Supply Chain Management Strategy for an Effective Collaboration A Case Study in Malaysia

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The relationship between the refinery and other oil palm industries represent here is an industry that affects other supply chain actors through power collaboration for influencing the supply chain strategy. The purpose of this study is to analyze supply chain relationships in an oil palm refinery. The study employed case study research which the data collection adopted through semi-structured interview and observation. Oil palm refinery in Malaysia was selected in the case study and analyzed using *supply chain operations reference* (SCOR) model. Finding showed that the oil palm refinery adopted push strategy. Then, the refinery and vessels emerged to be dominant actors in this supply chain relationship. The result provided implications for analyzing the supply chain relationships between supply chain actors which can be applied to any industry that decide to establish an effective collaboration.

Keyword: SCOR model, supply chain relationship, oil refinery industry, power collaboration.

1.   Introduction

Oil palm refinery is one of oil palm industries that cooperates with actors of the supply chain from upstream to downstream sector in the oil palm business process. The high demand of international markets consequently influences the oil palm refinery to collaborate with other partnerships. Refineries require the higher number crude oil such as crude palm oil (CPO) and crude palm kernel oil (CPKO) from suppliers involving milling industries and crushing industries. Moreover, Malaysia as one of the bigger players that supply crude oil to the world has 439 millings and 44 crushings (MPOB, 2014). Nevertheless, no consensus has been reached by these industries to deliver the crude oil only to local refineries in Malaysia. In addition, the major issue in distributing the products of oil refineries is the finished products are stored as various liquids. The refinery utilized transportation service providers, such as storage tanks and vessels to deliver across the world (Tahar and Abduljabbar, 2010; Matveeva, 2015). It is important to realize that relationships between the refinery and the actors of the supply chain must be maintained for balancing upstream and downstream oil palm sector.

The relationship between the refinery and other oil palm industries represent there is an oil palm industry that affects other supply chain actors through its power for influencing the supply chain strategy. Moreover, this industry is also supported by other actors to strength the collaboration in supply chain strategy. Therefore, the power collaboration of the supply chain strategy is expected to optimize the ability of the refinery for developing and maintaining the relationship between supply chain actors efficiently and effectively in running the business.

Moreover, SCOR model is a tool to diagnose the business activities in supply chain management (Bolstorff and Rosenbaum, 2011). This method considers analyzing the relationships between supply chain actors involving suppliers, manufacturers, distributors and customers in more detail into the activity of business processes (Taghizadeh and Hafezi, 2012; Golparvar and Seifbarghy, 2009; Erkan and Bac, 2011). Thus, aim of this research is necessary to be analyzed the supply chain relationship in oil palm refinery using SCOR model.

2. Power collaboration in Supply chain relationship

Supply chain strategy consists of relationship between stakeholders, business process, and resources in transforming raw material oil into finished products (Ofosu-budu and Sarpong, 2013). To optimize the supply and demand within this business, determination of supply chain relationship is important in order to develop collaboration with other supply chain actors in a business process (Bhakoo and Chan, 2011). Therefore, distribution of physical products from the supplier to the customer has a pattern that can be standardized into operational procedures within business processes (Soosay et al., 2008). Thus, it required the model conduct business process as networking that associated with suppliers, manufacturers and customers.

There is one framework to analyze the strategy of the supply chain which called methodology of Supply Chain Operations Reference (SCOR) which it is built by the Supply Chain Council (SCC). This approach is used as a set of key performance indicators (Singh et al., 2013), a modeling tool (Bolstorff and Rosenbaum, 2011) and a benchmarking tool (Ambe and Africa, 2014). In this study, SCOR method is required to analyze supply chain relationships for reengineering business process. Moreover, this method is also used to investigate the relationship between suppliers, manufacture and customers (Wang et al., 2010). Obviously, the reengineering business process using SCOR model have standardization of process category involving *planning, make, source, deliver* and *return*.

