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Supply Chain Analysis for Household Waste Treatment Product from Coconuts

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ABSTRACT: The discrepancy of goods quantity ordered, late payments, and returns management were the phenomenon behind this research. The purpose of this study is to find out the actors involved in the supply chain, identify the flow of goods, money, and information in the supply chain along with the obstacles that occur, and analyse the responsiveness of the supply chain. This explorative method research was conducted through collecting data by interviews and observations. The results showed that there were five actors involved in the supply chain. Timeliness of payment will facilitate the flow of goods and delay the fulfilment of orders. Based on the results of measuring the performance of the supply chain with the SCOR method, the company's supply chain performance value is obtained at 88.73, so the company is responsive enough in meeting the consumer's needs. Performance attributes are in the excellent criteria, i.e. responsiveness attribute (98.85), the adaptable attribute (94,66), the cost attribute (98.37), and the asset management attribute (95.95), while the reliability attribute of 55.82 is very poor. With these findings, it is hoped that supply chain efficiency can be improved in the future.

KEYWORDS: Flow of Goods, Flow of Money, Flow of Information, SCOR.

I. INTRODUCTION

CV. Jaya Carbon Bandung City is one of the companies engaged in the manufacturing of household waste treatment from coconuts. Where the company's production activities are producing activated carbon, active sand, manganese, zeolite, silica, fibrolite, and PVC filters whose raw materials are from coconut shells obtained from household waste (suppliers). But in practice, there are still some obstacles or problems that arise from the upstream direction during the distribution process, while for downstream there are no obstacles or problems in the distribution process. The problems of the upstream, namely: regarding the discrepancy in the number of goods orders in consumers, delays in payment by consumers, and poor management of returns, which has an impact on the disruption of the flow of goods downstream of end-consumer demand.

Based on the problems formulated above, the goal to be achieved is to identify the actors involved in the supply chain, identifies the flow of goods, the flow of money, and the flow of information in the supply chain along with the obstacle, and analysed the responsiveness of supply chain using the SCOR method.

II. LITERATURE REVIEW

To create a product and distribute it to customers, actors in the supply chain must coordinate its flow from upstream to downstream (Guritno and Harsasi, 2017:6). Furthermore, he also explained that the supply chain consists of several elements, among others: suppliers (suppliers), manufacturing centre (manufacturers), distribution centre (distribution), retailers (retail outlets), and consumers (customers). In the supply chain, there are also usually third parties in the distribution chain, namely freight forwarding services or expeditions which is a service that facilitates the process of sending goods from one place to another safely and accounted for security by the provider of the goods (Setyaningsih and Sidqon, 2020:54). Jakfar et al. (2015:109) state that organizational activities in the supply chain have two types of distribution channels ranging from producers to consumers, namely direct distribution channels and indirect distribution channels. Direct distribution channels involve only two organizations (without intermediaries) namely, producers and consumers, while indirect distribution channels involve other organizations (intermediaries) that are between producers and consumers.

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A. Flow of Goods, Flow of Money, and Flow of Information

The supply chain consists of several kinds of streams in a company where each activity correlates between the flow of goods, money, and information (Pujawan and Mahendrawathi, 2017:4). Furthermore, Pujawan and Mahendrawathi (2017:5) divide the flow of supply chain management into three types, namely: first is the flow that flows from upstream to downstream (upstream) is the flow of goods, the second flows from downstream to upstream (downstream) is the flow of money, and the third is the flow of information that usually occurs from downstream to upstream or vice versa. Pujawan and Mahendrawathi (2017:4) explained that the distribution flow flows downstream concerning raw materials, components, and finished products, while those that flow upstream are about return, recycle, and repair. Pujawan and Mahendrawathi (2017:5) that the flow of money flowing upstream is related to payments, while those flowing downstream are related to invoices (bills) and payment terms (payer time). While the flow of information flows in two directions, information flowing downstream related to capacity, delivery status, technical information, and flowing upstream related to stock, sales, and requesting offers.

