

Enhancement Supply Chain Control Tower to Reduce Inventory Parts of Heavy Equipment at PT The Biggest Heavy Equipment Company in Indonesia

Meidi Dwiyana¹, Ratih Dyah Kusumastuti², Yosman Bustaman³

^{1,2,3}Master's Program in Management, Swiss German University

meidi.dwiyana@student.sgu.ac.id, ratih.dyah@ui.ac.id, yosman.bustaman@sgu.ac.id

Abstract

As a leading heavy equipment distributor in Indonesia, PT. The Biggest Heavy Equipment Company in Indonesia is very concerned about after-sales service as an advantage compared to competitors. Keeping the service level based on target but, it was accompanied by a decrease in working capital as one of the goals of PT. The Biggest Heavy Equipment Company in Indonesia that was establishing a tower in its supply chain concept. This research was conducted at PT. The Biggest Heavy Equipment Company in Indonesia as the owner of the largest market share of heavy equipment in Indonesia. This thesis analyzed the performance of the Supply Chain Control Tower process in the company by using the Supply Chain Operations Reference (SCOR) 12.0 framework. PT. The Biggest Heavy Equipment Company in Indonesia manages supply chain business as a stocked product business, where the company prepares a number of inventories to ensure customer purchasing needs. The results of the analysis at SCOR level 1 show that all strategic metrics are below the set targets. So that at SCOR level 2, an in-depth analysis is carried out with Geographic maps and Thread diagrams that show potential problems in Enable Process (sE2), Plan Source (sP2) and Delivery (sD1) activities. Finally, results of SCOR level 3 analysis using a fishbone diagram reveal that the root cause of the problem is leak of internal company supply chain management, and we recommend to suggest the strategy for enhancement supply chain control tower at PT the Biggest Heavy Equipment Company in Indonesia.

Keywords

supply chain control tower;
SCOR model; inventory
reducing; parts of heavy
equipment



I. Introduction

The heavy equipment spare parts industry will be correlated with two things, namely an increase in sales of heavy equipment, as well as an increase in commodity prices, of course, being one of the capitals in after sales service that is so important and related to an increase in sales of parts which will have an impact on increasing revenue, increasing profits. if managed properly, and is important for achieving customer satisfaction. (Persson and Saccani, 2007). PT The Biggest Heavy Equipment Company In Indonesia has a special division for after sales service, namely a parts division for sales and support of spare parts, and a service division for unit repair services. PT The Biggest Heavy Equipment Company In Indonesia's working capital management, namely the heavy equipment spare parts inventory, is very high and requires proper supply chain management. PT The Biggest Heavy Equipment Company In

Indonesia's supply chain management method to maintain on time in full spare parts supply and keep days of inventory low is the supply chain control tower.

PT The Biggest Heavy Equipment Company In Indonesia has implemented the supply chain control tower, one of tower in Company is TAD or Tower Tanjung Area. However its impact on the inventory level has not been significant. From the secondary data, we see that the Days of Inventory (DOI) at TAD still high in the last 3 years, and has still not achieved the target. Furthermore, the Ratio of On Time in Full (OTIF) has never reach 100% in all Lower-level area, as can be seen in table 1.

Table 1 Performance Supply Chain Tower Tanjung Area

No	Performance Tower Tanjung Area	Plan	2021	2022 (COD June)
1	On Time in Full	90%	85%	87%
2	Days of Inventory	50 Days	75 Days	70 Days

In this research, we will use Supply Chain Operation Reference (SCOR) model to analyze the performance of the supply chain control tower to reduce working capital inventory. The SCOR analysis will be supported by qualitative interview and quantitative data from company.

This Research will answer two question, there are what is the performance of supply chain control tower at PT The Biggest Heavy Equipment Company In Indonesia, and the second, what improvement can be suggested from supply chain control tower. And this research have two objective, first, To evaluate the performance of supply chain control tower at The Biggest Heavy Equipment Company In Indonesia with SCOR Model. And the second, to suggest strategy improvement at supply chain control tower.

II. Review of Literature

Operational management in general is a maximum management effort in the use of various factors of production. From human resources, equipment, machinery, raw materials, and other factors of production in the process of changing these factors of production into a variety of products or services (Heizer & Reiner, 2018). Supply Chain Management (SCM) is the integration of material and service procurement processes, as well as their conversion into semi-finished commodities the finished items, as well as customer delivery (Heizer and Render, 2018).

