

Proposed Improvement of Performance Calculation of Supply Chain Management

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Abstract

Supply Chain Operation Reference (SCOR) Model It is a conceptual model developed by Supply Chain Council (SCC), one of which aims to evaluate the performance of the supply chain, the manajemean in this study is the product of bread fruit herbal tea Mahkotadewa Indonesia Ltd. research method used is descriptive method. Based on the metrics measured, concluded that the performance of the supply chain management products herbal teas breadfruit less efficient and the main cause is due to a few things among them: a less precise forecast, not integrated supply planning, weak coordination between sections within the company, supplier performance management, inadequate supplies of less well, and there is no checking of the inventory di warehouse.

Keywords: Supply chain management, performance measurement, SCOR model

Preliminary

Competition in industry was increasing along with the development of new companies in the global business. Manufacturers realize that providing cheap products, quality, and fastsoursop are not enough. All parties need the participation of all stakeholders from suppliers who process raw materials into finished products; Transportation Companywho sends raw materials from suppliers to the plant, as well as a distribution network who will deliver the product to the customer. Awareness of the importance of the role of all stakeholders in creating a product that is cheap, fast and quality is what gave birth to the new concept of supply chain management.

Company's selected suppliers that are not managed properly allow the supplier late in the procurement of raw materials for the company, because it can degrade the performance of the supplier and there is no price transparency of the bargaining between the supplier companies. The right application of SCM are can provide a competitive advantage, which is positive impact on the product and supply chain systems that built by the company.

The potential of the herbal medicine market is relatively small in terms of cost, as well as the technology required is not too complex, but there are some important points: the standardization that start from raw materials, process, up to the production and to achieve the appropriate use of cultured an obligation to develop supply chain performance. Therefore, Mahkotadewa Indonesia Ltd. which produces its own brand of herbal medicine, must develop the right strategic moves to face the complex competition. One of the strategic steps that can be taken is to evaluate the performance of the company's supply chain. Thus we can know which stages have problems in process of meeting consumer need that make the demand can't be served properly. The problems can be in term of quantity even time required

Problem Formulation

Based on the background, writer formulate the problem as follow:

1. How is the performance measurement of soursop herbal tea in Mahkotadewa Indonesia Ltd. using SCOR model version 10.0?
2. What alternatives solutions are found from the supply chain problem after it emerged from the performance measurement of supply chain management of soursop herbal tea?

Purpose of study

The purpose of this study is

1. Evaluating the performance of supply chain management for soursop herbal tea in Mahkotadewa Indonesia Ltd. Using SCOR model version 10.0.
2. Provide alternatives solution to the problem, After known from the activities of the performance measurement of supply chain management of soursop herbal tea.

Basis theory

Supply chain management

Supply chain management is the integration of procurement of raw materials and services activity, conversion into semi-finished goods and finished products, as well as delivery to the customer. These activities include purchasing and outsourcing activities (outsourcing), plus other functions that are important to the relationship between the supplier with distributors, Heizer, Jay and Render, Barry (2010).

Research methodology

In this study, the writer use descriptive methods. The type of data used is qualitative and quantitative and data sources used are primary and secondary. The analytical method used is the SCOR model.

Table 1. Research design

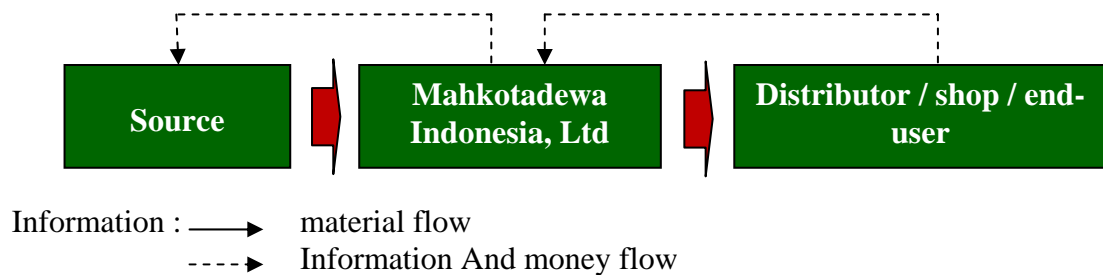
Purpose	Types and methods	Analysis unit	Time horizon
P-1	descriptive	Production divison of Mahkotadewa Indonesia Ltd.	Cross sectional
P-2	descriptive	Production divison of Mahkotadewa Indonesia Ltd.	Cross sectional