B. Obstacles

According to Pujawan and Mahendrawathi in Ariani and Dwiyanto (2015:17) supply chain management is something very complex, wherein its application from upstream to downstream is carried out by many actors ranging from suppliers to end consumers, so it is not surprising that in supply chain management experiencing various obstacles. Therefore, the implementation of supply chain management requires support from various parties ranging from internal, namely all company / internal and external management, namely all partners involved. The following are three types of uncertainty that will be experienced in SCM, namely: Uncertainty of demand: raw material demand and consumer demand, Internal uncertainty: engine damage, imperfect human resource performance (human error), the uncertainty of production quality, etc., External uncertainty: delivery lead-time, price and quality of raw materials, income (money), etc.

Responsiveness Analysis Using the SCOR Method

The responsive supply chain is a paradigm used in the manufacturing industry in the 21st century, the paradigm adjusts to changing market needs and increasingly competitive competition (Gunasekaran et al. in Paoki et al. 2016:3). Holweg in Tukamuhabwa et al. (2015:13) define responsive supply chain as the ability of a supply chain to quickly and precisely cope with changing customer demand. Responsive supply chains can also be defined as the ability of key integrated suppliers to cope with changes in company demand (Li & Lin in Rajagopal, 2016). The SCOR (Supply Chain Operating Reference) method is a method developed by the Supply Chain Council to measure a company's supply chain performance, improve its performance, and communicate to parties involved in the supply chain. The SCOR model presents a business process framework, performance indicators, practices, and technologies supporting communication and collaboration between supply chain partners to improve supply chain management and the effectiveness of supply chain refinement (Paul in Saragih et. al., 2021).

Measurement of the company's supply chain performance is done by first determining performance metrics (Azis, 2017) that are adjusted to the company's conditions following the benchmark SCOR model. After that, weighting performance metrics by using the AHP (Analytical Hierarchy Process) method is a method to make decisions from various problems. The use of the AHP method is done to determine the level of importance of several supply chain processes in analysing the criteria as a supporter of decisions (Mendoza in Saragih et al., 2021). The process of weighting performance metrics is done by providing questionnaires to experts who are very aware of the condition of the company, namely business owners. The weighting results of existing performance metrics will be used in the calculation of the company's supply chain performance.

Comparing the actual value with the target value contained in the company does calculation of supply chain performance. In one attribute, several matrices can be used as a performance measurement matrix. Performance attributes in question include reliability, responsiveness, flexibility, cost, and asset management efficiency (Irjayanti and Azis, 2013; Supply Chain Council in Saragih et al., 2021).

III. RESEARCH METHODOLOGY

The method used in this study is an exploratory descriptive analysis method. Descriptive and exploratory methods are used to describe the general picture of the company and its operational activities, the actors in the supply chain, the flow of supply chain management consisting of the flow of goods, the flow of money, and the flow of information, identify the obstacles that occur, and

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analyze the responsiveness of the supply chain used. The supply chain performance criteria are determined by the average of the results of each metric on each attribute. It is done to find out the state of the supply chain in the company (Saragih et al., 2021). The standard value classification of supply chain performance can be seen in Table 1.

Table 1 Classification of Supply Chain Performance Standard Values

Performance Value	Criterion
95 – 100	Very Good (Excellent)
90 – 94	Good (Above Average)
80 – 89	Medium (Average)
70 – 79	Less (Below Average)
60 – 69	Very Lacking (Poor)
<60	Bad (Unacceptable)

Source: Monzcka and Handfield in Saragih et al. (2021)

IV. FINDINGS AND DISCUSSIONS

Based on the field research, researchers found the parties or companies involved in the supply chain can be classified into two types of channels, namely direct distribution channels and indirect distribution channels. Indirect distribution channels only involve two actors, namely CV. Jaya Carbon Bandung city and the end consumer, while indirect distribution channels involve other intermediaries (retailers) in their distribution. In addition to direct and indirect distribution flows to consumers there are also third parties in supply chain management, as happens between suppliers and manufacturers, where suppliers cooperate with other parties, namely freight forwarding services or expeditions to deliver raw materials to manufacturers.

