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Analysis of Performance Supply Chain Management using SCOR method at PT NEO

[1,] Didik Setiawan Nugroho Suseno, [2,] Niken Sulistyowati
[1,] *Operational Management, Magister Management, Mercu Buana University, INDONESIA*
[2,] *Magister Management, Mercu Buana University, INDONESIA*

ABSTRACT: *PT. NEO is a company that produces batteries in Indonesia. Problems often faced by companies include shipments that are not in accordance with demand, and delays in product delivery. From the problems that occur, in terms of the supply chain, it is necessary to assess the performance of the supply chain flow using the Supply Chain Operation Reference (SCOR) method. The assessment was carried out in several stages, namely identification of SCOR matrix, verification of Key Performance Indicator (KPI) by distributing indicator questionnaires, calculation of normalization values (scores), weighting KPI using the Analytical Hierarchy Process (AHP) method by distributing AHP questionnaires. The supply chain flow performance value obtained is 69.18 with the Average category, the results of the benchmark analysis obtained 4 indicators that still have gaps, namely: POF 5.88%, OFCT 5 days, COGS 6.71%, CTCCT 3 days.*

KEYWORDS: *AHP, KPI, Supply Chain performance, Supply Chain Operation Reference (SCOR)*

I. INTRODUCTION

PT. NEO is one of the companies that produce automotive batteries in Indonesia. PT. NEO is a subsidiary of PT Nipress, Tbk which has been established since 1970, which is one of the companies whose 100% capital is owned by domestic has grown to become a battery manufacturer with both local and international market coverage both as an automotive component supplier and as automotive parts. In the current conditions if viewed from the perspective of Supply Chain Management, it can be seen that the delivery of the battery has been delayed from the schedule set in accordance with the wishes of the customer, PT. NEO cannot meet all the delivery schedules. So that this can disrupt the smooth operation of customers, which in the end PT. NEO obtains complaints from customers for the late delivery, both directly and indirectly. Based on data collected from 2014 to 2017, PT. NEO has had several delays in shipping. From the data there is a delay in sending batteries on average 8% and a figure of this magnitude is quite an impact on the performance of PT. NEO. With these conditions, the management of PT. NEO evaluates and looks for solutions so that this problem will not happen again. Error sending goods is known after a report from the customer QC team when checking the specifications of the goods, and informed to the QC team of PT. NEO, but there are still discrepancies in the delivery of products found by customers.

II. STUDY OF THEORY AND METHOD

Supply Chain Operation Reference Model (SCOR Model): As a model, SCOR is the main framework in this study, for that we need a brief introduction to the SCOR model (Supply Chain Council, 2010). Level 1 process is a top level consisting of 5 core processes, namely Plan, Source, Make, Deliver and Return. While level 1 metrics characterize performance based on two perspectives. The first perspective is from the customer side (Customer Facing) and the second perspective is based on the internal perspective. Level 2 is the configuration level and is closely related to process categorization. At level 2 this is done defining categories for each process at level 1. At level 2, the process is arranged in line with the Supply Chain strategy. The goal to be achieved at level 2 is to simplify Supply Chain and improve flexibility of the entire Supply Chain. At level 2, market constraints, product constraints and company constraints to compile inter and intra-company processes.

Level 3 is the process element level and is the lowest level in the scope of the SCOR model. At the implementation level, namely levels below level 3, process elements are described into tasks and follow-up activities. This implementation level does not cover the scope of the SCOR model. Level 3 allows companies to define in detail the processes identified as well as performance measures and also best practices in each activity. Performance levels and practices are defined for the processes of this element. In this level, benchmarking and the required attributes are also needed for enabling software. At level 3 also included output inputs and basic logic flow from process elements.Level 4, the implementation of Supply Chain takes a role. At this level detailed tasks in each activity are needed at level 3 to implement and manage Supply Chain on a daily basis.

Level 4 is also an implementation stage that maps specific implementation programs and defines behaviors to achieve competitive advantages and adapt to changing business conditions.

