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Performance Analysis in Palm Oil Industry Using Supply Chain Operations Reference (SCOR) Model

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ABSTRACT

The research aims to map the process and measure supply chain performance in the palm oil industry using the Supply Chain Operation Reference (SCOR) Model 11.0 approach. It was considered that this industry could influence the country's foreign exchange. The object of research was PT Perkebunan Nusantara I (PTPN I), Aceh. It was chosen because, compared to other PTPNs in the Sumatra region, the lowest productivity rate for palm oil processing was around 2,8 tons/ha, inversely proportional to the land area owned by state plantations of 42.233 ha. Data were collected using field survey methods and interviews with company managers involved in the company chain process. This measurement process was useful for measuring achievements and correcting ineffective supply chain processes. The results show that supply chain performance analysis for performance metrics has not reached the expected target. It describes Perfect Order Fulfillment (POF) with a gap of 98%, Order Fulfillment Cycle Time (OFCT) of 3,93 days, Total Cost to Serve (TCTS) of 71%, Cash to Cash Cycle Time (CCCT) of 242,32 days, and Return on Supply Chain Fixed Assets (ROF) of 0,123 times, when viewed from the calculation of the Lost Opportunity Measurement (LOM). In the research, four recommendations for improvement are given based on the problems that occur in the company using the best practices of the SCOR model. They are manufacturing reliability improvement, batch reduction, Single Minutes Exchange of Dies (SMED), and make-to-order fulfillment strategy.

Keywords: performance analysis, palm oil industry, Supply Chain Operations Reference (SCOR) model

INTRODUCTION

Presently, businesses play a more crucial role in Indonesia's economic development. As a result, job opportunity becomes more varied, creating tighter business competition. One of Indonesia's most important business sectors is plantation and agriculture (Badan Koordinasi Penanaman Modal, 2017). The sector benefits and provides raw materials for the food and beauty industries. In addition, the sector creates job opportunities on a large scale and increases foreign currency reserves. During an economic crisis, the sector has been proven dependable and resilient in facing economic shocks and fastening national recovery as targeted by the government.

Based on Table 1, it is known that the food and plantation industry ranks second after the mining industry in terms of foreign and domestic investments. It reveals that investment in Indonesia's food and plantation industry is sizable. The investment value indicates that the industry is one of the most influential and essential sectors in the Indonesian economy.

According to Badan Pusat Statistik (2016), palm oil is one of the essential commodities in the Indonesian economy. The palm oil industry has grown quite significantly in the last four decades. Palm oil is an industrial plant that produces cooking oil, industrial oil, and fuel (biodiesel) (Purba, Dewi, & Maharani, 2018). Since 2006, Indonesia has been the largest Crude Palm Oil (CPO) producer globally. Indonesia controls almost

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90% of the world's palm oil production. Potential markets absorbing CPO and Palm Kernel Oil (PKO) are the fractionation/refining industry (especially the cooking oil industry), special fats, margarine, bath soaps, and alternative fuels. These industries are the primary industrial sectors in Indonesia. The oil palm plantation industry in the process chain is divided into two parts, namely upstream and downstream activities. Upstream activities include plantation, marketing, and infrastructure activities that support these activities. Meanwhile, downstream activities include palm oil processing mills, palm oil stocks, palm kernel stocks, and export activities (Jakfar, Romano, & Nurcholis, 2015).

According to Pacheco, Gnych, Dermawan, Komarudin, and Okarda (2017), Indonesia, Malaysia, Thailand, Colombia, and Nigeria are palm oil producers that dominate the global market. Indonesia is the largest palm oil producer with 33 million tons of production and 1,6 million tons of domestic consumption. The export value is 24,5 million tons and zero imports, It is different from neighboring countries in Southeast Asia, such as Malaysia and Thailand, which still import palm oil overseas. Therefore, it is notable that the palm oil industry in Indonesia has a huge opportunity to keep developing. The domestic and international demands are still relatively high. Thus, it has been a challenge for the players in this industry, requiring them to strengthen their business by developing a sustainable and efficient production system to meet market demands. There are still ample opportunities to maintain and develop the palm oil business in the future.