Table 2. Operationalization of variables

Variables	Concept	Sub Variables	Indicator
SCM performance	SCOR model is a model of supply chain operations which basically is a model based process. SCOR model provides a unique framework that links business process, metrics, best practices and technology features into a unified structure to support communication among supply chain partners	Mapping Level 1	Process SCOR: <ul style="list-style-type: none"> • Plan • Source • Make • Deliver • Return Measurement metrics: <ul style="list-style-type: none"> • POF • OFCT • COGS • CTCCT
		Mapping Level 2	Configuration process <ul style="list-style-type: none"> • Planning • Excecuton • Enable
		Mapping Level 3	Element process: <ul style="list-style-type: none"> • Input • Process element • Output

Table 3. Analysis method

Purpose	Analysis method
P – 1	SCOR model
P – 2	SCOR model

Study Results**The concept of SCOR performance measurement methods****1. Mapping level 1****Figure 1.** Mapping of SCOR model level 1 supply chain products Herbal Tea soursop

At level 1 there is a mapping scope elements of SCOR processes in supply chain companies

Table 4. Scope of SCOR process elements

No.	Process element	Chain 1 (supplier)	Chain 2 (company)	Chain 3 (distributor / shop / end-user)
1	<i>Plan</i>	Planning the supply of raw materials such as Mahkotadewa fruit, soursop leaf, green tea, angelica leaves and gotu kola leaf.	Raw material requirements planning, inventory planning of soursop herbal tea, equipment preparation, production planning, financial planning and delivery planning.	Planning soursop purchase herbal tea, soursop herbal tea inventory planning.
2	<i>Source</i>	Procurement of raw materials to supply raw materials to Mahkotadewa Indonesia Ltd. and make a deal with a partner.	Ordering, delivery, inspection and related expenses pemrolehan raw materials from suppliers, selecting suppliers and make a deal with the supplier.	Through the company's purchase of herbal tea.
3	<i>Make</i>	There is no process of making, because the raw materials are available from nature directly transported to the company.	Cultivate, produce, and perform soursop herbal tea packaging.	There is no process made by the store / end-user. Herbal tea shop as the seller, while the end user as the end user.
4	<i>Deliver</i>	Transporting the raw materials to the company	Doing packaging / packaging in accordance with company procedures, making deliveries to the proper transportation and on time, manage process orders and maintain good relationships with customers.	Stores do delivery to end-users every purchase. End-user does not perform the delivery process for its own use.
5	<i>Return</i>	Managing the return of raw materials that do not match the demand of the company and provide transportation for the delivery of raw material substitute.	Making a claim for raw materials that do not conform to the requests of suppliers and manage claims for damaged herbal tea.	Making a claim for damaged herbal teas to the company.

Performance Metrics SCOR Level 1

SCOR model is used to evaluate the performance of the supply chain of products. By identifying the purpose of the company, which are giving the best service levels and increase corporate profits.

- The first goal can be achieved by analyzing the values of the three indicators below: **a.** Delivery performance, **b.** Responsiveness to customer demand, and **c.** Flexibility to demand changes.
- The second objective can be achieved by analyzing the values of the two indicators, there are: **a.** Supply chain cost and **b.** Asset management efficiency.

After learning the business objectives above, the next step is measuring the SCOR metrics corresponding to the business objectives. For the first business purpose, the data available is for the metric Perfect Order Fulfillment (POF) and Order Fulfillment Cycle Time (OFCT). As for the second purpose, the data available is for the metric Cost of Goods Sold (COGS) and Cash-To-Cash Cycle Time (CTCCT).

Gap analysis of data obtained from the benchmark consists of three categories, namely superior, advantages, and parity. In setting performance targets for each metric, SCC describes the terms of the stipulation in Bolstorff (2003). Performance targets in the superior category defined only for a single attribute that is the focus of the company's performance or metrics that represent key business objectives. Likewise, the performance of the target category only advantage given to the performance attributes are the focus of the next. Meanwhile, the performance targets of parity set for the two other attribute categories.

The Actual data and benchmarks from similar industries consisting of three categories are used to determine the position of the company's performance in Table 5. From the results of the metric seen companies still below target performance, this shows that the company is less efficient. Superior target is set for matrices that represent the first business objective, it is POF which is targeted to reach 98 % and reach 10 OFCT days. Target the advantage that 40.96 % of COGS and target parity is CTCCT 38 day.

The next step performs gap analysis, to quantify the differences in the actual conditions and targets that are achieved. The magnitude of the opportunity column filled with a big increase in revenue when performance metrics are to be increased to the targeted position as shown in table 6.