3. Methodology

Power collaboration in supply chain relationship requires understanding of business process that was obtained by perspectives from participants who can share their individual experiences. Furthermore, this study examined supply chain strategy based existing records, observed the phenomenon, or used the approaches to analyze what is happening in a given situation. Thus, this study was categorized into case study research where a strategy of inquiry explores a program, event, activity and process in-depth (Yin, 2003; Crowe et al., 2011).

Procedure of data collection in this research focused on open-ended interview and observations because this method provided opportunities to listen directly to the ideas and opinions of the stakeholders. Thus, the finding was obtained from understanding people's meaning through an investigation of qualitative research (MacIver et al., 2012). Moreover, this study also supported snowball sampling technique to obtain the information related to power collaboration in supply chain relationship because the supply chain strategy involved the relationship between supplier, manufacturer and customer that covered much information from some of the people in charge of the company. Merriam (2007) through snowball sampling suggested the researcher meet with these newly identified members, and those members were asked to further name some other members of the system. This process was continued until the desired information was reached.

4. Case study

Case study in this paper provided the analysis to define supply chain relationships in an oil refinery industry. Then, the empirical research was done in an oil palm refinery in Malaysia that adopting the SCOR model to elaborate the business process. In addition, the oil palm refinery in run the business process was supported by many industries such as milling and crushing and oleochemical. Moreover,

this case study analyzed the oil palm refinery located on a five-acre industrial site nine miles from Port Klang, Malaysia. This industry produces oil and specialty fats such as Olein, Stearin and Plam Fatty Acid Distillate (PFAD) to deliver to the buyer. The crude oils were supplied from milling and crushing industry. Potential market of the finished products are not only in local industry, but also the international market. Moreover, to distribute the finished product, oil palm refinery collaborated with Third-Party Logistics (3PL) service as transportation service provider such as the vessels. Nevertheless, to deliver finished product to local industry and loading in the port, it was supported by their own fleet such as lorry. Figure 1 and Figure 2 shows the business process that occurs on the oil palm refinery using the SCOR model through *process wizard* software.
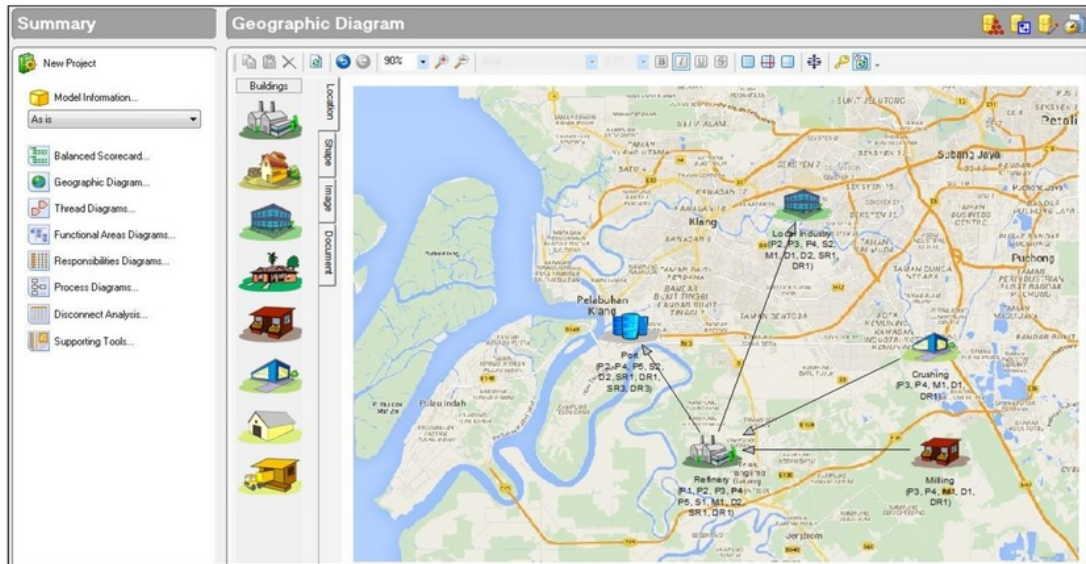

