ability obtained through the characteristics and resources of a company to achieve higher performance than other companies operating in similar industries. This competitive advantage will be achieved if the company can present better business operational processes so that it can produce products and services at high quality at competitive prices. Five factors are the point of creating a competitive advantage that requires the attention of the company (Porter, 1985), including: (1) the intensity of competition among existing competitors; (2) customer bargaining power; (3) the bargaining power of suppliers; (4) threats from substitution products; and (5) the threat of new entrants in the industry. The competitive advantage of a company can be measured through several indicators, including: (1) price; (2) quality; (3) delivery time; (4) product innovation; (5) time to reach the market.

Today's competitive advantage is not only related to the company's ability to produce a lot of output at any time but also related to quality, distribution, and after-sales service. Therefore, companies must be able to compete in the market, not only by relying on productivity alone but must be able to create product differentiation based on quality. For this purpose, the implementation of SCM will improve product quality and the distribution system and satisfy customer needs to increase the sales value of a product and the company's value in the eyes of its customers.

D. Components of E-Supply Chain Management

The development of the E-SCM requires several main elements (Turban, 2007), namely:

- a) Extranet
The extranet is a network needed to support cooperation and communication inter-organizational.
- b) Intranet
Support the company's extranet network to establish cooperation and communication internally.
- c) Enterprise Gateway
Entrance for the implementation of cooperation and collaboration both internally and externally.
- d) The flow of information within the company
- e) Groupware
It is a tool that supports collaboration and cooperation between several company parts.

III. METHOD AND DISCUSSION

The object in this study is PT Waragonda Minerals Pratama (WMP). WMP is a national private company located in Central Maluku Regency, Maluku Province, which is engaged in processing garnet sand. Garnet sand is an important material used for sandblasting, water jet cutting, and abrasives paper. Sandblasting materials are most widely used in the shipping, petrochemical, and offshore industries. Until now, Indonesia's domestic Garnet material needs are still met through imports from major producing countries, such as Australia, India, China, and United States.

This research uses a descriptive analysis approach, where the researcher describes the existing conditions of the company and develops a system plan that will be made based on considerations of chain analysis and internal control of the company.

A. Company Profiles

WMP was established towards the end of 2020. As a new company, WMP is in the early phase of entering the industry. Currently, the company has completed the construction of a factory with an installed capacity of 20,000 tons per month. Observing the existing market conditions, the competition that will be faced by WMP is likely to be fierce and requires readiness to implement information technology that supports efforts to increase value in the company's supply chain.

B. Identification of SCM Elements

There are several parties involved in the company's SCM, including:

a) Suppliers

The company's suppliers consist of suppliers of garnet sand, sacks and ropes, oil, and fuel. Garnet sand suppliers come from communities that collect garnet sand from coastal areas to sell to companies. The supplier sells sand in crack size or equal to 1.8 cubics. The sacks and ropes used are sacks that can accommodate 1 ton of purified garnet. These suppliers come from several factories located on the island of Java. Lubricant oil is used for engine maintenance and fuel for starting the engine. Both of them are supplied by companies located in the Central Maluku area.

b) Companies

Garnet handling in the company involves several departments, namely stockpile, purchasing, factory, and warehouse. Stockpile is the department that handles the purchase and temporary storage of garnet sand as raw material. The purchasing department handles ordering, purchasing and storing sacks, ropes, lubricant oil and fuel. Garnet processing is done at the factory. The results of processing in the form of purified garnet are stored in the warehouse.

c) Buyers

Buyers of garnet products are particular buyers who have contractual engagements. Buyers consist of domestic buyers and foreign buyers.

C. Process Identification

The company's supply chain is started by suppliers who come from residents around the company and are registered as suppliers sending sand collected from the beach to the company. The officer in the stockpile section will receive the shipment of the materials. The officer will check the condition and suitability of the size of the material. If fulfilled, the stockpile officer will make proof of receipt and report to the administration. Based on the report, the administration will process payments to suppliers.