Tabel 5. Metrik SCOR model Level 1

<i>Performance attribute</i>	<i>Level 1 metric</i>	<i>Actual data (a)</i>	<i>Superior (b)</i>	<i>Advantage (c)</i>	<i>Parity (d)</i>
<i>Supply chain reliability</i>	<i>Perfect order fulfillment (POF)</i>	91.05%	98%	94.5%	86.75%
<i>Supply chain responsiveness</i>	<i>Order fulfillment cycle time (OFCT)</i>	18 day	10day	12day	15day
<i>Supply chain flexibility</i>	<i>Upside supply chain flexibility</i>	N/A	N/A	N/A	N/A
<i>Supply chain cost</i>	<i>Cost of goods sold (COGS)</i>	40.96%	25.7%	34.67%	50.99%
<i>Supply chain asset management</i>	<i>Cash-to-cash cycle time (CTCCT).</i>	45 day	22 day	32 day	38 day

Description: n/a= not available

Table 6. Gap analysis between actual data with performance targets

<i>Performance attribute</i>	<i>Level 1 metric</i>	<i>Data actual</i>	<i>Superior</i>	<i>Advantage</i>	<i>Parity</i>	<i>Requirement Gap</i>	<i>Opportunity</i>
<i>Supply chain reliability</i>	POF (%)	91.05	98	94.5	86.75	6.95%	IDR 4,100,152 *)
<i>Supply chain responsiveness</i>	OFCT (hari)	18	10	12	15	8 day	Improve reliability of supply / delivery
<i>Supply chain flexibility</i>	USCF	N/A	N/A	N/A	N/A	N/A	N/A
<i>Supply chain cost</i>	COGS (%)	40.96	25.7	34.67	50.99	6.29%	IDR 3,710,785 **)
<i>Supply chain asset management</i>	CTCCT (day)	45	22	32	38	7 day	Reducing interest expense and opportunity cost

Description: n/a = not available

*) see Table 8

**) see Table 9

There are several methods in the SCOR model which can be used to calculate the amount of opportunity for POF. One method used in this paper is the lost opportunity measure (LOM), (Bolstorff; 2003). With this method it can be seen that the magnitude of the lost opportunity to earn a certain income to the performance of the current POF and COGS. This is done if the company can improve its performance, it will experience an increase in revenue.

Table 7. Table calculation opportunity for POF with LOM

Component	Results of calculation
Total revenue	IDR. 218,500,000
Actual POF	91.05 %
POF targets (superior)	98 %
Total income x ((100-POF actual) / 100) (a)	IDR .19,555,750
Total income x ((100-POF target) / 100) (b)	IDR. 4,370,000
Difference (a) and (b)	IDR 15,185,750
Gross profit	27 %
Gross profit margin x(opportunity)	IDR. 4,100,152

The magnitude of the opportunity is to reach the target metric OFCT in line with the opportunity that comes from POF. If OFCT the lower, that means shorter waiting time, it automatically creates a higher POF value and impact on increasing revenue (Bolstorff; 2003).

Opportunity for COGS metric is obtained by calculating the reduction in cost of goods sold when the target is reached. This decline is directly indicates an increase in the gross profit or operating profit as shown in table 8.

Table 8. Table calculation opportunity for COGS by LOM

Component	results of calculation
Total revenue	IDR.218,500,000
Actual COGS	40.96 %
COGS targets (advantage)	34.67 %
Total revenues COGS actual x (a)	IDR.89,497,600
Total revenues COGS targets x (b)	IDR.75,753,950
Difference (a) and (b)	IDR.13,743,650
ross profit	27 %
Gross profit margin x (opportunity)	IDR. 3,710,785

2.Mappinglevel 2

At mapping level 2 is shown a detailed picture of the processes that exist in the enterprise supply chain, ranging from processes associated with suppliers, production and distribution activities until the product is received by the consumer. Figure 2 shows the activities that have been carried out for the fifth plan, source, make, deliver and return.