As the global competition gets tight, the palm oil business has become more competitive than ever before. Let alone, Indonesia is the world's largest producer of this product. An effective and efficient production system is a prerequisite for success among businesses in this sector. Such conditions require palm oil companies to provide high-quality and timely services to meet consumers' demands. An effective and efficient system is also essential for the success of production activities. The production includes effective supply chain management and efficient supporting infrastructure. It considers that supply chain management includes all functions involved in receiving and fulfilling customer demands (Chopra & Meindl, 2013). The relationship between those two factors is vital for achieving production targets to streamline the distribution to consumers. Then, an efficient production process in meeting market demand can be achieved by procuring an effective and sustainable supply. According to the Council of Supply Chain Management Professionals (CSCMP) in Wisner, Tan, and Leong (2012), supply chain management is the planning and management of all activities related

Table 1 Industry Comparison based on Investment Value in Indonesia

	Sector	Foreign Investment (Million USD)	Domestic Investment (Million Rupiahs)
1	Food and Plantation Industry	852	3.643,6
2	Livestock Industry	83,7	298,8
3	Forestry Industry	35,8	10,9
4	Fishing Industry	7,9	23,3
5	Mining Industry	2.171	15.543

(Source: Badan Koordinasi Penanaman Modal, 2017)

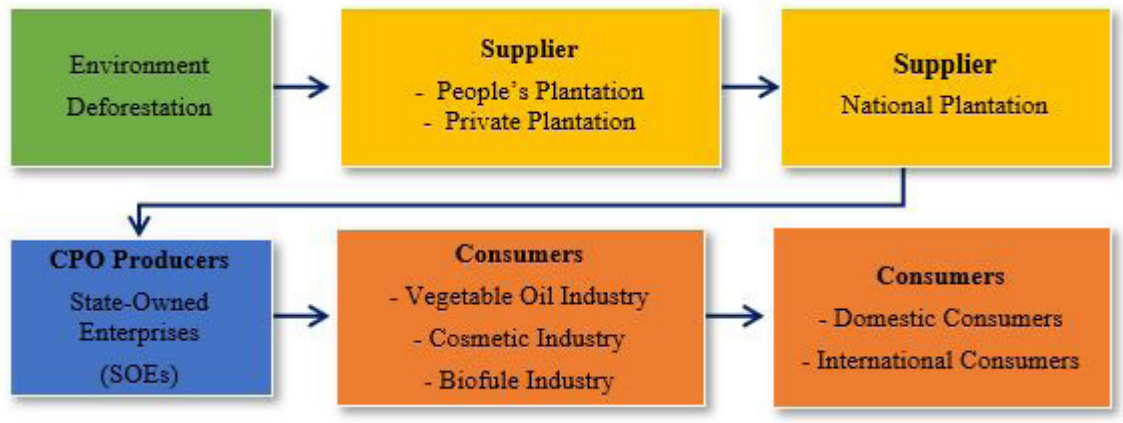

Figure 1 Mapping of Supply Chain Flow in CPO Industry in Plantation State-Owned Enterprises

to sourcing and procurement, conversion, and all logistics management activities. The supply chain includes coordination and collaboration with partners, such as suppliers, intermediaries or third-party services, and customers.

Figure 1 explains the implementation of supply chain management in the palm oil industry with its complex elements. It includes raw material suppliers, producers, domestic and international consumers, and Indonesian forest (environment). Then, raw material suppliers comprise people's plantations, private plantations, and state-owned plantations. CPO procurers are the companies that process palm oil from state-owned enterprises and private firms. However, private firms have more production, domination, and control over the market than state-owned enterprises. Then, both domestic and foreign consumers are the companies that need CPO for producing cooking oil, margarine, biofuel, and others. Environment (Indonesian forest) is a sub-system of the CPO supply chain, which this CPO industry affects.

Based on the outlined explanation, the research evaluates the performance of the supply chain of palm oil company Supply Chain Operation Reference (SCOR) version 11.0. The model is a tool to measure supply chain performance in various industries. Compared to the Balanced Scorecard (BSC) method to measure the company's performance, BSC focuses more on financial results. It causes company managers to be more concerned with financial aspects than other aspects (Nurjaman, 2013). Meanwhile, the SCOR model concerns more with data and detailed and in-depth observations of the company's operational activities. This model divides the supply chain into five processes: plan, source, make, deliver, and return. The purpose of the standardization concept conducted by Supply Chain Council (SCC) is to ease the understanding of the supply chain as an early step to achieving an effective and efficient supply chain management for sustaining a company's strategy (Paul, 2014). The supply chain operations reference model was developed by Supply Chain Council (SCC). This model was created by two private U.S. research and consulting firms. – the Pitiglio Rabin Todd & McGrath (PRTM and Advanced Manufacturing Research (AMR) in 1996. Previously, the model was tested by a group of administrators working at leading companies in the US. In the same year, other companies in the group formed SCC (Camargo, Zanandrea, Pacheco, Malafaia, & Da Motta, 2013).