Safety Stock is extra inventory kept on hand to defend against or sustain the risk of material shortages (Stock Out). Heizer and Render define reserve inventory as extra inventory held to anticipate variations in demand. King (2011) states that the safety stock with variability in demand with normal distribution can be measured with high effectiveness by using the formula (Mc Kensey, 2012):

Scientifically-tested formula to set optimal inventory model Tower or Lower Level

$$\text{Target inventory} = z \cdot \sqrt{It \cdot \sigma_d^2 + d^2 \cdot \sigma_{It}^2} + d \cdot It + d \cdot co$$

= Demand side safety stock (safety stock) + Supply side safety stock (lead time) + Inventory for lead time + Inventory for ordering cycle

Data Input

d = Average past demand

It = Average replenishment lead time

co = Average ordering cycle time

z = Safety factor as per service level

σ_d = Standard deviation of demand

σ_{It} = Standard deviation of lead time

Figure 1. Safety Stock Formulation

In response to the need for Supply Chain Visibility, essential Supply Chain Visibility ideas are increasingly being used in Supply Chain Control Towers. With a Control Tower enabled by full visibility across the entire supply chain, there is an opportunity for more efficient management and decision-making than ever before. This is a capability that should be a part of everyone's Supply Chain strategy using technology integration, supply chain transition and mediating technology collaboration (Vlachos, 2022). A supply chain control tower is a central hub that is outfitted with the required technology, structure, and procedures to collect and use supply chain data in order to provide improved visibility for immediate and long-term decision-making that is aligned with strategic objectives (Vlachos, 2022.)

Then Trzuskawska in 2017 has also researched 3 different companies, namely telecommunications, electronics and logistics companies. The three companies are more than ready in terms of technology and infrastructure readiness and are getting real benefits from the supply chain control tower (Trzuskawska-Grzesińska, 2017).

Company performance should be measured with the correct perspective. Because Organizational performance measurement system can make improvement or stagnant. (Kaplan & Norton, 1992). The increase in the value of the company's shares, the higher the company value, the higher it will be (Katharina, 2021). Balfaiah et al. (2016) make three main things classification for measure performance supply chain, there are perspective based approach, the process based approach, and the hierarchical based approach. These criteria tend to be part of the Balance Score Card and SCOR Model. (Wulandari & Kusumastuti, 2019).

The Supply Chain Council (SCC) supports the SCOR concept. The SCC, which was founded in 1996, is an international and autonomous non-profit organization whose membership is available to all enterprises and organizations. The association's research, application, and initiatives to increase the sophistication of supply chain management systems and practices are its main priorities. Using diagnostic procedures and benchmarking the SCC millennia assists businesses in making significant changes to their supply chain systems (Poluha, 2017).

Kocaoglu (2013) explain that SCOR are used by Researcher and Practitioner as reference that integrates most of business process in supply chain. (Wulandari & Kusumastuti, 2019). The SCOR model was created to provide a method of self-assessment and comparison of supply chain activities and performance as a cross-industry supply chain management standard. This model presents a business process framework, performance indicators, best practices, and unique technologies to support communication and collaboration between supply chain partners, and can improve the effectiveness of supply chain management and the effectiveness of supply chain improvement (SCOR Version 12.0 Handbook, 2017).

III. Research Methods

This research utilizes a mixed method, which is a research phase that combines two types of research methodologies, namely qualitative and quantitative. Mixed research is a research method that mixes qualitative and quantitative data (Creswell, 2010). Meanwhile, Sugiyono (2011) defines mix methods as research methods that combine two research methods, namely qualitative and quantitative, in a research activity to acquire more comprehensive, valid, trustworthy, and objective data.(Creswell & David Creswell, 2018). Using the Supply Chain Operation Reference (SCOR) Method version 12.0, this research intends to examine the company's supply chain performance, particularly in the key raw material procurement sector.