Analytical Hierarchy Process (AHP): Analitycal Hierarchy Process (AHP) Is a method for solving a complex situation that is not structured into several components in a hierarchical arrangement, by giving subjective values about the importance of each variable relative, and determining which variable has the highest priority to influence the outcome of the situation. Kocauglu et al. (2013) explain the steps in the AHP method as follows: 1)Define the problem clearly and set the goals and objectives of the system as a whole, 2) Develop a hierarchical structure of problem decisions in relation to the overall objectives, criteria, sub criteria, and alternative decisions, 3) Comparing alternatives with criteria, or determining priority elements. This is done by making a paired comparison, which compares elements in pairs according to the criteria given, 4) There are n (n-1) for each assessment needed in developing a set of matrices in step 3. The reverse will be automatically assigned to each paired comparison, 5) Hierarchy synthesis, used to find eigenvector values by weighting criteria and getting local priority.

Root Cause Analysis (RCA): Root Cause Analysis (RCA) is a process of analyzing and identifying the main causes or roots of a problem by using a structured approach so that it can carry out an effective corrective or preventive action. Root cause is the most basic reason for unexpected events. If the main problem cannot be identified, then small constraints will emerge and the problem will not end.In utilizing RCA, there are four steps that must be taken, namely: 1) identifying and clarifying the definition of undesired outcome, 2) collecting data, 3) placing events and conditions at the event and causal factor table, and 4) continue the "why" question to identify the most critical root causes.

Method: Based on the problems studied, this type of research is quantitative research. According to Sugiyono (2012) Quantitative methods can be interpreted as research methods that are based on positivist philosophy, used to examine certain populations or samples, data collection using research instruments, data analysis is quantitative statistical data, with the aim of testing predetermined hypotheses. The scope of this research is in the External Supply Chain Performance research variable, and the Internal Supply Chain Performance variable with the dimensions of the research variables, namely: 1) Reliability, 2) Responsiveness, 3) Flexibility, 4) Cost, and 5) Asset management efficiency. The variables used in the research to measure Supply Chain activity in this Battery manufacturer company are: 1) Supply Chain Variables external (customer facing) performance. 2) Variable Supply Chain internal performance (internal facing). The purpose of this study to determine the application of Supply Chain model by using the SCOR model by measuring the performance of the supply chain management. This study is a category of business research which uses quantitative and qualitative research methods (Sutawijaya, Ahmad. H and Eri Marlapa, 2016)

III. RESULTS AND DISCUSSION

RESULT: Based on the stages of analysis and after normalization for the results of KPI calculations obtained from secondary data, then the weighting of the normalization results is then carried out. The total results obtained from the overall measurement of PT NEO's supply chain performance are 69.18 from a scale of 100.Weighting criteria, will be done for metrics / KPIs from the Agility, Cost and Asset attributes. The numbers used are obtained from the results of a questionnaire filled by 7 respondents (R) who were selected as experts at PT NEO, and qualifications of respondents with positions of Head of Department (Procurement, Marketing & Sales, Finance Accounts, Quality, Engineering, Production, Maintenance).

From the data obtained ranking for the importance of Agility criteria, namely USCA as the first rank (59.68%) followed by DSCA (24.92%) and USCF (15.39%). The ranking for the importance of the Cost criteria is COGS as the first rank (75%) followed by SCMC (25%). For the Asset criteria, the ranking is CTCCT as the first rank (57.92%) followed by RSCFA (34.43%) and ROWC (7.65%). The next step is the weighting calculation of the criteria or performance attributes of the SCOR model. As with sub criteria, the calculation of criteria weights is also based on the results of respondents from 7 experts. The results of data processing from the pairwise comparison questionnaire for performance reliability, responsiveness, agility, cost and asset performance as ranked in the first position were reliability 45.72% followed by responsiveness, agility, cost and asset management, with the weight values of each of them being 26.44%, 16.85%, 8.81% and 2.18%. After obtaining KPI measurement values for supply chain activities and also the total value of supply chain performance, the next step is to benchmark against the measurement values obtained. The benchmark value used is similar companies with the best in class performance category. Determination of strategies is based on the results of the calculation of primary data for each performance attribute that has been weighted to get the importance of determining the

supply chain strategy. SCOR supply chain cards are used to determine the gap between the actual performance measurement value and the benchmark value of the specified strategy. SCOR supply chain cards can be seen in Table 1.