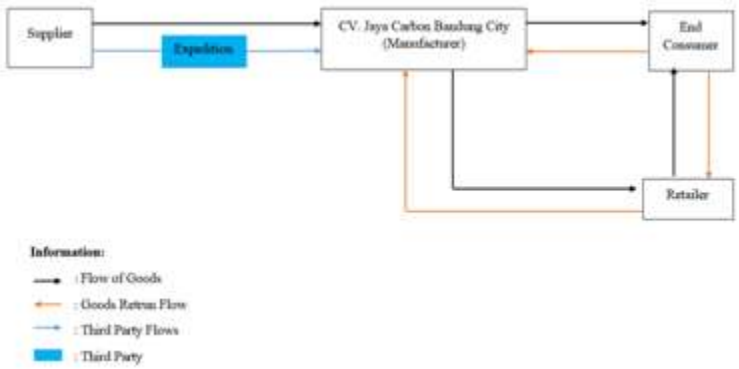

Figure 1 Flow of Goods

Source: Extracted from the data collection, 2021.

From the field explanation there are 5 (five) actors involved in the supply chain, namely: suppliers, manufacturers, retailers, end consumers, and freight forwarding or expedition services. But in the supply chain on a CV. Jaya Carbon Bandung City does not have actors as distribution centers (distributions) or in other words the company directly markets its products to retail outlets, but there are third parties who are members as supply chain actors in CV. Jaya Carbon Bandung City is a freight forwarding service or expedition that acts as a mode of transportation in getting the supply of coconut waste raw materials from suppliers.

A. Flow of Goods

As explained earlier, there are 3 (three) suppliers of coconut waste. The suppliers make delivery of raw materials using freight forwarding services or expeditions following the schedule and quantity that has been set in advance where the company makes an order to the supplier by contacting the supplier by phone or WhatsApp.

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Before the goods are sent through a freight forwarding service or expedition, the supplier will re-check the item.

If the goods are under the order, then the supplier will send coconut waste using freight forwarding services or expeditions and if there is no freight forwarding service or expedition with an estimated time during the 2-4 days of travel. If the goods are not under the order, it will result in the addition of coconut waste raw materials to match the order, and then the waste of coconuts that have been completed in production will be distributed to retailers and end consumers.

Distribution of goods to retailers is sent using the company's mode of transportation. In the process of loading the retailer checks the goods physically. But in the distribution process, there are often errors or damages of goods so that there is a return from the consumer or return of the product and must be replaced with a new one by the seller. Here is the process of controlling return products.

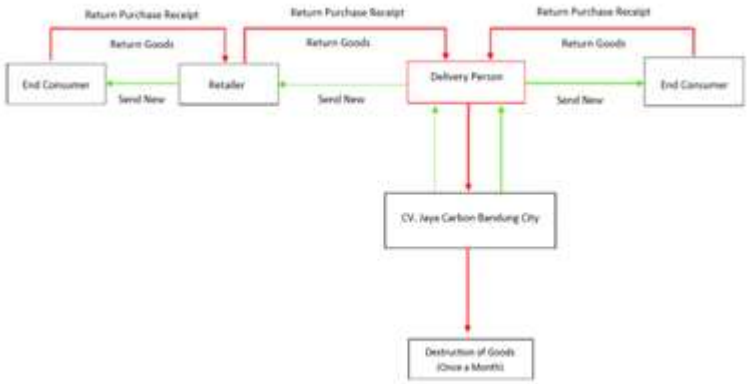

Figure 2 Controls of Return Products

Source: Extracted from the data collection, 2021.

Figure 2 shows that the end consumer buys goods through the retailer, then the flow of return through the intermediary begins by submitting receipts or return purchases and return goods to the retailer, then from the retailer of the goods in the return will be submitted to the company's goods delivery along with the return purchase receipt. For the end consumer of the company (without intermediaries) directly return the goods to the company's goods delivery along with submitting receipts for the purchase return (afternoon depending on traffic conditions and mileage). Then the goods returned by the retailer and the end consumer are handed over to be replaced with new goods and goods that are returned will be destroyed periodically (once a month), by being thrown into landfills. Up to the present time, there are only 2 (two) consumers who return goods because there is a leak in the PVC filter and the size of active sand is too small.