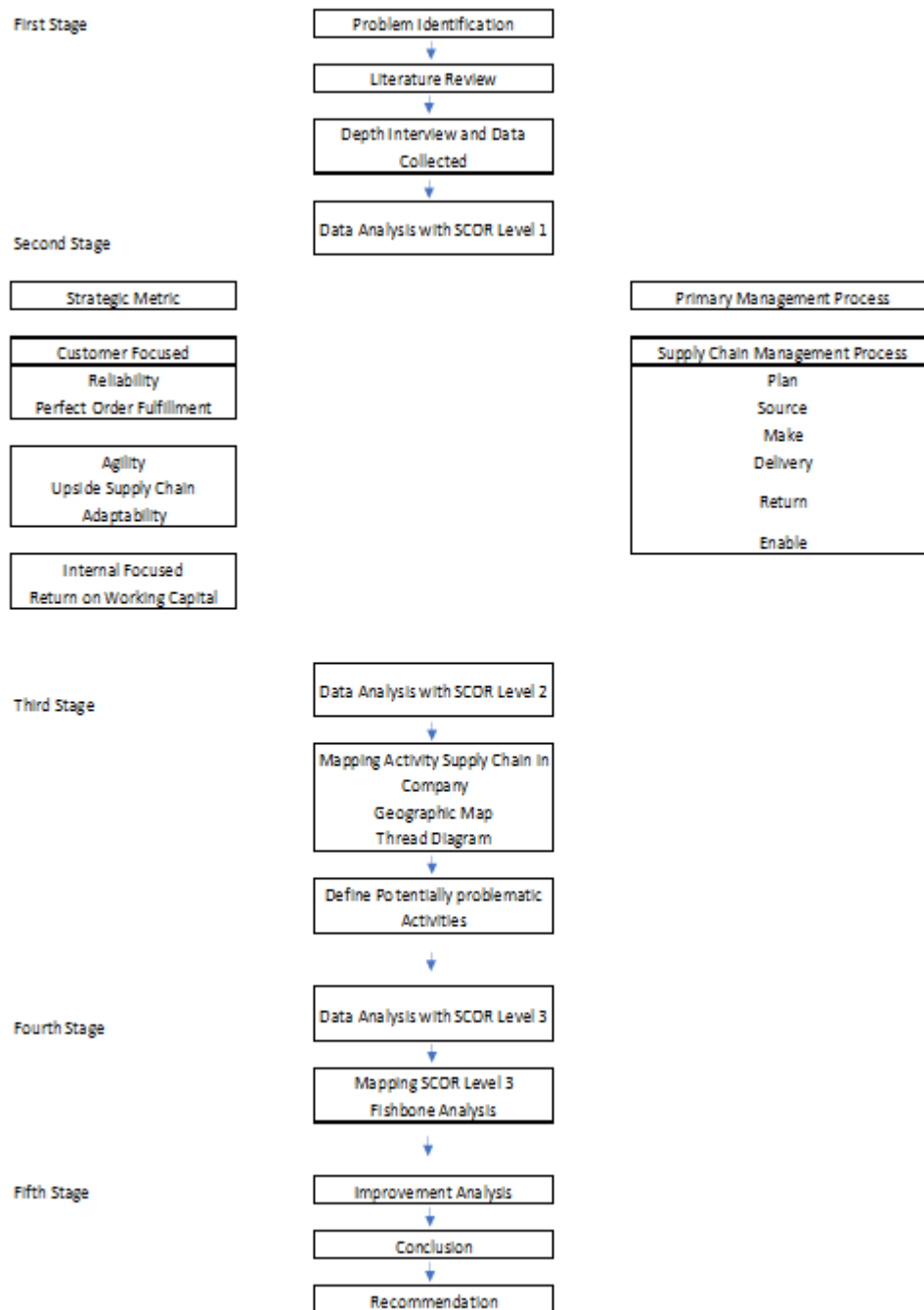


Figure 2. Research Design (Source from Researcher)

According to the core structure of the Supply chain excellence phase (Bolstorff & Rosenbaum, 2007), this study is organized into five major stages, which are as follows:

- Stage I

At this initial stage, the identification and formulation of problems is carried out in accordance with the topic of the study, namely the evaluation of supply chain performance. The literature review was carried out referring to predetermined topics, ranging from Operations Management, Supply Chain Management, Supply Chain Performance Measurement, Supply Chain Operation Reference (SCOR) Methods, Inventory Management, to heavy equipment Industry which is the object of this research. Data collection is carried out according to the main stages of SCOR from levels 1 to 3.

- Stage II

In this second stage, an analysis began to be carried out referring to the SCOR level method, starting from the company's Supply Chain Management Process referring to the 6 Primary Management Process, as well as the corresponding Strategic Metric Level 1. This study uses three Performance Attributes, namely Reliability, Responsiveness and Asset Management Efficiency, with four Strategic Metric, namely Perfect Order Fulfillment (POF) and Order Fulfillment Cycle (OFC) which focuses on consumers, as well as Cash-to-cash Cycle Time (C2C) and Return on Working Capital (RWC) using metric level 2, namely Inventory, which focuses on the internal conditions of the company.

- Stage III

In this third stage, it is explained about the description of the company's supply chain activities according to the stages of SCOR Level 2, using a Geographic Map and Thread Diagram. Based on the description of the company's supply chain activities, it is determined which activities have the potential for problems in the company's supply chain management as a whole.

- Stage IV

Referring to the activities that have the potential to be problematic in the mapping of SCOR Level 2, a more detailed analysis of SCOR Level 3 was carried out, focusing on Inputs, Processes, and Outputs. Analysis of the factors that cause the problem was carried out using Fishbone Analysis.

- Stage V

In this last stage, based on the analysis of the previous three stages of SCOR, an analysis of improvements and alternative solutions was carried out that could be used as recommendations for the company. (Bolstorff et al., 2012.)