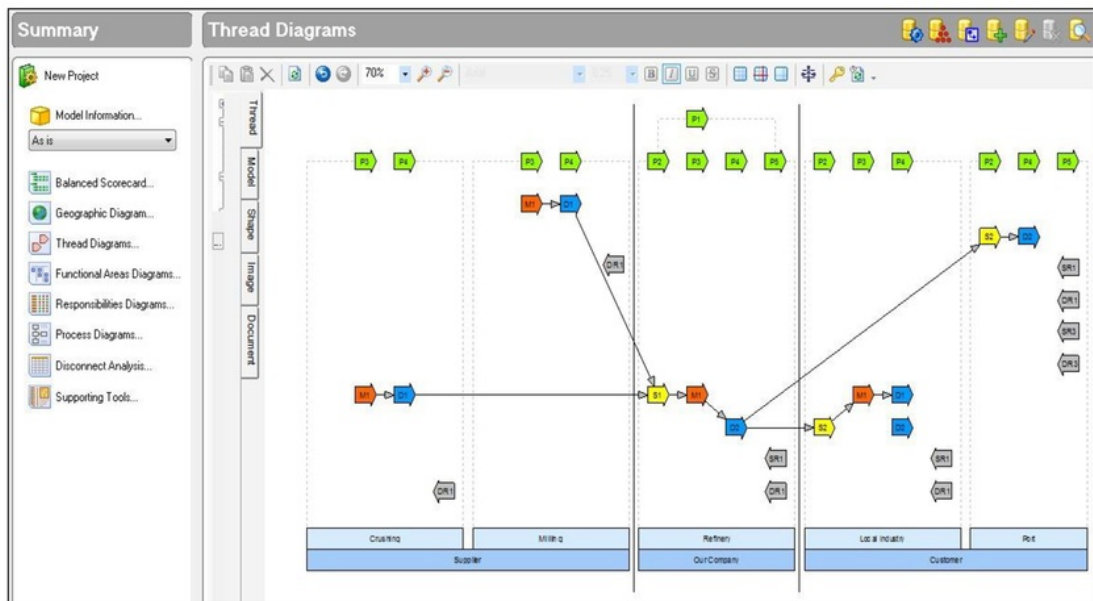Figure 1: Business process in an oil palm refinery in Malaysia

Figure 2: SCOR model in an oil palm refinery in Malaysia

5.   **Finding**

There were five main process categories in SCOR model which described activities in the business process. *Plan* represented the power of refinery in balancing customer demand and supply finished products. The *source* represented the power of suppliers to influence the business process to supply the crude oil in the oil palm refinery. The power of the refinery leads the business process represented by *Make*. *Deliver* represented the power of supporting transportation providers to distribute the finished products of the oil palm refinery to the customers. Lastly, *return* represented the power of customers to push the refinery to provide the finished products based on customer requirement. This study analyzed the supply chain relationship model based on the power collaboration of a refinery to associate with the supplier, distributor and the buyer.

a.   **Power of Supplier**

There were two main suppliers of refinery involving the milling producing CPO and the crushing producing CPKO. Moreover, milling produced CPO where its feedstock comes from the fruit fresh bunch (FFB) in plantations. For a detailed process in CPO, FFB in the plantation was harvested every day and delivered to the milling. Then, the milling process cannot postpone in producing CPO whenever FFB have been harvested. Therefore, fruits in plantation that have been stored for long periods prior to processing have high *free fatty acid* (FFA) contents. FFA would still remain within the standard level of 5%, where it stored an average less than five-days (Tagoe et al., 2012). Beside, based on the MPOB annual report in 2014 showed that Malaysia was one of the biggest suppliers of palm oil in the world where it had planted area approximately 5.392.235 Ha and 87% FFB was mature. There were 439 millings and 44 crushings in Malaysia with different abilities to extract oil. In addition, the detailed report about summarizing the ability of suppliers of refinery in Malaysia can be seen in Table 1. Although CPO and CPKO were the main crude oils that was produced at the refinery, power collaboration of the supplier in supply chain relationship model followed the information from the refinery. Thus, the supply chain relationship model in this term showed that the power collaboration of the supplier to the refinery is not a dominant.