SCOR model has a framework that combines the business process of the supply chain with performance measurement based on best practices into an integrated structure (see Figure 2). Thus, the communication process among supply chain elements and the activities within the supply chain can run optimally (Bolstorff & Rosenbaum, 2012). One of the advantages of the SCOR model is Process Reference Model (PRM). Its capability can integrate business process re-engineering, benchmarking, and best practice analysis into the supply chain framework. The weakness of the SCOR model is that it is not suitable when applied to a distributor company to calculate the company's performance, where the calculation only reaches level 1 of the 4 levels offered, so it is considered not optimal (Sarjono, Suprapto, & Megasari, 2017). SCOR supply management hierarchically consists of detailed and integrated processes from supplier to customer. Those processes align with the company's operational strategy, materials, work, and information flow (Paul, 2014).

PT Perkebunan Nusantara I (PTPN I) is a producer of Fresh Fruit Bunches (FFB) of palm oil and processed products of palm oil and palm kernel, obtained from several work units of the plantation managed by the company to meet its targets. The supply chain analysis of the palm oil industry shows that the downstream palm oil industry is still in dire need of a supply of FFB raw materials from smallholder plantations. Hence, the role of smallholder plantations cannot be separated from the development of downstream industries (Siahaan, 2016). The company's products are marketed through PT Kharisma Pemasaran Bersama Nusantara (KPBN). CPO and palm kernel are marketed by KPBN Jakarta and Medan to meet the demand of domestic consumers because the market for palm oil is vast. It is widely known that palm oil is an important raw material for

Figure 2 Process Framework of SCOR Model

daily needs such as beauty products, cooking oil, and bio-diesel. So far, the company has applied the supply chain management concept to operate the flow of goods from suppliers to end consumers. However, the company's supply chain has experienced a problem since there is a gap between production planning and actual production. Therefore, it is necessary to measure the company's supply chain performance to identify whether the existing supply chain has been effective and efficient. The five work attributes in the SCOR model, namely, reliability, responsiveness, flexibility, cost, and asset management, need to be measured to determine the supply chain performance for attaining the company's target (Yuniaristanto, Ikasari, Sutopo, & Zakaria, 2020). PTPN I can continue to exist if it has competitive advantages over its competitors. These competitive advantages may deal with costs, raw material inventory, determination of production quantities, and time to fulfill orders from consumers. According to Sutopo, Maryanie, and Yuniaristanto (2015), in the results of research on palm oil mills in Indonesia with five attributes, only reliability, responsiveness, and asset have a numerical gap between the performance values of the benchmarking target. Meanwhile, agility and cost have numbers that are equivalent to the benchmarking target.

METHODS

The research utilizes primary and secondary data. Data are qualitative and quantitative. According to Sekaran and Bougie (2014), primary data are obtained directly through observations and interviews from parties related to the occurring problems. Meanwhile, secondary data are from literature studies, the Internet, journals, and other supporting documents. There are several data in the research. First, it is the general description of the company, which includes the organizational structure and management of the company and the line of business. It is the secondary data from the documents owned by the company. Second, the company's supply chain structure in the form of primary data is obtained directly through interviews with the involved parties and field surveys on the operation of the company's supply chain structure. Third, data needed to analyze the firm supply chain performance are annual reports and SCOR Quick Reference 11.0.

Data processing and analysis in the research use SCOR model version 11.0. The SCOR model has three levels of the process, starting from an overview to an in-depth review. Level one is the highest level that provides a general definition of the five core supply chain processes. A gap analysis is used when testing level 1 analysis. Then, level two is the configuration level. The enterprise's supply chain can be configured from several core processes. A company can form the configuration of the current phase (as-is) to the phase to be addressed (to-be). Level three is called the element level process, which contains input, process, and output (Bolstorff & Rosenbaum, 2012).

In the SCOR model, some attributes are measured: supply chain reliability, responsiveness, flexibility, cost, and asset management. The benchmark of these performance attributes can use the following performance metrics. First, according to Paul (2014), Perfect Order Fulfillment (POF) is the percentage of orders delivered perfectly and on time according to consumer demand. Moreover, the delivered products do not have quality problems.

Second, Order Fulfillment Cycle Time (OFCT) is a consistent average cycle time to meet consumer needs. The performance attribute consists of three components. There are resource cycle time, production cycle time, and delivery cycle time (Paul, 2014).