Figure 2. Mapping of SCOR model level 2 supply chain products Herbal Tea soursop

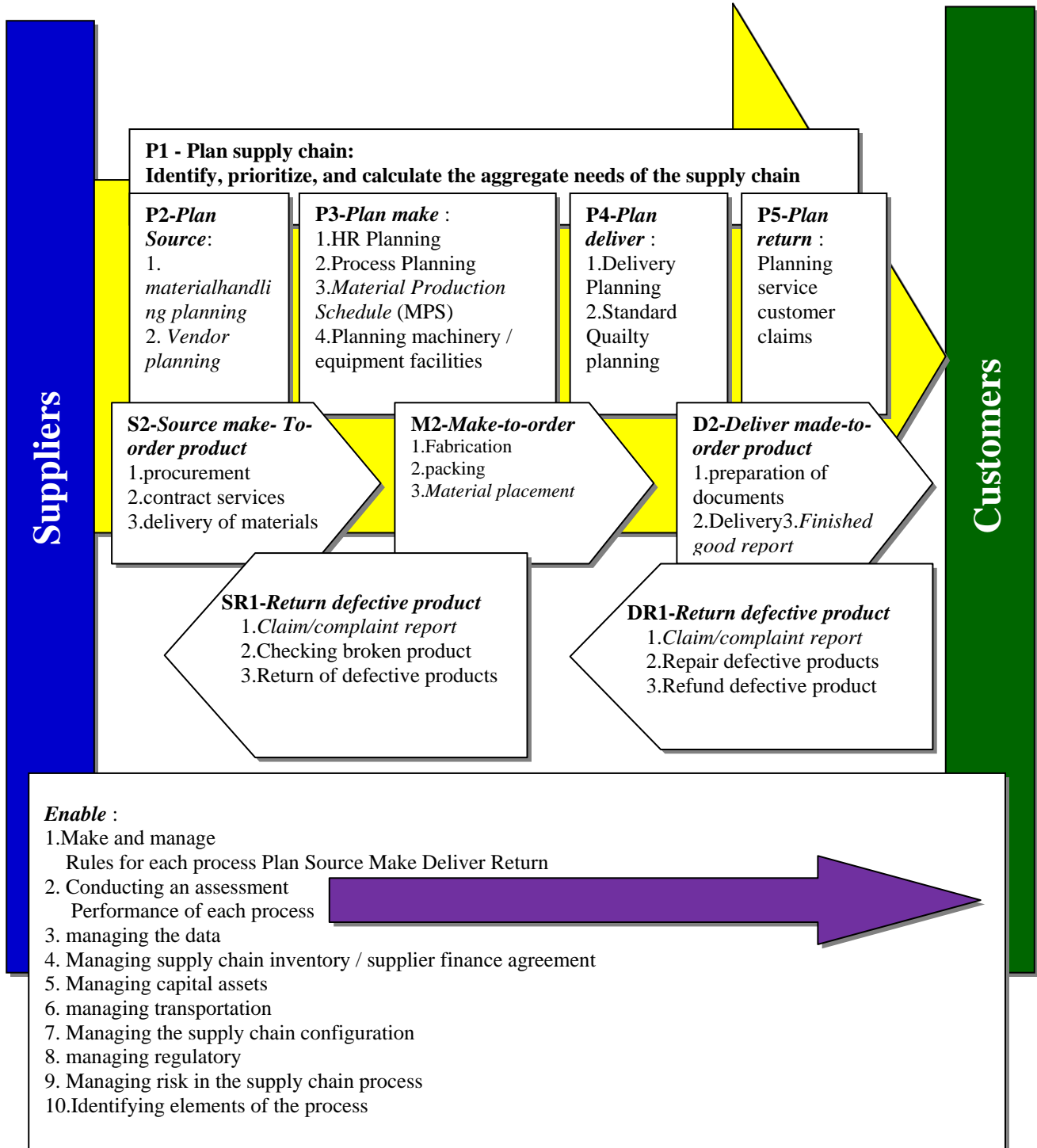