3.1 SCOR Level 1

SCOR Level 1 is used to describe the scope and configuration of the upper level of the supply chain. At level 1, the performance target of a supply chain is determined as the basis for competition.

SCOR Level 1 is used to describe the scope and configuration of the upper level of the supply chain. At level 1, the performance target of a supply chain is determined as the basis for competition. The scope of discussion of SCOR Level 1 includes the six primary management process as follows (SCC, 2012):

1. Plan

The plan process describes planning activities related to the operation of the supply chain. This includes collecting consumer needs, collecting information from available resources, and balancing needs and resources for define planned capabilities and resource gaps. This is followed by the process of identifying corrective steps against existing gaps.

2. Source

The source process describes ordering or scheduling activities and the receipt of goods or services. This process includes the issuance of Purchase Orders, scheduling shipments, receiving, validating shipments and storing, and receiving supplier invoices.

3. Make

Make process describes activities related to the process of changing a material or creating a content from a service. It focuses on material conversion, rather than production/manufacturing, because Make represents all types of material conversion such as assembly, chemical processes, maintenance, repair, overhaul, recycling, refurbishment, remanufacturing, and all other forms of material conversion processes. The general guideline of this process is the presence of inputs and outputs.

4. Deliver

The deliver process describes activities related to the creation, maintenance, and fulfillment of consumer orders. This includes receiving, validating, creating consumer orders, scheduling order shipments, packaging, and billing processes to consumers.

5. Return

The return process describes activities related to the reverse flow of products in consumers. This includes identifying the need for returns, disposition, scheduling returns , and sending and receiving products returned by consumers.

6. Enable

Enable process is the process associated with the creation, maintenance and monitoring of information, relationships, resources, assets, business regulation, regulatory compliance, and commercial contracts to operate the supply chain.

In SCOR Level 1, Performance Attributes and Strategic Metric will also be determined. For customer-focused Performance Attributes, Reliability is used as one of the attributes, with Perfect Order Fulfillment (POF) as its Strategic Metric. Another attribute that is also customer-focused is Responsiveness and Agility, with Order Fulfillment Cycle Time (OFCT) and Upside Supply Chain Adaptability (UPSA) as its Strategic Metric. For Internal-focused Performance Attributes, Asset Management Efficiency is used as the last attribute, Inventory as metric level 2 of Return on Working Capital (RWC) as its Strategic Metric. The calculation formulas for preset strategic measures, as well as their modifications for PT The Biggest Heavy Equipment Company In Indonesia, are shown in Table 2.

Table 2. SCOR Strategic Metrics

SCORE 12.0			PT. XYZ		
Performance Attributes	Strategic Metric - <u>Ly 1</u>	Formulation	Strategic Metric - <u>Ly 1</u>	Formulation	Definition
Reliability	Perfect Order Fulfillment [RL. 1.1]	$\frac{([Total\ Perfect\ Orders])}{([Total\ Number\ of\ Orders])} \times 100\%$	POF (%)	$\frac{([Total\ quantity\ of\ TMBP\ received\ on-time])}{([Total\ quantity\ shipment\ plan])} \times 100\%$	The percentage of the actual amount of UT Parts receipt arrived on time, according to the shipment plan, without split shipment.
Responsiveness	Order Fulfillment Cycle Time [RS. 1 .1]	$\frac{[Sum\ Actual\ Cycle\ Times\ for\ All\ Orders\ Delivered]}{[Total\ Number\ of\ Orders\ Delivered]} \text{ in Days}$	OFCT (days)	[Actual Received Date UT] - [On Order Lower Level]	Total time required starting from publishing Stock Order Lower Level to Tower arrive at the warehouse
Agility	Upside Supply Chain Adaptability [AG. 1.1]	$[Inventory\ Days\ of\ Supply] + [Days\ Sales\ Outstanding] - [Days\ Payable\ Outstanding] \text{ in days.}$	UPSA (%)	Total item Receive / Total Item on Order x 100%	Total Item Receive in Warehouse per Total Item on Order
Asset Management Efficiency	Return on Working Capital [AM. 1.3]	$\frac{([Supply\ Chain\ Revenue] - [Total\ Cost\ to\ Serve])}{([Inventory] + [Accounts\ Receivable] - [Accounts\ Payable])}$	Inventory (MT)	Ratio [Actual All Tower Area Stock]/ [Revenue Area]	The amount of Tower and Lower-Level inventory expressed in amount form compared to revenue all lower level

3.2 SCOR Level 2

At SCOR Level 2, a more detailed configuration of the SCOR level 1 process is carried out, and a determination of the capabilities of the supply chain is carried out: Source to Stocked, Stocked Product, Make-to-Stock, Make-to-Order, or Engineer-to-Order. Especially in this research which focuses on the process of procuring the main raw materials, then for SCOR Level 2 the discussion will focus on the configuration of the Plan and Source process. The following is an explanation of each process configuration for Plan and Source:

1. Plan

The plan process is described into five types of planning, namely Plan Supply Chain (sP1), Plan Source (sP2), Plan Make (sP3), Plan Deliver (sP4), and Plan Return (sP5).