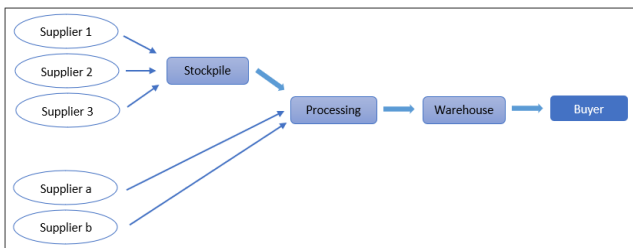
Moreover, besides the primary material, sand, some auxiliary materials must be prepared because they are used in production, such as sacks, ropes, and fuel. The sacks are used specifically to accommodate finished materials weighing 1 ton. Warehouse officers must ensure the availability of sacks, ropes, and fuel following the established production plan.

When production starts, the Production Manager will send a request for sand material to the stockpile section. The sand material received from the stockpile will enter the production process in the form of the separation of garnet material from impurities such as rocks and other sand. Then, the material is cleaned of brine content and dried. The final result obtained is in the form of garnets packaged in sacks capable of loading 1 (one) ton and sent to the warehouse for storage and will be issued when the delivery time to the buyer has arrived.

D. E-SCM Design

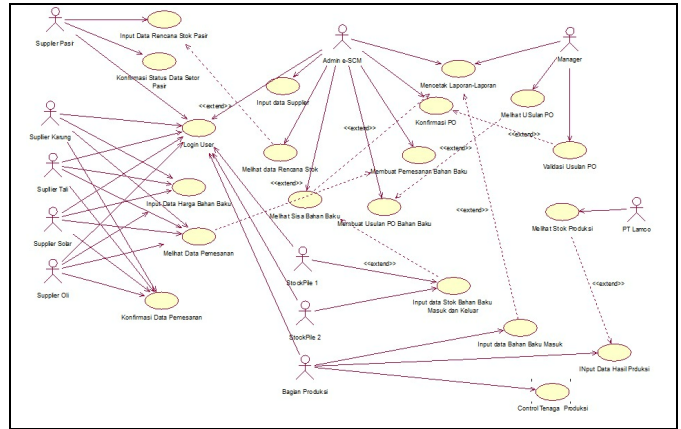
After identifying the elements and processes within the company, the selection of the SCM model can then be carried out. The selection of the SCM model is carried out by considering business processes involving upstream and downstream elements. Based on the existing conditions, the SCM would involve three entities, namely suppliers, manufactory, and buyers. Thus, WMP can use the direct supply chain model (Mentzer et al., 2001).

Figure 2. Model SCM of PT WMP



The design of the SCM model is shown more specifically in the form of the following use case diagram:

Gambar 2. User case SCM PT WMP



In the use case design, it is shown that the supply chain starts from the stockpile officer sending a notification of material receipt to the supplier, which will be responded to by the supplier with information about the delivery either via the web or SMS messages or what's up. Feedback information will be recorded automatically by the system for inspection by the stockpile officer. The supplier will send the material to the stockpile according to the approved time. The stockpile officer will verify the sender's data by scanning the ID and checking the suitability of the quantity and quality of the material. The supplier represented by the sender will provide approval in the form of a fingerprint on the receipt of the material issued by the system. Records of receipt data will be used by the administration for processing payments.

When the production department inputs a request for materials verified by the Production Manager, the stockpile officer delivers the material in the quantity requested. The system automatically updates the amount of material inventory in the stockpile. The production department further verifies the materials received from the stockpile and inputs the data of employees involved in production. The resulting finished product is packaged in sacks and sent to the storage warehouse.

E. Benefits of E-SCM to be Develop

a. Benefits for Suppliers

The implementation of e-SCM will support an effective and fair process for suppliers. Information about the material needs of the stockpile will be received faster by the supplier. Supplier responses in the form of material delivery will also be obtained more quickly by the stockpile, allowing the handling of materials sent by suppliers to take place faster.

b. Benefits for Company

E-SCM improves the company's internal control function, especially in handling raw material purchases. One of the problems faced by the company is the reliability of the purchasing system applied. Some of the conditions that arise are purchases that are not well verified, especially in quantity and quality. The use of e-SCM requires the stockpile department to verify suppliers and purchases of raw materials through scanners to check the size and quantity of materials.