Table 1 SCOR Card Supply Chain Benchmark

Supply Chain Score Card					BENCHMARK			
Dimensi	**Performance Atribut**	**SCOR Level 1 Metrik KPI**	***Strategy***	***Actual***	***Parity***	***Advantage***	***Superior***	***GAP***
SC External Facing	*Reliability*	*Perfect Order Fulfillment*	*S*	92.12%	92%	96%	98%	5.88%
	Responsiveness	*Order Fulfillment Cycle Time*	*A*	11 days	8 days	6 days	4 days	5 days
	Agility	*Upide Supply chain Flexibility*	*P*	9.09 days	80 days	62 days	40 days	+71 days
SC Internal Facing	*Cost*	*Cost of Good Sold*	*p*	43.29%	>=50%	43-49%	<43%	6.71%
	Asset Management	*Cash to cash Cycle Time*	*p*	133 days	130 days	110 days	90 days	3 days

S = Superior; A = Advantage: P = Parity

From Table 1 the PT NEO Supply Chain Scor card is seen for actual performance values of Agility attributes that have no gap, even when benchmarked with even superior values, SC Agility PT NEO has exceeded the benchmark SC value. This can be assumed, for Agility no repair conditions are needed at this time. So that recommendations for improvement will be focused on the performance of the Reliability attribute with the Superior strategy setting still having a gap value of 5.88%, Responsiveness with the Advantage strategy setting still having a 5 day gap, Cost with the Parity strategy setting still having a 6.71% gap, and Asset Management with the Parity strategy setting has a 13 day gap. The four performance attributes are each represented by POF, OFCT, COGS and CTCCT metrics. To provide a solution for the gap performance of POF, OFCT, COGS, and CTCTT, again used SCOR models to identify problems at the level of the supply chain process.

SCOR Level 1 model mapping: On level 1 SCOR mapping the model displays the scope and content of the Supply Chain. The scope is based on 5 SCOR core processes, namely Plan, Source, Make, Delivery and Return. At this level 1, performance targets set by the company are set.

SCOR Level 2 model mapping: Level 2 is the configuration level and is related to the categorization of processes where definitions of categories for each process are carried out at level 1. The next step is to analyze the metrics that still have gaps, namely at POF, OFCT, COGS and CTCCT. For this reason, an upstream to downstream analysis of the level 2 process will be carried out so that the strategy to meet the analysis gap for the four metrics can be achieved. Which affects the POF measurement value is the timeliness (on time), the accuracy of the number (in full) and supporting documents with the condition of the goods according to customer expectations (perfect condition). The results of the POF measurement in the previous section are only in the downstream part, namely in the delivery process (from manufacturing to the customer).

The achievement of POF in the delivery process has reached 92.12%, of which the value is between Advantage and Parity from the benchmark value used. The decision to determine the POF value must reach the Superior category of 98%, resulting in a gap that must be achieved or in other words the increase that must be achieved for POF is 5.88%. POF on delivery is also determined from the upstream performance, namely POF in the Source process. From the results of interviews with PT NEO's Purchasing Manager, currently delivery in the source process is mainly experiencing problems, namely in tin delivery raw material from supplier. From the results of the discussion conducted by mapping the level 2 the conclusions of the problem were found in the S1 process category (Source Stock Product).

OFCT, from the downstream process and the results of quantitative data processing shows that the cycle time for each longest time order fulfillment of PO is 29.24 minutes and the fastest time is 13.37 minutes, it can be assumed that the ideal cycle time for PO completion is 13.37 minutes. One way to improve this cycle time can be done with the value stream mapping of the entire process related to fulfilling OFCT. Value stream mapping can analyze current conditions accompanied by a record of time at each stage of the process so that the analysis of improvement can be mapped in which part of the process has the possibility of improvement. COGS and CTCCT, can not be clearly seen in the level 2 SCOR mapping. From an internal facing and financial perspective, these two metrics are priorities that must also be given an analysis for improving their performance.