Third, Total Cost to Serve (TCTS) is the total cost of supply chain management to fulfill product delivery to consumers (Paul, 2014). It includes several costs, including planning costs, procurement costs, raw material costs, production costs, order management costs, shipping costs, return costs, and Cost of Goods Sold (COGS). The model is in Equations (3) and (4).

$$Perfect\ order\ fulfillment = \frac{number\ of\ orders\ fulfilled}{Total\ number\ of\ orders} \times 100\ \% \quad (1)$$

$$OFCT = \frac{amount\ of\ cycle\ time\ of\ delivered\ orders}{number\ of\ total\ delivered\ orders} \quad (2)$$

$$TCTS\ (IDR) = procurement\ cost + planning\ cost + production\ cost + shipping\ cost + return\ cost \quad (3)$$

$$TCTS\ (\%) = \frac{TCTS\ (IDR)}{total\ sales} \quad (4)$$

$$CCCT\ (Days) = Inventory\ Days\ of\ Supply + Days\ Sales\ Outstanding - Days\ Payable\ Outstanding \quad (5)$$

$$ROF = \frac{supply\ chain\ revenue - COGS - management\ costs\ of\ supply\ chain}{supply\ chain\ fixed\ assets} \quad (6)$$

$$ROW = \frac{supply\ chain\ revenue - COGS - management\ costs\ of\ supply\ chain}{Inventory + account\ receivable - account\ payable} \quad (7)$$

Fourth, Cash to Cash Cycle Time (CCCT) is required for an investment to flow back into the company after spending on raw materials (Paul, 2014). There are supporting components in this performance attribute. It consists of inventory days of supply, days sales outstanding, and days payable outstanding.

Fifth, Return on Supply Chain Fixed Asset (ROF) is the return received by the company from the capital invested in the supply chain fixed assets used in the plan, source, make, deliver, and return processes (Paul, 2014). ROF calculates the amount of investment related to the company's working capital position versus the income generated by a supply chain. The company seeks to restore fixed assets, such as tools or information technology used for production activities. Then, suppliers return fixed assets, such as equipment or technological information used to produce materials. However, not all production activities must rent or buy the tools. If the supplier can buy tools for production, it will benefit more for the next project or production.

Sixth, Return on Working Capital (ROW) is the relative amount of investment in the company's working capital compared to the income generated by a supply chain operated by the company (Paul, 2014). Its components include accounts receivable, inventory, supply chain earnings, cost of goods sold, and supply chain management costs. Equation (7) shows the components of the ROW attributes.

In the SCOR model, several methods calculate the opportunity of SCOR metrics. In the research, the method used is Lost Opportunity Measurement (LOM). According to Pratiwi and Sarjono (2014), it is possible to identify the lost opportunities in obtaining certain income with this method.

RESULTS AND DISCUSSIONS

Supply chain performance analysis using SCOR Model version 11.0 has three mapping levels. Level 1 mapping deals with the implementation of the company's supply chain from the beginning of managing raw materials for production to selling palm oil to consumers to be reprocessed into finished products. This mapping is illustrated in Figure 3.

PTPN I runs its production operations by implementing a supply chain that involves chains from suppliers to customers. As shown in Figure 3, it is known that the company's supply chain process starts from sources from plantations managed by the company and purchases from third parties to meet production needs. Then, the raw materials are processed in the plantations managed by the company to be made into CPO and distributed to consumers (refinery industry) to become finished products needed by the related industry.

To measure the performance of the upstream palm oil processing industry, it is generally necessary to compare the best industry or the targets that the company has previously determined to meet the performance appraisal standards based on the SCOR model. In the research, the company's performance is assessed on a limited basis only for palm oil (CPO) products produced by PTPN I, Langsa, Aceh in 2018. Furthermore, the performance of CPO products in the 2018 fiscal year is compared to the targets previously determined by the company in the Rencana Kerja dan Anggaran Perusahaan (RKAP -Corporate Budget and Work Plan).

These benchmarks are used to determine the target performance to be attained by the company by describing the gap between the actual performance and the targeted performance. Therefore, supply chain performance in the entire chain should also be improved to achieve firm improvement. The target written in the 2018 RKAP of PTPN I has illustrated the revenue that had to be obtained or the opportunity to be acquired. Opportunity costs are the lost costs resulting from the non-optimal supply chain performance on the Level 1 of the SCOR model. After setting the performance target, the next step is to perform a gap analysis to calculate the difference between the actual and targeted conditions. The difference is described in the increase in revenue if the performance is improved to reach the target.

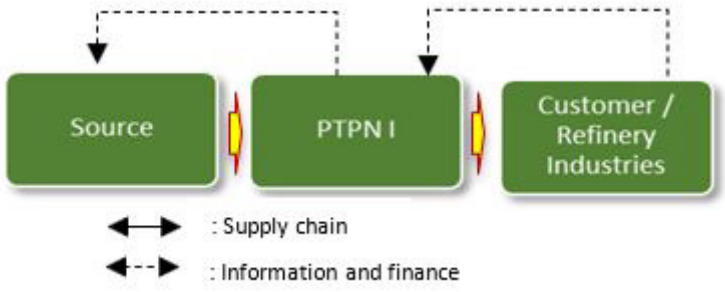

Figure 3 Level 1 of SCOR Model in PTPN I
(Source: Manager of Commerce in PTPN I)

Based on the gap analysis, the opportunity column is filled with the magnitude of the opportunity to increase the revenue. Performance for these metrics is geared towards achieving the target. Data on the total income and the percentage of gross profit generated by CPO products are needed to calculate the opportunity. Based on management reports in 2018, the gross profit was 19,36%. Meanwhile, the revenue from CPO products was 468,41 billion IDR.