This verification process makes purchase transactions more accountable.

c. Benefits for Customers

The buyer is a permanent buyer who is bound by a contract. Despite this, the e-SCM system allows the buyer to know the conditions of availability of the finished material to order in the contract. As a result, the buyer can also make better planning for the delivery of goods.

IV. CONCLUSIONS

From the design of the proposed SCM model and the consideration of the underlying benefits, it can be concluded that first, the design of the SCM model at PT WMP, per the company's conditions, is the direct SC model. Second, the direct SC model integrated with web-based information technology, SMS, and WA will bring benefits for suppliers, companies, and buyer/consumer companies. The benefits obtained are mainly in terms of timeliness of delivery of raw materials, administrative accuracy, and, most importantly, internal control related to handling the purchase of raw materials.

ACKNOWLEDGEMENT

This research can be fully carried out with the support of the Center for Research and Community Service (P3M) of the Ambon State Polytechnic. We express our deepest gratitude for the support that has been provided through funding and other support.

REFERENCES

- [1] Banerjee, M., & Mishra, M, 2017, Retail supply chain management practices in India: A business intelligence perspective, *Journal of Retailing and Consumer Services*, 34, 248-259
- [2] Deane, M.T, 2022, Top 6 reasons new business fail, published online on <https://www.investopedia.com/financial-edge/1010/top-6-reasons-new-businesses-fail.aspx>
- [3] Elmuti, D, 2002, The perceived Impact of Supply Chain Management on Organizational Competitive Advantage, *Journal of Supply Chain Management* 38 (3): 49-57.
- [4] Hamidianpour, F, Esmacilpour, M, Daryanavard, A, 2016, The effect of electronic banking on the performance of supply chain management of small and medium business, *Modern Applied Science*, Vol 10, No 11, 19-29
- [5] Horvath, L, 2001, Collaboration: the key to value creation in supply chain management, *Supplu chain Management : An International Journal*, 6, 205-207
- [6] Huges, J, 2005, What is Supplier Relationship Management and Why Does it Matter, *Vantage Partner* (www.vantagepartner.com)
- [7] Jamaludin et al, 2020, Service Supply Chain Management in the Performance of National Logistics Agency in National Food Security, *International Journal of Supply Chain Management* 9 (3)
- [8] Jamaludin, M, 2021, The Impluence of Supply Chain Management on Competitive Advantage and Company Performance, *Uncertain Supply Chain Management* 9:696-704.
- [9] Mentzer et at., Defining supply chain management, *Journal of Business Logistics*, Vol 22, No 2, pp. 1-25, 2001.
- [10] Lankford, W.M, Supply Chain Management and the Internet, *Online Information Review*, emerald, Vol. 28, No. 4, pp. 301 – 305, 2004
- [11] Lee, K. L, 2015, Relationship of supply chain capabilities and supply chain technology adoption towards supply chain operational performance in textile and apparel industry (Doctoral dissertation, Universiti Utara Malaysia).
- [12] Porter, M. E, 1985, *The Competitive Advantage: Creating and Sustaining Superior Performance*, NY: Free Press.
- [13] Pulevska-Ivanovska, L., & Kaleshovska N, 2013, Implementation of e-Supply Chain Management, *TEM Journal* 2(4), 314-322.
- [14] Siahaan, T, Nazaruddin, Sadalia, I, 2020, The effect of supply chain management on competitive advantage and operation organization performance at PT PLN (Persero), *International Journal Research and Review*, Vol 7 (4), 80-87
- [15] Simchi-Levi, D., Kaminsky, P., Simchi-Levi, E., & Shankar, R, 2008, *Designing and managing the supply chain: concepts, strategies and case studies*, Tata McGraw-Hill Education.
- [16] Turban, E, Aronson, J.E, Ting-Peng L, 2007, *Decision support systems and intelligent systems 7th edition*, Prentice Hall, US
- [17] Varma, T, N, & Khan, D, A, 2014, Information Technology in Supply Chain Management, *Journal of Supply Chain Management Systems* 3(3); 35-46

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