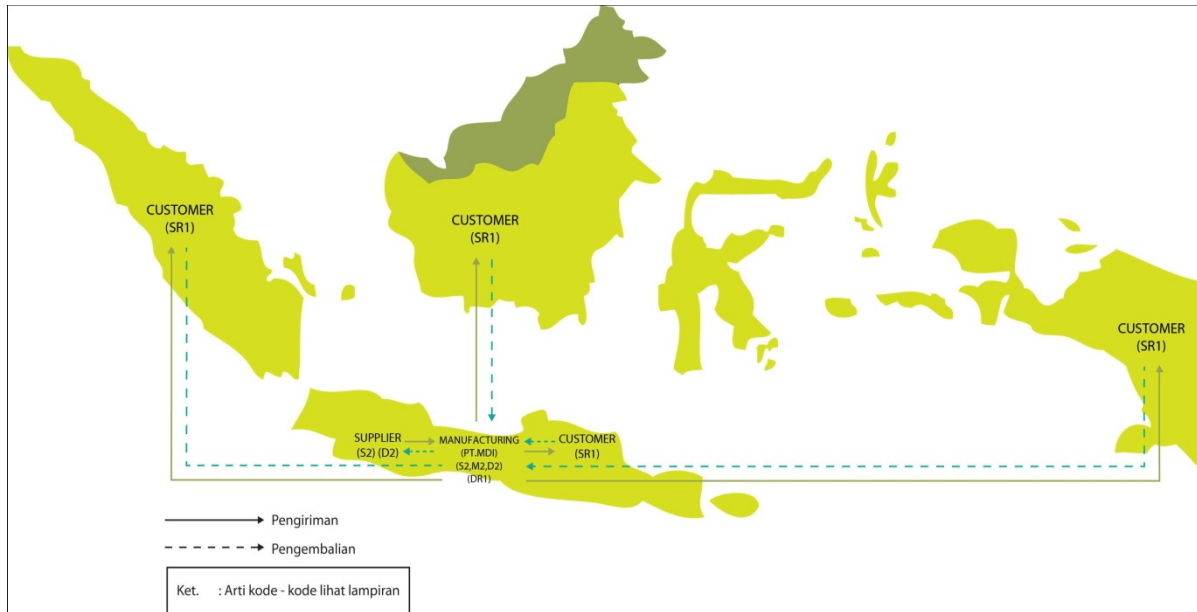
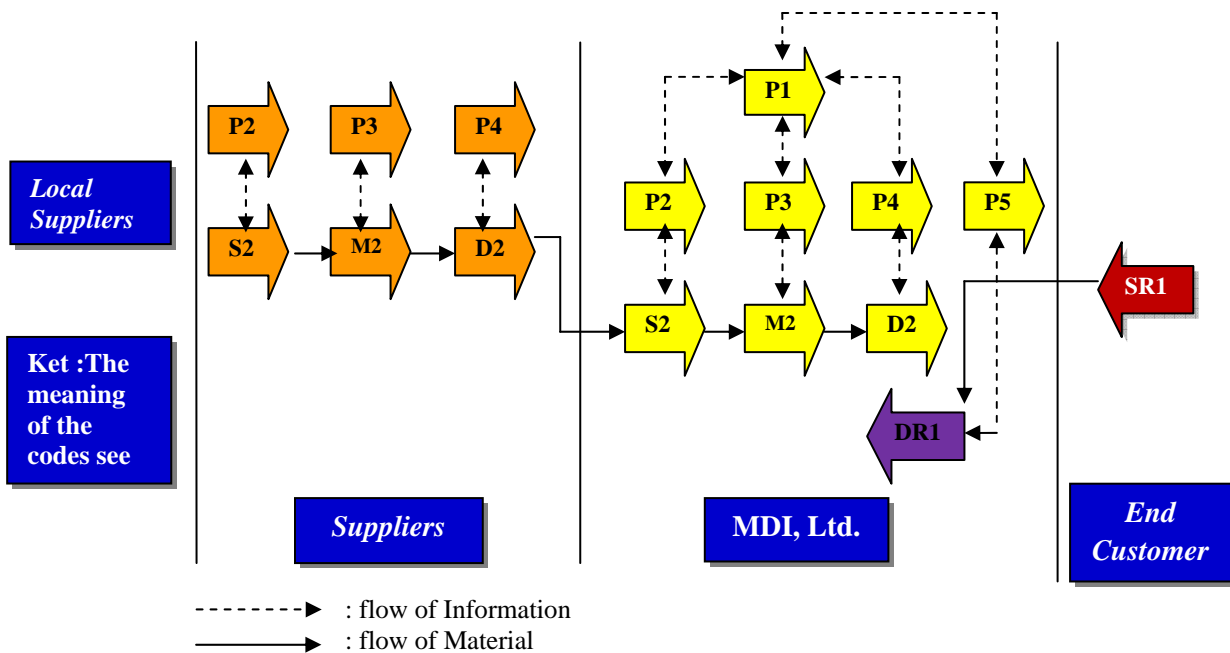