B. Flow of Money

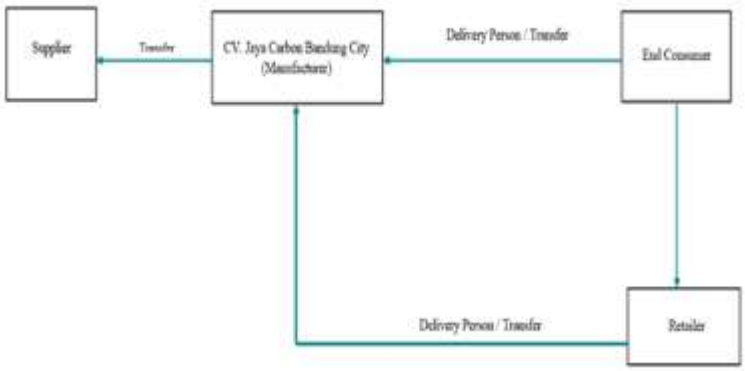

Figure 3 Flow of Money

Source: Extracted from the data collection, 2021.

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The process of money flow begins from the end consumer side, where the consumer conducts goods purchase activities (exchange of ownership). In the flow of goods that have been described before where the end consumer can buy goods from the retailer, this allows the flow of money that occurs can directly flow first to the retailer before to the next party or can buy it directly to the CV. Jaya Carbon Bandung City, then the flow of money will flow directly to the company and then the money will continue to flow to the supplier in cash through a transfer at the time of the purchase of raw materials.

The payment maturity for retailers and end consumers is one week after the goods are shipped. It can also be done by making a payment agreement with the company to determine the repayment time of those payments. Payment in cash is submitted by the delivery of goods and also be made via transfer to the bank account. Consumers will enter into the classification of overdue if the consumer is late in making payments, and this can cause the consumer can not make an order again until the payment of the bill.

C. Flow of Information

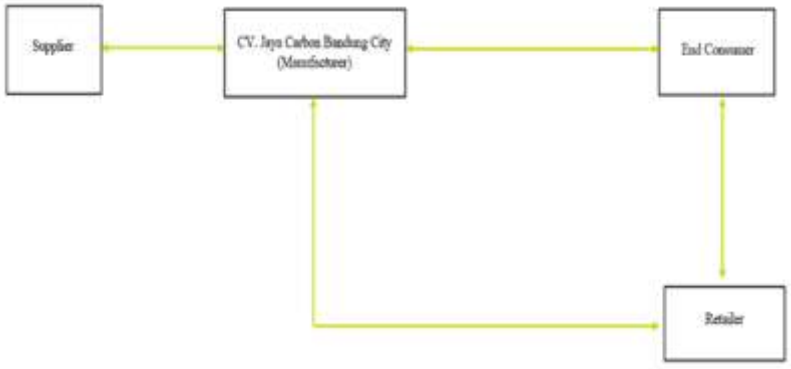

Figure 4 Flow of Information

Source: Extracted from the data collection, 2021.

In figure 4 can be seen on the downstream side of the flow of information that occurs is between the end consumer and the retail trader related to the purchase with the retail system, the end consumer with CV. Jaya Carbon Bandung City is related to the purchase of large quantities and information from upstream, namely: between the company and the company related to the purchase of raw materials or the availability of raw materials at one of the suppliers contained in table 4.1. This information is the basis of the availability of goods sold, the price set, how to make payments, and the services offered by the CV. Jaya Carbon Bandung City must be known and communicated to its consumers in trade promotion.

CV. Jaya Carbon Bandung City ordered coconut waste to suppliers by phone or WhatsApp and then the supplier will send goods with about 2-4 days to get to the factory CV. Jaya Carbon Bandung City by using logistics services. The procedure of receiving goods at the factory CV. Jaya Carbon Bandung City by checking by matching the amount ordered by the company with the number of goods carried by logistics services by using scales during the loading process of goods. If there is a less ordered amount, the company will contact the supplier to send the deficiency at the time of ordering again, then the waste of coconuts that have finished the loading and checking process is brought into the factory to be produced into finished goods. Consumers order products to marketers, via phone or WhatsApp, then the booking information will be forwarded to the financial and operational sections, to be processed to the process of shipping goods and payments (there are no collectible and uncollected documents), then the goods will be delivered directly after the consumer makes the order.