- Plan Supply Chain (sP1) is the process of developing and building a supply chain management plan for a certain period of time that shows the projected use of supply chain resources to meet supply chain needs for a long time taking into account the limited supply of resources.
- Plan Source (sP2) is the process of developing and building a plan at a certain period of time that shows the projected suitability of material resources to meet supply chain needs.
- Plan Make (sP3) is the process of developing and building a plan in a certain period that shows the projection of the suitability of production resources to meet production needs.
- Plan Deliver (sP4) is the process of developing and building a plan at a certain period of time that shows the projected suitability of resource delivery to meet delivery needs.
- Plan Return (sP5) is a strategic or tactical process for building and adjusting planning in a given period that shows the projected suitability of the return of resources and assets to meet the demands of returns whether anticipated or not anticipated.

2. Source

The source process is described into three main processes, namely Source Stocked Product (sS1), Source Make-to-Order Product (sS2), and Source Engineer-to-Order Product (sS3).

- Source Stocked Product (sS1) is the process of ordering, receiving and transferring raw materials, sub-assemblies, products and services based on the needs of aggregate demand.
- Source Make-to-Order Product (sS2) is the process of ordering and receiving an ordered (or possibly conFigured) product or material only when there is an order request from a consumer.
- Source Engineer-to-Order Product (sS3) is the process of identifying and selecting sources of supply, negotiation, validation, scheduling, ordering and receiving parts, assemblies or special products/ services designed, ordered, or built on the needs and specifications of a particular consumer order.
- The following is a summary of the problems that occur in the thread diagram,

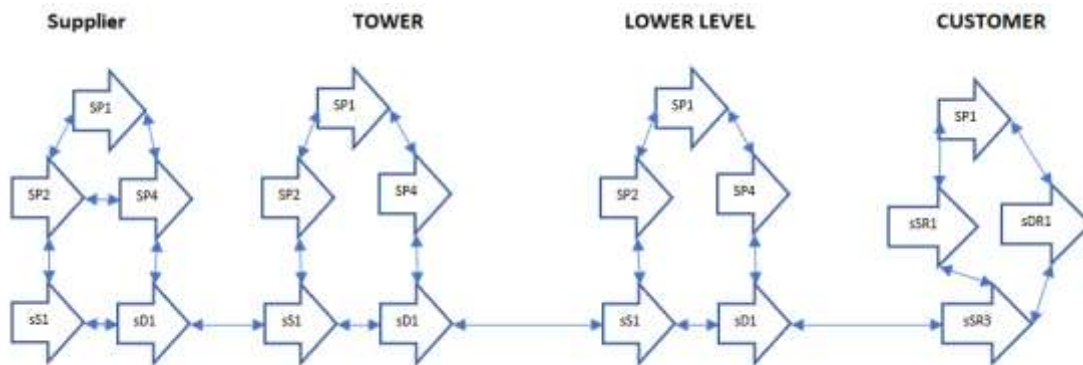


Figure 3. Thread Diagram Problem Identification

The problem occurs in 3 elements, the first, the availability of stock in the principal, marked with sS1 in the Supplier. The second problem is in terms of forecasting, where Tower is not intervened in forecasting by contract items from customers, marked with sP2. Then sS1 or low stock availability in principle. SD1 in the Tower means that there are problems in delivery due to mixed deliveries for regular LIB needs and overhaul needs, which are still far from being planned. Problems that occur at the lower level also follow what happened in the tower. In this study, SCOR Level 3 will focus on problems in the internal THE BIGGEST HEAVY EQUIPMENT COMPANY IN INDONESIA Tower and Lower level, so that it can provide solutions to reduce working capital in terms of forecasting and lead time delivery.

3.3 SCOR Level 3

Based on SCOR Level 2, a more detailed analysis was re-conducted on potentially problematic activities. SCOR Level 3 mapping includes detailed activities including inputs, processes, and outputs. For the analysis of the factors that cause the problem, fishbone analysis is used with all related elements, namely Man, Machine, Material, Method, Environment. Based on the SCOR Level 3 analysis, it can be determined that an analysis of improvements that can be carried out to overcome the problem.