Figure 3. Geographic map for Herbal Tea products soursop (As-Is Process)



From geographic map above, visible shipping and product returns flow between suppliers, manufacturing, and customer on the company. In addition to seeing the process of supply chain based on the location of each element, geographic mapping also helps to create a second mapping in the form of diagrams (thread diagram).

Figure 4. Thread mapping diagram level 2 for Herbal Tea products soursop (As-Is Process)



Based on the mapping above, material procurement activities (source) that is based on the coming order (source to order) and the production process running when there is an order (make to order) shows that the process is not well connected. The second activity that causes OFCT be very long and less than optimal POF.

After mapping geographically and diagrams, the next step is to determine which process is causing POF (Perfect Order Fulfillment) and OFCT (Order Fulfillment Cycle Time) of companies that are bad. In the calculation of POF and OFCT there are three conditions that must be met, there are punctuality (on time), the accuracy of the quantity (in full) and the completeness of the supporting documents as well as the condition of the goods (perfect condition).

For it will be traced in stages that starting from downstream to upstream; starting from the delivery process, the make, and the source that led to the order fulfillment is not timely. In the process of delivery, POF value reaches 96%. Values less than 2 OFCT day. In the process of make POF value around 88%, the value of the make process is OFCT on day 20. Last is the source for the POF value that is equal to 80%, the value OFCT the source is a 30 day process.

Based on the value of POF and OFCT for this three processes, it appears that the source has the lowest performance. To find out what is causing the performance of the source is low then conducted research at level 3.

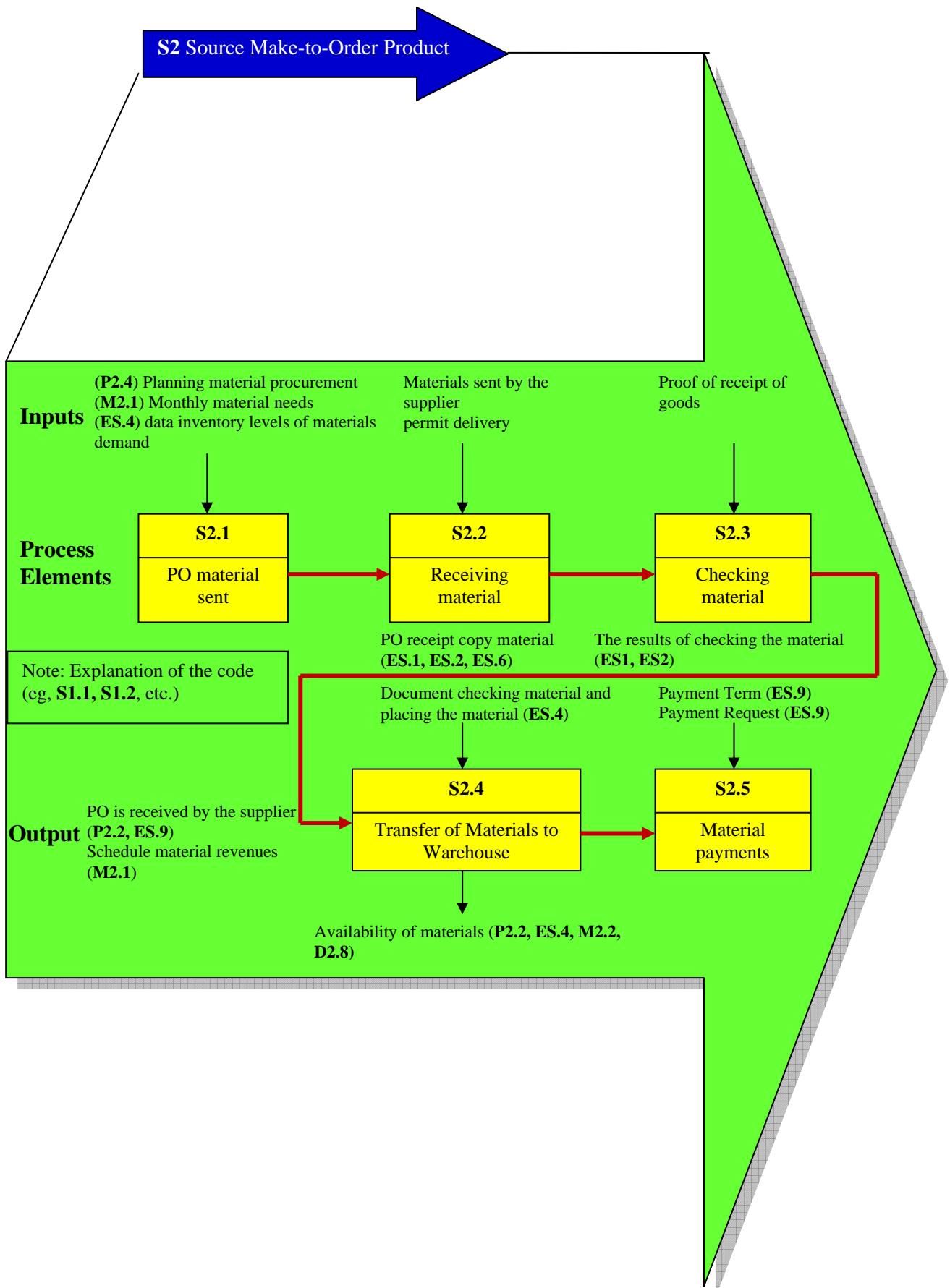
Table 9. POF value and OFCT to deliver, make and source

Metrik	<i>Deliver</i>	<i>Make</i>	<i>Source</i>
<i>Perfect Order Fulfillment (POF)</i>	96 %	88%	80%
<i>Order Fulfillment Cycle Time (OFCT)</i>	2 day	20 day	30day