These metric calculations are directly obtained from PTPN I and noted by the researchers during the research. From the ten-performance metrics in the SCOR model, six metrics are identified, including POF, OFCT, TCTS, CCCT, ROF, and ROW. However, four agile performance metrics are unavailable because the company does not experience them. The research results show that the company's supply chain performance is seen from the internal benchmarks that have been determined in the RKAP (corporate budget and work plan), which are in the best position in their class and have better performance figures.

It indicates that the company can actually earn revenue more maximally if it reaches the determined target. Therefore, actions are needed to find the root of the problem, especially in OFCT and the solutions. A more in-depth study of the company's supply chain performance is analyzed in level 2 of the SCOR model.

Before discussing the main sub-processes that are the company's main problems deeper, it is necessary to analyze the indicated sub-processes that have problems as described at level 2. These problems are source stocked product (process code: sS1), make to stock (process code: sM1), and deliver to order (process code: sD2). Those are related to the performance process as described in the previous level. It is known that the make-to-stock process has been delayed for 50 working days from the target. So, the delay rate is calculated starting from the actual cycle time of the supplier or source, making, and delivering. Table 2 describes the delivery, making, and source processes that cause the fulfillment of the order not to reach the target.

The source and delivery time cycles do not experience delays, especially for the source. It is eight days faster than the specified target. Furthermore, the delivery process reaches the target. The actual day and the target day have been confirmed for delivery, as seen from the distance and travel time of the shipping from each palm oil mill.

In short, the source process is 28% (8 days) faster than the target. The delivery process does not experience any delay. However, in the process of making, the delay percentage is 15,08% or 50 working days.

Moreover, in calculating OFCT, it needs to pay attention to the time and quantity of delivery, as well as the documents and conditions of the shipped items. If one of those requirements is not fulfilled, the provided service is perceived as poor quality. Level 2 helps the company to identify the root of the performance gap problem, as identified in level 1. Figure 4 illustrates the supply chain of PTPN I in fulfilling CPO orders translated into level 2 for the SCOR model. That graph explains each activity, as translated into five main processes: plan, source, make, deliver, and return. These processes align with the SCOR model for defining each supply chain activity and identifying the relationship between one activity with others.

The explanation in Figure 4 relates to the planning process and execution of supply chain flows operating in the company. Level 2 mapping is also said to be configuration level, portraying the current running configuration (as-is) or further phase to be stepped in (to-be). The current configuration can be pointed by the as-is geographic map and as-is thread diagram.

Level 2 mapping, also known as level configuration, can describe the current configuration (as-is) or the phase to be addressed in the future (to-be). The current configuration can be shown with an as-is geographic map and an as-is thread diagram. The shift in supply chain flow starts from raw materials obtained by the company from its plantations managed by the company and purchasing garden products from traditional gardens managed by the people located in the cities of Langsa, Aceh Tamiang, and Aceh Utara. Furthermore, the flow of product materials between the company and consumers is sent directly from three palm oil mills located in Cot Girek, North Aceh and Karang Baru and Tamiang Hulu, Aceh Tamiang, as seen in Figure 5.

To understand or evaluate the process in each operational activity, the company can change the as-is geographic map into an as-is thread program focusing on the ongoing operation of the company. The as-is thread diagram is illustrated based on each chain in the oil palm supply chain, as shown in Figure 5.

Table 2 Values and OFCT for Deliver, Make, and Source

Matrix	Deliver	Make	Source
Order Fulfillment Cycle - Actual Time	2 days	933 days	21 days
Order Fulfillment Cycle - Target Time	2 days	875 days	29 days
Day Difference	-	50 days	-8 days
Delay Percentage (%)	0 %	15,09 %	-28 %

(Source: Company Data Processed by the Authors, 2019)