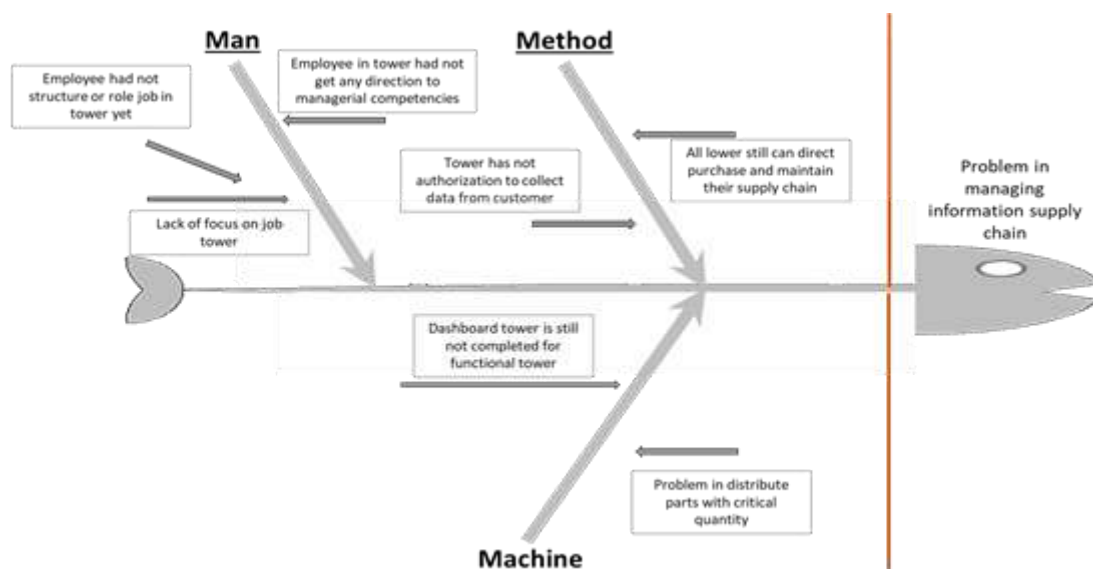


Figure 4. Fishbone Element sE Enable Manage Performance

In Figure 4 there is a problem from the method side, that the tower has not been able to accommodate the needs of the lower level. Problems also occur because there is no standard structure in the tower and officially registered with the company, so there is an authority bias. Meanwhile, in terms of technology, digitalization is still not complete and needs to be completed in terms of managing information supply chain.

In the causal figure 4, it can be seen that there is still a mix of regular demand with demand overhaul and this hampers the delivery lead time.

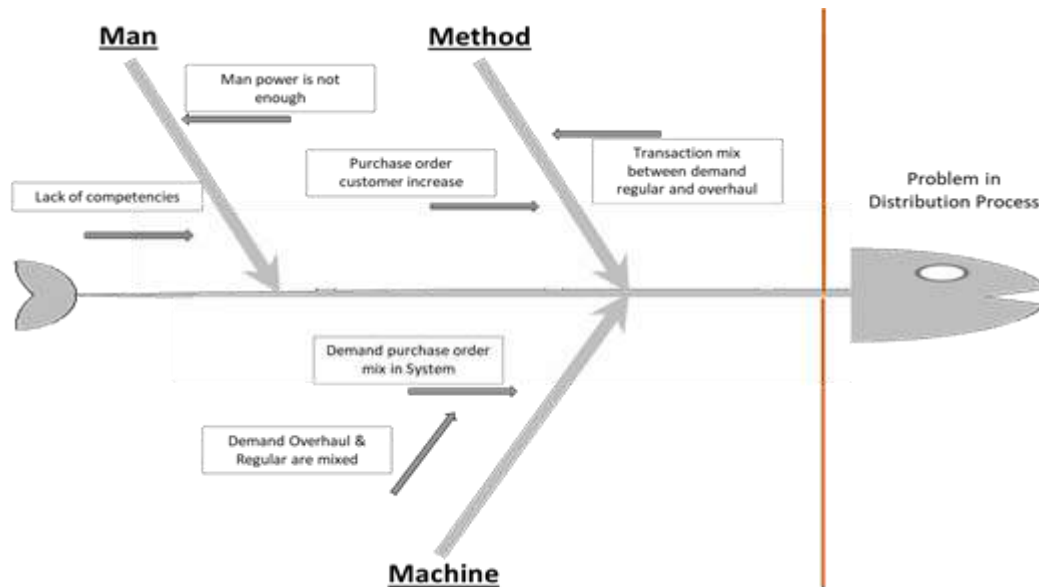


Figure 5. Fishbone Element Delivered Stocked Product (sD1)

In accordance with the mapping of activities in the Source Stocked Product process an analysis was carried out using a relation diagram to find out the root causes that caused the planning process to be not optimal. Based on observations and interviews with internal users such as logistics, SPM, Tower and Lower Level, a causal diagram is obtained.