The payment billing process is contained in the CV. Jaya Carbon Bandung City can be done if the goods have been received by the consumer concerned. Consumers can choose to make bill payments via transfer or through the delivery party of goods from CV. Jaya Carbon Bandung City. The consumer (credit) will be given his purchase receipt if he has paid the bill, while the purchase receipt (credit) will be given when the consumer reorders or the receipt will be sent via WhatsApp. For discounts, programs are usually CV. Jaya Carbon

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Bandung City will provide a 10% discount only for consumers who often make product purchases from their companies.

D. Obstacles

In its implementation, the three streams did not always run well. The research found some obstacles occurred on the CV. Jaya Carbon Bandung City. The number of orders that do not match those ordered/sent (consumers are not fulfilled) by the company, the first obstacle factor is human error, namely employees who are less careful and do not check the quantity and quality again during the process of packaging goods to cause discrepancies in ordered goods from the CV. Jaya Carbon Bandung City to retailers.

The second obstacle factor is late payment by the retailer to the CV. Jaya Carbon Bandung City because the retailer concerned has exceeded the maximum maturity time of the initial commitment. If within 1 (one) week has not made payment repayment by the retailer then there is an overdue. When the consumer's experiences were overdue, then the consumer can not make any more orders until the consumer makes a payment of the bill.

The third barrier factor is poor management of return on goods ordered by consumers to the CV. Jaya Carbon Bandung City, the cause of the company cannot distinguish and ensure that the goods are new shipments or old consignments; it is often used by consumers to cut payment bills for the next period.

Supply Chain Responsiveness Analysis Using SCOR Method

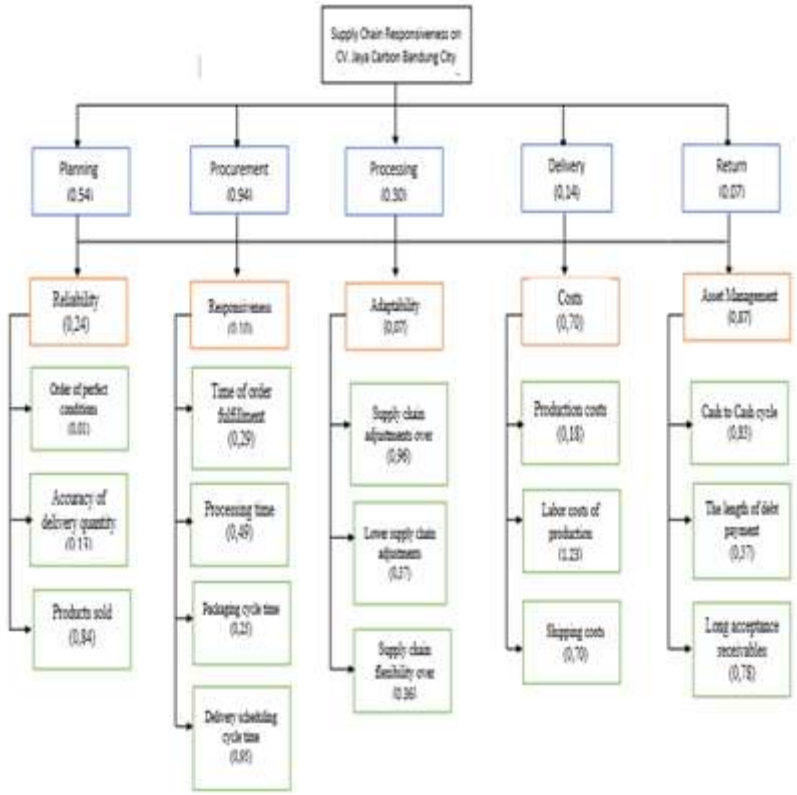

Figure 5 Results of Weighting Supply Chain Performance Metrics

Source: Extracted from the data collection, 2021.