For COGS, the management target to be achieved is the ratio of COGS to revenue must be smaller or equal to 50%. PT NEO COGS is formed from raw material inventory, packaging, overhead and operational costs. Pressing the COGS to revenue ratio means increasing efficiency which means increasing profit for the company. While CTCCT is measured from three components, namely the average value of accounts payable (measure of the speed of the company paying suppliers), account receivable (a measure of how quickly the customer makes payments) and inventory days of supply (average inventory). CTCCT is one of the financial indicators to assess the health of a company's supply chain. The shorter the time, the better for supply chain performance. For the determination of the Parity strategy in CTCCT metrics there is still a 3 day gap. This means that the company must find a solution so that the gap can be removed, so that the time for the CTCCT will increase from the time the measurement results obtained 133 days to 130 days.

Based on the results of interviews with PT NEO's Management Representative, the company's financial strategy is currently not to increase working capital in the form of cash or inventory. This step is considered less effective in optimizing financial performance. PT NEO is more focused on adding investment assets that are considered more able to contribute to the demands of the company's growth and can further accelerate the company's revenue. So that the performance improvement of CTCCT is recommended by optimizing from 3 components, namely accounts payable, account receivable, and inventory turnover. To add to the DPO, it is necessary to renegotiate the term of payment to the supplier and also renegotiate the customer so that they can make payments faster to PT NEO. For strategies to reduce inventory time, it can be seen from level 2 mapping, inventory problems are in the Source (S2) process category. This is in line with the identification of problems in POF, OFCT and COGS which have potential opportunities for improvement.

SCOR Level 3 model mapping: Level 3 analysis is used to look in more detail at the Source Stock Product process category. The potential for improvement opportunities in the process category resulting from level 2 analysis are expected to be able to improve supply chain performance by focusing on implementing strategies from the results of analysis with the supply chain scorecard. At level 3 the mapping is carried out again in the Source process which is broken down into the process of Input, Process and Output. For the purpose of level 3 mapping is to analyze the Source process and know the process elements which have the biggest potential problems, so that if it can be improved it can contribute to the improvement of PT NEO's supply chain performance. According to the results of interviews with the Purcasing Department, information was obtained that for all tin procurement from local and imported suppliers, problems were identified in the input elements of material procurement planning. This has resulted in elements of the process of scheduling material shipments, especially the procurement of tin.

IV. DISCUSSION:

The results of data processing and analysis, there are several main findings that are the answers to questions that formulate the problem in this study, namely the determination of level 1 SCOR as a KPI for supply chain performance measurement at PT NEO, also known for each KPI value based on data calculations secondary, and primary data, and especially the results of overall supply chain performance measurement (overall objective measurement of supply chain) which has only reached 69.18. By using performance monitoring system according to Volbi (2000), performance 69.18 entered as a performance indicator on the Average level. This means that PT NEO must find a strategy so that the value of its supply chain performance moves towards Good (70-90) or towards Excellent (> 90). For the formulation of KPI problems or what metrics are used in measuring PT NEO's supply chain activity, then as a first step performance measurement uses the standard KPI of performance level 1 SCOR model attributes, namely perfect order fulfillment (POF), order fulfillment cycle time (OFCT), upside supply chain adaptability (USCA), supply chain flexibility (USCF), cost of good sold (COGS), supply chain management costs (SCMC), cash-to-cash cycle time (CTCCT), asset asset return supply chain (RSCFA)), and return on working capital (ROWC). From the 10 initial indicators of SCOR standard KPI models, after an analysis has been carried out there is one indicator that cannot be quantitatively calculated, namely downside supply chain adaptability (DSCA). This is because during the period of data collection from January to December 2017, PT NEO has no history of order changes for cases of decreasing quantity (downside) orders. Fulfillment of orders during this period is in accordance with what is requested by the customer, even if there is a change, the type of change is an increase in the quantity of order (upside) that affects the USCF indicator. So that the results of measuring the overall supply chain performance of PT NEO are obtained from 9 level 1 indicators of the SCOR model perfomance attribute.