3.Mapping Level 3

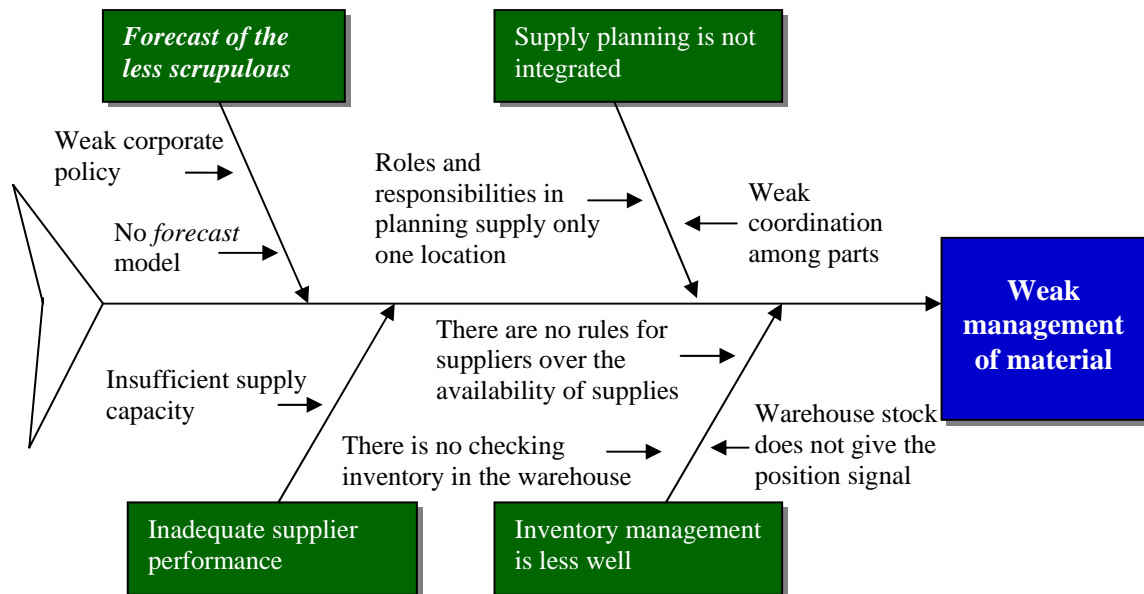
Level3 mapping analysis is done to see more detailed source process, because it has the lowest performance and OFCT POF value based on the analysis of level 2. 3 level mapping done for all activities in the process source sehingga obtained Figure 5. (As – Is-Process). The figure shows the inventory management of materials (source) which consists of inputs (input), process elements (the elements), and output (output).

Figure 5. Mapping of SCOR model level 3 supply chain products Herbal Tea soursop (As-Is process)



Result to be achieved from the analysis of level 3 is looking for the cause of the problem in the source. The method used to trace the root of the problem in the process is the method of analysis fishbone shaped causal diagram. The main problem identified is the lack of planning in the management of material.