Table 1: MPOB annual report in 2014

No	Supplier	Total Industry	OER	Production (Ton)	Export (Ton)	
1	Milling (CPO)	439	20.62%	19.667.016	4.700.603	24%
2	Crushing (CPKO)	44	45.94%	2.277.382	328.283	14%

b.   **Power of Refinery**

The refinery runs the business process based on the make-to-stock production, which it arranged production schedule based on demand in annual forecasting. Thus, the refinery had the power to manage their resources and supplier with the higher authorization involving determining the capacity of batch production, delivery size, and lead time of order crude oil. In addition, the pattern of this business process showed that the refinery runs the business process under the coordination of their holding group which the supplier and refinery directly were controlled directly by headquarters (HQ) to deliver crude oil and determine the fixed lead time of schedule delivery product. Thus, crude oils were supplied to refinery from the milling and crushing process under the holding group. Consequently, refinery and supplier conduct joint forecasting and cooperate to achieve the optimal size of batch production. Thus , this strategy had portrayed that there was the power collaboration of the refinery to be dominant actor.

c. Power of Distributor

This refinery was built close to the port. For solid product, it was delivered using road tanker to the local market. Then, the main transportation service provider in distributing finished products of the oil palm refinery in the international market was the vessel. Consequently, Refinery followed the schedule of the vessel whenever distribute using the port. Furthermore, oil world in the year 2013 reported that export of oils and fats in the world approximately 74.81 million tons, which it consist of 62% of palm oil and palm kernel (Basiron, 2014). In fact, Malaysia supplies these products around 42% because most of the oil palm products exported to the international market through the port. Indeed, distributors had a power in the collaboration as an entity which was indispensable to move the finished products forwards to the buyer. Thus, the distributor was one of the dominant actors in this supply chain relationship model.

d. Power of Buyer

This refinery was influenced by under holding groups to run the business process which it pushed refinery implementing make-to-stock strategy. Although there were high demands of international market, the production system was not only consider the demand of customer order, but also arranged annual forecasting of demand in order to utilize the resource of production. In addition, refinery seldom does the outsourcing of finished product to other parties because the production put the number of inventory in the warehouse to buffer customer demand. Indeed, to be part of holding group, it provided the ability for a refinery to strengthen power collaboration in order to cooperate with the buyer. In other word, refinery produced number of finished products do not just consider waiting the information from the buyer. Thus, this case represented that the power collaboration of the buyer is not dominated whenever describes in this supply chain relationship model. Summarizing of supply chain relationships between refinery and other supply chain actors can be seen in Table 2.

Table 2: supply chain relationship between refinery and other supply chain actors

Supply Chain Actor	Relationship Model	Power Position
Power of Supplier	• Low demand of international market (CPO and CPKO). • Characteristic of FFB (not stocked for a long time).	Not dominance
Power of refinery	• Running the business under coordination of the holding group (make to stock). • Crude oils are supplied from the milling and crushing under the holding group.	Dominance
Power of distributor	• Refinery followed the schedule of the vessel. • High number finished products of refinery is exported to the international market.	Dominance
Power of buyer	• Refinery seldom does the outsourcing of finished product to other parties. • The production system of refinery was not only consider the demand of customer order, but also arranged annual forecasting.	Not dominance

Supply chain relationship using the SCOR model found that refinery and supplier of crude oil joint forecasting and run the business process which it was controlled directly from HQ (Refinery (R) = Supplier (S)). In addition, this type ran production based on demand in annual forecasting so the finished products available in warehouse whenever the customer required (Refinery (R) > Buyer (B)). Furthermore, the distributor would feel indispensable because there was the high demand of international market and the finished products must use the vessel to deliver to the customer (Refinery