SCOR method was used to assess supply chain responsiveness based on five indicators, namely: reliability, responsiveness, adaptability, cost, and asset management. Here the author presents the results of weighting performance metrics in figure 5.

Furthermore, the supply chain performance value on the reliability attributes is in table 2.

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Table 2 Supply Chain Performance Values on the Reliability Attributes

Performance Metrics	Unit	Current	Target	Weight	Performance Value
Sold products	Ton/pcs	5.533	7.000	0,84	48,72
Delivery quantity accuracy	Ton	4.333	5.533	0,13	6,63
Order of perfect conditions	Ton/pcs	5.332	5.533	0,01	0,47
Total Performance Value on the Reliability Attributes					55,82

Source: Extracted from the data collection, 2021.

The performance value obtained from the reliability attribute is 55.82. The value indicates the reliability attribute falls into the criteria of bad (unacceptable). In reliability attributes, there are no metrics that can meet the target. CV. Jaya Carbon Bandung City can only deliver products in perfect condition as much as 5,332 tons / pcs from the target of 5,533 tons / pcs (96.3%) and the accuracy of the number of orders sent only has a percentage value of 81.2% due to the number of orders less (4,333 tons) than the targeted (5,333 tons), while in the metric of products sold during the month that is March 2021. The company can only sell 5,333 pcs of products out of the 7,000 pcs/month targeted by the company. Based on this data CV. Jaya Carbon Bandung City is only able to sell products to consumers with an actual value of 76.2% of the target value.
Furthermore, the supply chain performance value on the responsiveness attributes is in table 3.

Table 3 Supply Chain Performance Values on the Responsiveness Attributes

Performance Metrics	Unit	Current	Target	Weight	Performance Value
Order fulfillment cycle time	Day	1	1	0,29	15,95
Processing cycle time	Day	1	2	0,49	26,95
Packaging cycle time	Day	1	1	0,25	17
Delivery scheduling cycle time	Day	1	1	0,95	38,95
Total Performance Values on the Responsiveness Attributes					98,85

Source: Extracted from the data collection, 2021.

Based on Table 3 it can be seen that the total performance value on the responsiveness attribute is 98.85. These results show the responsiveness attribute falls into the criteria very well (excellent). The responsiveness attribute of performance metrics that can meet actual data of 100% of the specified targets are the metrics of order fulfilment cycle time, scheduling cycle time, and packaging cycle time, while for processing cycle time (50%) has an actual value faster than 1 Day than the company's specified target time of 2 Days. The packaging process is always done after the processing process is completed. For scheduling the delivery of products to consumers the company always schedules 1x24-hour delivery using the company's mode of transportation. In addition, there is a second option that uses freight forwarding services or expeditions from Jaya Solution Cargo.
Following table 4 describe the supply chain performance value on the adaptability attributes.

Table 4 Supply Chain Performance Values on the Adaptability Attributes

Performance Metrics	Unit	Current	Target	Weight	Performance Value
Top supply chain adjustments	Ton/pcs	6.000	7.000	0,37	19,98
Supply chain adjustments down	Pcs	1.650	3.000	0,65	28,6
Supply chain flexibility	Day	15	15	0,96	46,08
Total Performance Value on Adaptability Attribute					94,66

Source: Extracted from the data collection, 2021.

The result of performing calculations on the adaptability attribute obtained a performance value of 94.66. These results show performance values on attributes included in the excellent group.

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In the flexibility of the supply chain, the company can meet the increase in production following the 15 Day target so that it has an actual value of 100% of the target value. In the upper supply chain adjustment, the company is only able to produce an average product every month as much as 6,000 tons / pcs from the target of 7,000 pcs / month so that in this metric only has 85.7% of the target value. The bottom supply chain adjustment also meets only 55% of the maximum reduction target value of the amount of production where the company only gives a maximum decrease limit of 30.7% of the total minimum production.

Following table 5 describe the supply chain performance value on the cost attributes.