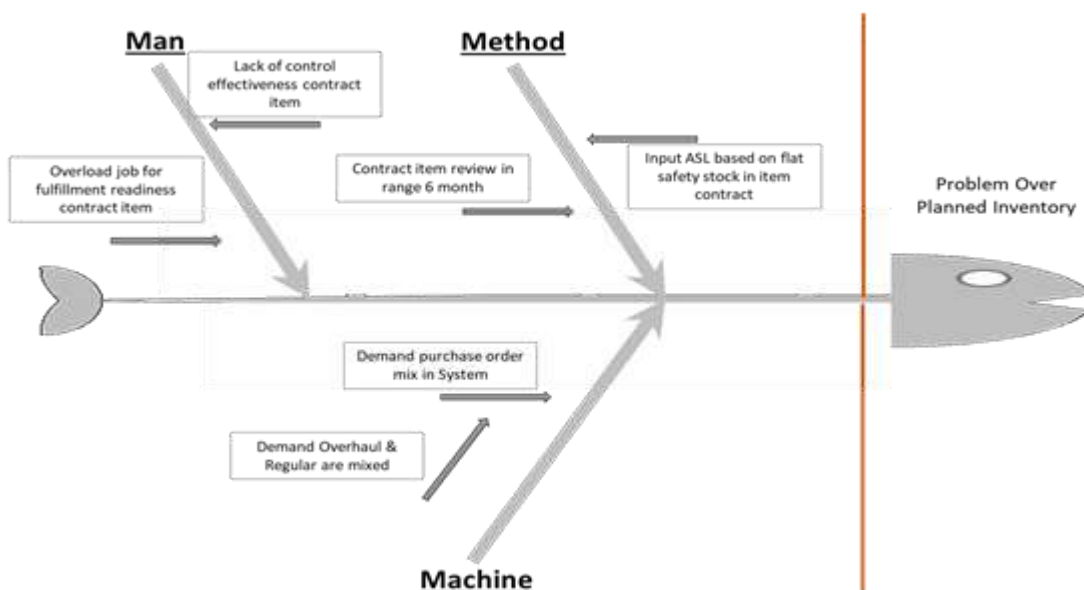


Figure 6. Fishbone Element Plan Source (sP2)

The results of interviews and discussions regarding the causes and effects of the problem of high inventory in the Tower and the lower level are centered on the high demand along with the increase in coal prices and the decrease in Covid-19 cases, causing the demand for orders for unit repairs, project maintenance and overhauls to be very high compared to customer needs related to parts. heavy equipment normally. This periodic need and can be maintained should be managed by the tower and when needed only supplied to the lower level. The unavailability of stock at KMSI so that the readiness stock in the tower causes perfect order fulfillment at certain lower level sites not to be achieved. This is exacerbated by the inhibition of stock distribution between sites because the man power warehouse cannot provide optimal performance both because of competence and the amount that has not been balanced with daily transactions in all warehouse towers and lower levels.

IV. Discussion

From Fishbone diagram in SCOR Level 3, this research found three problem with supply chain at PT the Biggest Heavy Equipment Company in Indonesia, they are show in Table 4. Ideation for the problem are set up authority of person in charge (PIC) Supply chain control tower, replace contract item quantity to customer with on time in full contract, and make zero inventory overhaul demand for lower level.

Table 3. Summary Problem and Suggestion Solution

Problem	Root Cause (What)	Solution (What)	Objective (Why)	Where	When	How
Man	M1 – No Organizational Structure yet in Tower	Make Organizational Structure PSCE in Tower separated with lower level	Structure PSCE under Parts division head office	Head Office	Continue	Speed up Process blue print planning place of PSCE in team Supply Chain
Method	M2 – High Safety stock item contract	Remove item contract concept, safety stock use calculation actual lead time and circle order with normal distribution simulation	Stock Level Maximum inventory area base on simulation PSCE and supply chain.	Lower Level & Tower	In 2023	Propose to customer to remove item contract readiness, UT will send measure performance supply chain in OTIF (On Time in Full)
Material	M3 – Mixed Demand Overhaul & Regular in Warehouse Process	Zero Stock lower level for Overhaul demand	Overhaul demand prepared by Tower	Tower	In 2023	Overhaul demand prepared and delivered by Tower (Dropship Concept)