Figure 6. Fishbone Analysis for Source process

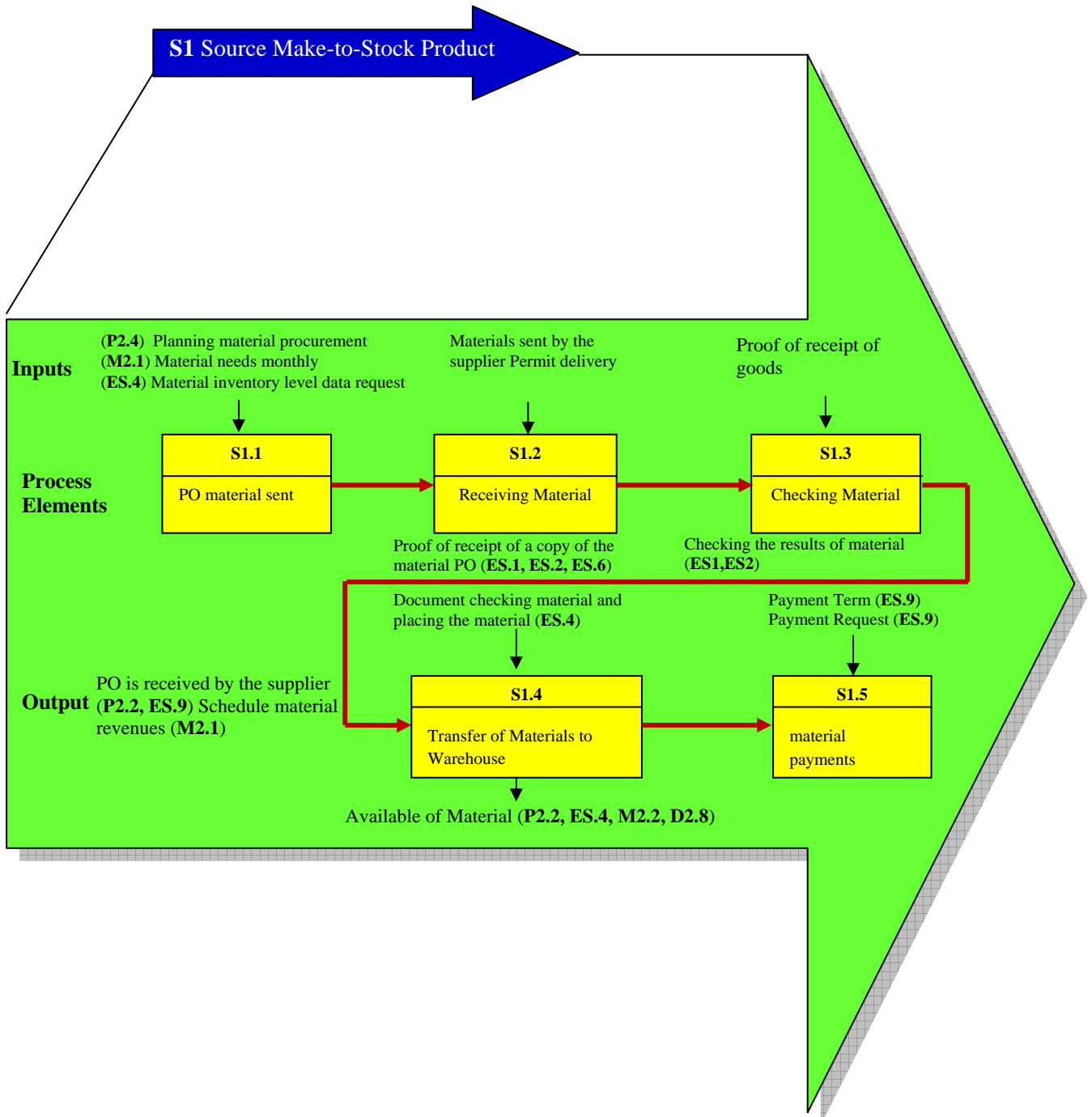


After the performance measurement of supply chain management, it can be seen by the results of the analysis of level 1. By observing the activities that are long enough, it can be said that the process should make to order is supported by the source to stock (stock up) to shorten of the waiting time (OFCT) and improve services (POF). Application of management changes from the source material to be a source to order stock is divided into two parts, namely:

- a. Changes in material management applied to all materials. Changes were made so that the waiting time (OFCT) becomes shorter and the level of service perfectly (POF) rises.
- b. If the changes do not allow applied to all material, material management changes can be applied only to certain materials that have the longest waiting time. While the management of other materials still use the source to order.

In addition to making changes to the source from the source into a source to order stock, other alternative to do is apply a Vendor Managed Inventory (VMI). Vendor Managed Inventory is a strategy of collaboration that exists among the parties involved in the supply chain. The manufacturer has the authority to decide a decision. The concept if VMI is shifting the job of inventory management (inventory) form Mahkotadew Indonesia Ltd. to supplier. By implementing VMI hopefully the material needs are met well as well as reducing of cost of inventory. Here is the mapping level 3 on the source used to better the company.

Figure 7. Mapping of SCOR model level 3 supply chain products Herbal Tea soursop (To-Be Process)



Conclusion

Supply chain performance assessment with a focus on business objectives is inefficient. The results obtained from the measurement of performance metrics at the level of 1 is the Perfect Order Fulfillment (POF) = 91.05%, Order Fulfillment Cycle Time (OFCT) = 18 days, Cost of Goods Sold (COGS) = 40.96%, and the Cash to Cash Cycle Time (CTCCT) = 45 day. Opportunity based on the gap analysis, the magnitude of the increase in revenue that can be achieved when the POF and COGS able to achieve the target set is IDR. 4,100,152 per year and USD.3,710,785 per year. In addition to obtaining increased revenue, achieving the target also affect some aspects but can not be processed further in this paper because of data limitations.

The main cause less efficient supply chain performance lies in the poor performance of the materials management process (source). The low performance of the source caused by several things, including: Forecast of the less scrupulous, not integrated supply planning, weak coordination between divisions within the company, supplier performance is inadequate, poor inventory management, and no checking inventory in the warehouse.

Recommendation for the future research

Further research could do research on the part of the delivery, the delivered from the company to the customer.

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