Performance Atribute Supply Chain: Based on the results of the calculation of primary data using AHP for performance attributes (Criteria), the following levels of importance are obtained: Supply chain reliability is the highest performance attribute, which is 0.228, because the ultimate goal of PT NEO's supply chain activities is to deliver products in a timely, exact amount, and quality to their customers. The second rank, supply chain responsiveness with the difference in the value of the reliability supply chain is only 0.014, becoming a performance attribute that is considered dominant in the determinant of supply chain activity. The characteristics of the final product are battery, perishable. Products that are included in the perishable category are products that require a high responsiveness supply chain, because the speed of products to consumers is a top priority in maintaining product quality. The third order of importance is supply chain agility, which also means the flexibility of a company's supply chain. Agility performance in the supply chain is important for the company. How companies prepare strategies for changes that occur, especially changes that come from outside the company, either from the supplier side or from the customer side. In accordance with the results of measurement of Agility performance based on actual data from the field, especially for USCF KPI, its performance has been considered very good. It only takes 11 days to prepare orders if there is an increase in orders reaching 20% of normal orders. This can be achieved because the company has an inventory level in the form of sufficient work in process products. However, on the other hand the company must also consider this inventory level as one of the costs that must be kept as low as possible. Looking at the level of importance of the third performance attribute is supply chain external facing, it can be said that the performance of the suppy chain focuses on customer satisfaction becomes a level of importance that is considered more important than the performance of supply chain internal facing.

For the fourth order of importance is the Cost supply chain. Of the two KPI attributes of Supply chain cost, namely SCMC and COGS, the importance of COGS is higher than SCMC. The COGS is still at 75%, as one of the cost factors of the supply chain, and is a preliminary finding during the study, which identifies the inefficiencies in PT NEO's supply chain activities. Viewed from the perspective of the management, SCMC is considered as supply chain operational costs. The measurement for SCMC which reached 25% is still far from the parity benchmark value used, which is only in the range of 10.8%. In this case the company must really look for a strategy so that the cost factor of SCMC can be minimized. The significant decrease in SCMC is expected to be able to improve the supply chain performance, which in turn can increase the company's profit. Because the scale of COGS interests is higher than SCMC, the company's main focus is to make a strategy so that the COGS to revenue ratio can be in line with the company's target, which is smaller or equal to 50%. One of the company's efforts to reduce this ratio starts with looking at the largest cost constituent of the COGS component, namely the cost of inventory raw material and packaging, and the most material used is material for Battery products. From the results of data processing, the results of research that show that the procurement of tin supplies is still constrained.

Based on the results of analysis using root cause analysis diagram, there are four main causes of tin supply constraints, namely the difference between forecast and actual tin requirements, not yet integrated integrated material planning system between departments (marketing, production, purchasing, warehouse), lack of guidance suppliers, raw prices fluctuating material. The level of importance of performance attributes Asset management becomes the last level of importance with a weight value slightly below the cost, which is 0.081. If viewed in two perspectives, namely internal facing and customer facing, the degree of importance of customer facing is superior according to PT NEO expert respondents. In this case the respondents realized that customer satisfaction was the main thing in maintaining the company's business continuity. Efforts to improve performance indicators that have not yet been achieved by making a re-mapping of Supply Chain in the company, by uniting the departments included in the Supply Chain section in one Division. This is done to facilitate the delivery of information and control on meeting customer requests ranging from receiving orders, making MPS, making MRP, managing daily production, and fulfilling Finish Good to delivery plan. If there is one process that is hampered, it will be easier to provide information to Management as an escalation pattern, so that meeting customer demand by delivering products that are in accordance with the amount and time will eliminate delays and delivery errors. The impact of this improvement is that the Supply Chain performance will improve and continuously be carried out will encourage the achievement of the targets of the specified Supply Chain performance.

V. CONCLUTION.

Using the SCOR method is directly obtained which section or section has errors and can be easily corrected, so that the performance of each part will increase in order to increase metric value. So that the increase in the value of the metric automatically increases the income to be achieved will increase. Efforts to improve performance indicators that have not been achieved from the targets set by uniting the departments included in the Supply Chain section in one Division. This is done to facilitate the delivery of information and control on meeting

customer requests ranging from receiving orders, creating MPS, creating MRP, managing daily production, and fulfilling Finish Good to delivery plans. If there is one process that is hampered, it will be easier to provide information to Management as an escalation pattern, so that meeting customer demand by delivering products that are in accordance with the amount and time will eliminate delays and shipping errors.

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