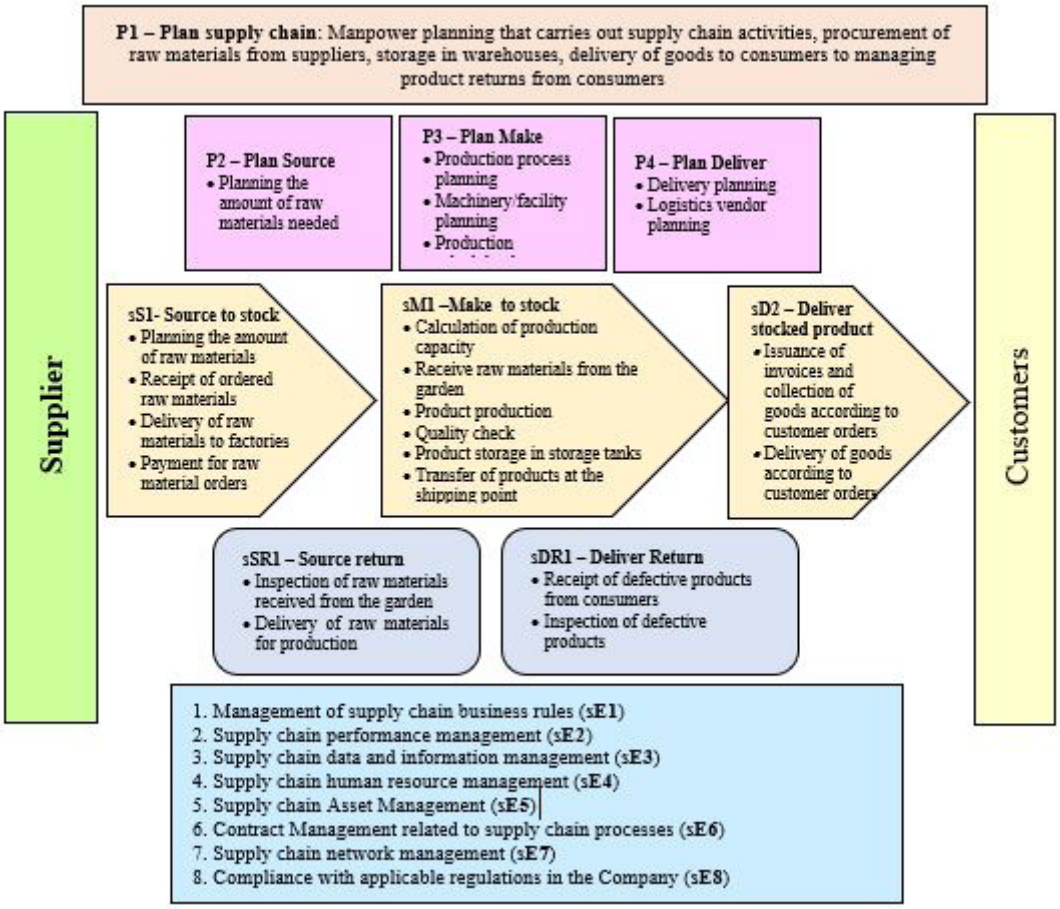

Figure 4 Level 2 of SCOR Model in PTPN I

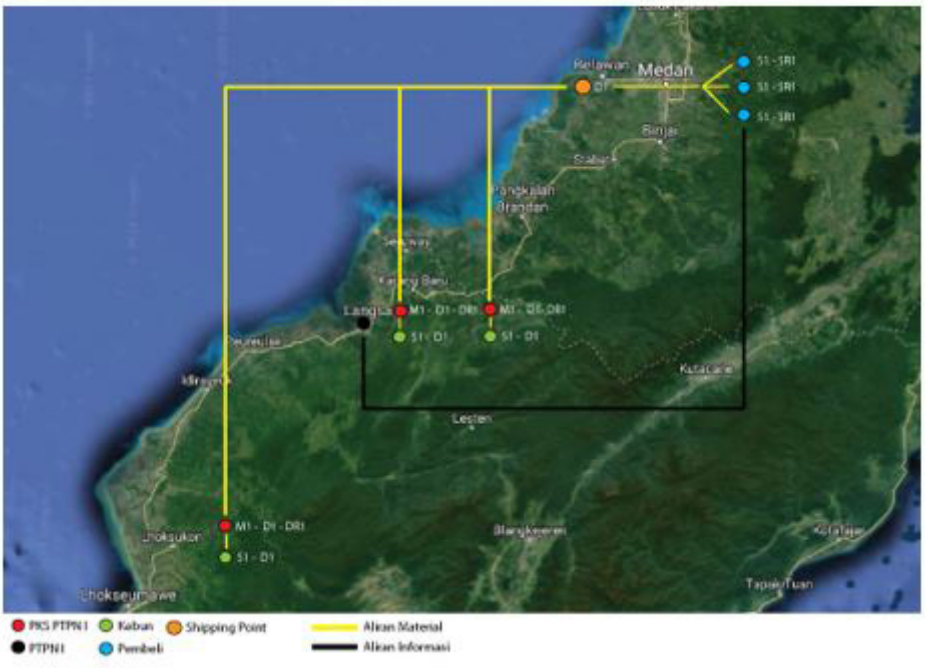

Figure 5 As-Is Geographic Map of Company's Supply Chain Flow

Next, level 3 mapping is conducted to identify the making process in more detail. It is essential because the delay percentage of the making process is much smaller than the percentage of source and delivery processes. It is essential to map the entire activities of the supply chain process, which describe the process of make to stock (process code: sM1) divided into three parts (input, process, and output) to identify the cause of this low performance in the making process in level 3. Input activities include sP3.4, which is the work establishment adjusted to the material projection for fulfilling production plan requirements and operation. Then, the activity of sE4.2 is the work control of the company's human resources within the supply chain.