(R) < Distributor (D)). This business process pushed all resources in the production system to stock of finished products. Thus, this business process was categorized into push strategy. The detailed supply chain relationship model in oil palm refinery using push strategy can be seen in Figure 3.
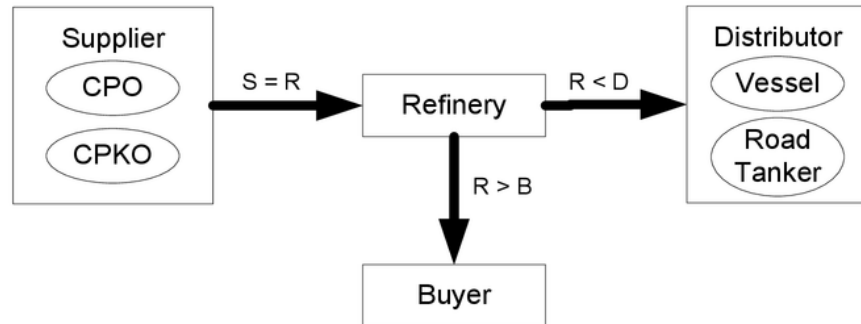

Figure 3: Oil palm refinery in push strategy

6. Discussion

This study found that the relationship model between oil palm refinery and other actors such as their supplier, distributor and buyer are categorized into push strategy. It involved the refinery and supplier running the business with coordination and control under a holding group because their supplier adjusted to deliver of crude oil with fixed lead time. However, this strategy affected the higher transportation costs (Zhang, 2008) because arising from urgent production conversion caused by big volume of crude oil. In addition, push strategy was useful to achieve the effective resource of supply chain strategy (Faraoni and Petretto, 2009). Therefore, refinery confidence arranged the production schedule based on demand in annual forecasting and difficult to meet changing demand patterns. Furthermore, the relationship between refinery and distributor showed delivering of finished products of the refinery was supported by transportation service provider, such as road tanker to local industry and vessel to international market. High demand of finished product come from international markets and a small percentage was delivered to local markets. In addition, most refineries run business process close with port in order to easily manage the vessel. Thus, the logistics strategy was pushed to follow the schedule of the vessel and to determine the optimal capacity in delivering product. It shows that lead time of customer determined the quality of customer satisfaction. Therefore, the demand of the customer is fulfilled for providing the best quality of product and high service level (Angelova and Zekiri, 2011). It is achieved by managing the distribution of finished product to the customer and keeping the product on time delivery. Furthermore, the higher power collaboration of refinery than buyer caused the refinery to be able to effectively sustain the strategy of supply chain as a competitive advantage and difficulties were to be surpassed by those that are able to develop the supply chain (Sukati et al., 2011). Moreover, this refinery was suitable for the systems with higher resource allocation because of the crude available and stock in the warehouse. Then, it can be adopted for complex supply chain structures in order to provide the high demand of finished products.

Finally, this study identified that there are dominant actors in this collaboration involving the refinery and distributor such as the vessels. Both of them affected the supply chain actors as it has a high power in the collaboration to run the business process. Nevertheless, the suppliers and buyers are in a weak power position in the collaboration because their strategy can not influence the business process of oil palm refinery. Moreover, Kahkonen (2014) revealed that the actors with high levels of power in the collaboration of the SCM practices have high levels of competitive advantage. As the result, analyzing supply chain relationships shows that actors have the ability to push its strategy to other supply chain actors following its requirements.

7. Conclusion

This paper adopting the SCOR model to analysis the supply chain relationships in an oil palm refinery in Malaysia through power collaboration was presented. There are two supply chain actors that have a high power collaboration in the supply chain relationships involving refinery and distributor. Nevertheless, the result of the analysis can be fluctiative depending on the mutual interaction and collaboration between supply chain actors. Thus, further research suggests to measure the performance supply chain relationship in order to evaluate the collaboration and maintain effective partnership.

Acknowledgement

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