4.1 Authority of PIC Supply Chain Control Tower

Person in Charge (PIC) leader supply chain control tower is a specialist or expertise, and the organizational structure still below on lower level. The solution for remove bias and manage information supply chain more independent is make PIC Supply Chain Control Tower independent and below head office, not lower level. The authority and role position should be changed from expertise specialist to generalist or managerial with the function manage supply chain upstream and downstream more effective and impactful.(Derwik et al., 2016). Adapted from CCL; Ram Charan, Steve Drotter, Jim Noel, “The Leadership Pipeline”, 2004-2012, PIC Supply Chain started from specialist (managing self) and move to manager of others like shown in figure



Figure 7. Transition of Leadership

Source: PPM Management

4.2 Replace Contract Item Quantity to Customer with On Time In Full Contract

Comparison between the contract item quantity and normal calculation with distribution normal, give a lot of amount inventory. Contract item use flat safety stock and distribution normal use actual safety stock. Total simulation saving inventory with distribution normal for sampling 3 parts heavy equipment is 148.348.452 IDR. The sampling parts use ABC Analysis for choosing the parts of heavy equipment with three classification amount. A Class is High impact amount but minimum item, B Class is medium impact amount and medium item, and C Class is low impact amount inventory. Simulation safety stock with distribution normal also proven with historical data, that calculation never give short stock or stock always enough for back up purchase order customer.

4.3 Zero Inventory Overhaul Demand for Lower Level

Current condition, lower level has inventory for overhaul or maintenance planning. Maintenance planning is a demand that can be planned and usually have a lot of item and amount parts. Lower level also should be prepared big warehouse for accommodate the maintenance demand planning. This research suggest for company, use “ship to bill to” transaction or popular name is e-way bill dropship transaction. Like shown at figure 6, current condition and suggestion business process.



Figure 8. Different Method Back up Demand Planning

V. Conclusion

This research has main purpose to evaluate the element supply chain control tower at PT the Biggest Heavy Equipment Company in Indonesia as stocked business product with

SCOR Model 12.0. As a company that has much working capital inventories, maintaining supply chain is necessary for good profit meanwhile maintain service levels for customers. SCOR Method is used as a method in this research. The result shows that the performance of the Supply Chain Control Tower in Tower Tanjung Area (TAD) does not achieve the target. However, the researcher found some strategies to enhancement of the supply chain control tower in Tower Tanjung Area (TAD) and it can apply to the whole supply chain control tower in PT the Biggest Heavy Equipment Company in Indonesia. For the future research, it is needed to focus on the downstream element, because the business have main goals to achieve service level to customer with fluctuation of lead time and complexity 3 party logistic company transportation.

References

- Ahmad Al-Atrash, S., & Ahmad Sharabati, A.-A. (2018). Title the Impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry.
- Bolstorff, Peter, Rosenbaum, & Robert. (2012.). Supply Chain Excellence.
- Bråtenndal, J., & Gustafsson, F. (n.d.). DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS Division of Supply and Operations Management Development of a Tactical Strategy for a Supply Chain Control Tower. www.chalmers.se
- Creswell, J. W., & David Creswell, J. (2018). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.
- Dedia, & Vaishali. (2017). An improved stochastic programming model for supply chain planning of MRO spare parts. *Applied Mathematical Modelling*, 47, 189–207. <https://doi.org/10.1016/j.apm.2017.03.031>
- Derwik, P., Hellström, D., & Karlsson, S. (2016). Manager competences in logistics and supply chain practice. *Journal of Business Research*, 69(11), 4820–4825. <https://doi.org/10.1016/j.jbusres.2016.04.037>
- Heizer, J., & Reiner. (2018). *Operations Management: Sustainability and Supply Chain Management* (12th Edition).
- Huan, S. H., Sheoran, S. K., & Wan, G. (2004). A review and analysis of supply chain operations reference (SCOR) model. In *Supply Chain Management* (Vol. 9, Issue 1, pp. 23–29). <https://doi.org/10.1108/13598540410517557>
- Katharina, N., et.al. (2021). Influence Capital Structure, Liquidity, Size the Company, Debt Policy and Profitability towards Corporate Value on Property Company, Real Estate and Building Construction Listed on the Stock Exchange Indonesia Period 2016-2019. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* Vol 4 (2): 2241-2256.
- Poluha, R. G. (2017). Application of the SCOR Model in Supply Chain Management. *SCOR Overview Participant Workbook*. (2017).
- Trzuskawska-Grzesińska, A. (2017). Control towers in supply chain management– past and future. *Journal of Economics and Management*, 27, 114–133. <https://doi.org/10.22367/jem.2017.27.07>
- Turban. (2017). A simulation based optimization approach for spare parts forecasting and selective maintenance. *Reliability Engineering and System Safety*, 168, 274–289. <https://doi.org/10.1016/j.res.2017.05.013>
- Zhou, H., Benton, W. C., Schilling, D. A., & Milligan, G. W. (n.d.). *Supply Chain Integration and the SCOR Model*.