Process activities include sM1, sM2, and sM3. sM1 activity deals with the production schedule to fulfill the needs in the planning and provide quality to consumers. The production unit of PTPN I consists of three palm oil plants operating 24 hours a day in two shifts (day and night). Then, sM1.2 is the selection and physical movement of raw materials from suppliers to the factory. Meanwhile, sM1.3 is the series of activities in processing raw materials into work-in-process goods. These goods will later be processed to be sold as finished goods for customers.

Output is the final element of each production activity. It consists of sM1.5 and sM1.6, which are the continuity of the previous activities. The sM1.5 is an activity to store finished good (oil) in the tanks of each factory before it is sold to customers. The last activity is sM1.6, which is an oil delivery to the shipping point, Belawan port in Medan. Consumers will need to take the oil from the shipping point as stipulated in the purchase contract.

The generated result in level 3 is to find the cause of the problem related to the low performance of the making process. Therefore, fishbone analysis in a causal diagram is used to trace that problem. Based on interview results with employees in PTPN I, the primary identified problem is related to the less efficient machines. These operating machines are relatively old, ranging from 20 to 30 years. Thus, the produced products are below the standard, and production activity is less optimal.

Based on a further interview with employees in PTPN I, the less optimal making process is caused by several factors. First, it is cost. The primary factor of this issue is related to financial factors. PTPN I has experienced a drastic decline in financial performance in the last three years. As a consequence, the supply chain performance has deteriorated. Presently, this company is in the transition phase to improve its performance.

Second, the less optimal making process is caused by the poor reliability of the company's machines in producing CPO. These machines in three oil palm plantations managed by PTPN I are not efficient. Therefore, it affects production capacity. The machines are old, and their spare parts are not readily available in the market. It can take more time to fix the broken machines. As a result, the production process often experiences a delay.

Third, another problem is related to the poor raw materials (source). The plantation management is traditionally performed. Hence, the raw material shipping and handling in the plantations are relatively poor.

Those issues seriously affect the production performance. It is revealed that the company still cannot fulfill the production target. For example, the OFCT performance from January 2018 to December 2018 was expected to be 875 days. In reality, it took 933 days, recording a delay of 58 days (15,09% of the target). Indeed, it gives time disadvantages for the company.

The metrics in the company's target can be improved by referring to the best practice recommendations of the SCOR model. In addition, there have been very few previous studies discussing these recommendations. Having measured the supply chain performance, the researchers propose several recommendations. First, it is the Single Minute Exchange of Dies (SMED) (code: Best Practice_BP. 003) or changeover time, which changes from one model to another, takes hours, and results in production having to run in large lots sizes for one model to avoid repeated changes. This method reduces the set-up time by classifying the set-up into two types: internal and external set-up. Internal set-up is a set-up activity carried out when the machine is off, while the external set-up is carried out when the machine is on and in production.

Second, it is a make-to-order strategy (code: BP.040). It allows customers to purchase products according to their specific specifications. This approach only allows product production after a customer has placed an order. It has more flexible customization than ordering directly from a retail company.

Third, there is batch size reduction (code: BP.042). Reducing batch size or capacity can improve performance level metrics found in OFCT. The involved SCOR processes include the processes of supply chain plan (code: sP1) and make plan (code: sP3).

Fourth, in manufacturing reliability improvement (code: BP.53), the development of manufacturing reliability is recommended. It can include the supply chain plan and the making plan in the SCOR process. This practice includes reliability tools to implement each work process if a problem appears. This strategy also combines the analysis and simulates the processes in the production of goods to identify the opportunities for increasing the reliability of supporting production machines and capacity or service factors.

The PTPN I's POF performance from January to December 2018 ranged from 90%−97% per month, except for August and September 2018, which had the lowest performance. It was only 85% for August 2018 and 79% for September 2018. The causes can be caused by various reasons, namely the quality of raw materials from suppliers caused by weather factors,

delivery limitations because the shipping route has difficult terrain, and human resource factors that carry out illegal buying and selling of palm oil. The total of the company's POF performance metrics in the 2018 period was 98%, which was obtained using Equation (8).