Table 5 Supply Chain Performance Values on the Cost Attributes

Performance Metrics	Unit	Current	Target	Weight	Performance Value
Production costs	Rupiah/month	60.000.000	72.000.000	0,18	8,28
Labor costs	Rupiah/month	3.742.276	3.742.276	1,23	65,19
Shipping costs	Rupiah / month	375.000	600.000	0,70	24,9
Total Performance Value on the Cost Attributes					98,37

Source: Extracted from the data collection, 2021.

Based on the data, the total performance value of the cost attribute is 98.37. The value is in the excellent criteria. Labour cost performance metrics have a percentage value of 100% of the cost. Production costs are the average cost incurred by the company in carrying out the production process from January to March 2021 and have a percentage value of 83.33% of the target that has been determined by the company. As for shipping costs less than the target value that should be Rp. 600,000 month to 375,000/month and has a percentage value of 62.5%. The target shipping cost is an estimated monthly for the delivery of goods that use the expedition service.

Following table 6 describe the supply chain performance value on the asset management attributes.

Table 6 Supply Chain Performance Values on the Asset Management Attributes

Performance Metrics	Unit	Current	Target	Weight	Performance Value
Cash cycle time	Day	7	7	0,83	40,67
Length of debt repayment	Day	730	730	0,37	16,28
Length of receipt of receivables	Day	5	7	0,78	39
Total Performance Value on the Asset Management Attributes					95,95

Source: Extracted from the data collection, 2021.

The performance value of the asset management attribute is $95.95. Based on these values, asset management attributes fall under very good criteria (excellent). In the asset management attribute, some metrics can meet the target, namely the time of the cash cycle and the length of debt payments with a percentage value of 100%, while for the length of receipt of receivables, the average receivable received by the company during 5 Days from the targeted time of receipt during 7 Days to have an accuracy of 71.4% of the targeted time.

Following table 7 describe the summary of the supply chain performance of every attribute.

Table 7 Supply Chain Performance Value Results

Performance Attributes	Performance Value	Classification
Reliability	55,82	Bad (Unacceptable)
Responsiveness	98,85	Very Good (Excellent)
Adaptability	94,66	Good (Above Average)
Cost	98,37	Very Good (Excellent)
Asset Management	95,95	Very Good (Excellent)
Total Performance	88,73	Medium (Average)

Source: Extracted from the data collection, 2021.

Based on the results measurements on reliability attributes, responsiveness, adaptability, asset management then obtained the company's supply chain performance value of 88.73, so the company is quite responsive in meeting the needs of its consumers because the performance value is included in the classification of moderate criteria (average). Performance attributes that are already included in the excellent criteria are the responsiveness attribute (98.85), the adaptability attribute (94.66), the cost attribute (98.37), and the asset management attribute (95.95). The performance attribute that has the smallest value is the reliability performance attribute of 55.82, which falls under the criteria of poor.

The less maximum value of the reliability attribute found in the metric accuracy of delivery quantities and orders of perfect conditions due to the difference in the number of doses in consumers with the company so that the total target accuracy of the quantity of delivery has not met the target specified by the company. In addition, there are still damaged products and the size of goods ordered is too small due to the nature of products that are easily broken and fragile when moving into the warehouse or shipping to consumers.

V. CONCLUSIONS AND RECOMMENDATION

From the research, it was found the parties involved in the supply chains are 5 (five) actors ranging from suppliers to end consumers, namely: suppliers, manufacturers (CV. Jaya Carbon Bandung City), retailers, end consumers, and goods or expedition services. The flow of goods are gradual, money flows has been running under the rules, and the flow of information using several channels. The obstacles that occur on the CV. Jaya Carbon Bandung City is a discrepancy in the number of goods orders on consumers, delayed payment by consumers, and poor management of returns by companies.

Supply chain responsiveness is already quite responsive because based on the results of supply chain performance measurements on reliability, responsiveness, adaptability, asset management then obtained the company's supply chain performance value of 88.73 because the performance value is included in the classification of moderate criteria (average). To improve supply chain performance by increasing efficiency, it is recommended to research the reliability metric attributes, especially (a) delivery quantity accuracy and (b) order of perfect conditions. Further research is mainly aimed at double-checking the number of goods to be sent to consumers, the target of the delivery quantity accuracy metric, or research related to moving goods from the warehouse or during the delivery process.

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