Second, the actual cycle time of orders that the company can fulfill to consumers is 910 working days. The OFCT is calculated by Equation (9). The calculation shows that the time for the company to fulfill consumer demand for CPO products from the incoming order until the order is sent to the consumer is 3,93 days/order.

Third, TCTS uses Equations (10) and (11). The company realizes the actual data amounted to 468,41 billion IDR, with 71% of the total sales value for the January−December period with 659,31 billion IDR. The large percentage of this cost shows that the cost to meet and serve consumer demand exceeds the sales value that has been targeted.

Fourth, CCCT is calculated by Equation (12). It is known that Inventory Days of Supply (IDS) is the number of days of inventory material that can be used to produce goods. The result of the IDS number of days is 246,58 days to sell the existing inventory. Meanwhile, Days Sales Outstanding (DSO) is the number of days of pending sales due to receivables from consumers. The result is 3,29 days, meaning that the company needs that time to turn receivables into cash. Then, Days Payable Outstanding (DPO) is the number of days of outstanding debt due to debt from purchasing raw materials or operating costs. It has 7,55 days for the company to convert debt into supply chain costs. Then, it can be concluded that from the calculation results from CTCCT, the company takes 242,32 days to rotate the money that has been invested in the various calculations so that it can flow back into the company.

Fifth, in ROF, an organization's return from the capital invested in the supply chain assets is used in the plan, source, make, deliver, and return processes. It is calculated using Equation (13). Judging from the results of the ROF calculation, the figure of 0,123 means that the company gets a return of 0,123 times the invested capital for assets that support the supply chain process.

Sixth, there is ROW. The amount of investment is related to the company's working capital position and the income generated by a supply chain. It is calculated using Equation (14).

CONCLUSIONS

Based on the results and discussion, the conclusions drawn from the research are as follows. First, from the analysis conducted on the supply chain performance of PTPN I using the SCOR model version 11.0, the company's supply chain performance is relatively good. Level 1 mapping shows the results of each attribute using performance metrics of POF, OFCT, TCTS, CTCCT, ROF, and ROW with the values of 98%, 3,93 days, 71%, 242 days, 0,123 times, and 2.315 times, respectively. However, by comparing those figures with the targets to be achieved, supply chain performance has not been optimal in the OFCT, TCTS, CCCT, and ROF. It is because from the LOM data, PTPN I can actually earn a profit of 129,34 billion rupiahs if it achieves the determined target. So, a more in-depth analysis must be carried out on level 2 mapping. The level 2 mapping reveals a problem in the process of make-to-stock (sM1). Level 3 mapping is conducted to identify the cause of this problem. This mapping unveils that the root cause is the delay of the make cycle time. This delay is worse than both processes of source cycle time and delivery cycle time.

$$Perfect\ Order\ fulfillment = \frac{3669}{3759} \times 100\ \% = 98\% \tag{8}$$

$$OFCT = \frac{910\ day}{3669\ order} = 3{,}93\ days/order \tag{9}$$

TCTS (IDR / million) = 3.935 + 342.643 + 91.045 + 18.521 + 10.274
TCTS (IDR / million) = IDR 468.418 (10)

$$TCTS\ (\%) = \frac{TCTS\ (IDR)}{Total\ sales} \rightarrow TCTS\ (\%) = \frac{468.418.454.000}{659.310.000.000} = 71\ \% \tag{11}$$

$$CTCCT\ (Days) = 246{,}58\ Days + 3{,}29\ Days - 7{,}55\ Days$$
$$= 242{,}32\ \text{days} \tag{12}$$

$$ROF = \frac{468.418 - 93.578 - 223.445}{1.226.369} = 0{,}12344 \tag{13}$$

$$ROW = \frac{468.418 - 93.578 - 223.445}{63.217 + 9.693 - 7.534} = 2.315 \tag{14}$$

Second, based on the best practice of the SCOR model, the researchers propose two recommendations: the priority recommendation and the optional recommendation. The company should implement manufacturing reliability improvement and batch reduction as a priority recommendation. Meanwhile, the company may implement SMED and make-to-order fulfillment strategies as an optional recommendation.

For the research limitation, the researchers manually calculate the model score model. Many items must be calculated with relatively complete data, starting from planning, procurement, making deliveries, and returns. Then, as the data are calculated one by one, it takes time, cost, and effort. Hence, it will be easier and cut the time if the calculations are computerized. For future research, palm oil plantations are currently high in profit, given the world's shortage of palm oil. In Sumatra, there are five PTPNs (state-owned plantation companies), so it will be better if research can be conducted on other PTPNs in Sumatra. Their performance can be monitored, which has less performance and can be re-evaluated.

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