BIS ENERGY AND ENGINEERING

Volume 2 2025 | DOI: 10.31603/biseeng.238
6th Borobudur International Symposium on Science and Technology (BIS-STE) 2024

UNIMMA PRESS
Universitas Muhammadiyah Magelang

Supply chain management performance analysis using SCOR method at PT. Bertho Chrisanta

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Abstract

PT. Bertho Chrisanta is a customer goods distribution company. This company strives to provide the best performance to always meet product demand from consumers, one of which is by improving supply chain management (SCM) performance. This study aims to assess the company's SCM performance and evaluate the results to provide suggestions for improvement. The methodology used combines the Supply Chain Operation Reference (SCOR) framework to measure and analyze supply chain performance, as well as the Analytic Hierarchy Process (AHP) method to assist in decision making and prioritization in evaluating SCM performance. The assessment results show that the overall SCM performance of PT. Bertho Chrisanta reached a value of 85.682, which indicates performance in the "good" category. This finding provides a positive picture of the effectiveness of the company's current supply chain management. Based on these results, it is concluded that although the company's SCM performance is good, there is still room for improvement. This study provides a strong basis for the company to identify areas that need improvement and implement the right strategy for supply chain optimization.

Keywords

Performance measurement, Supply chain management, SCOR, AHP

Introduction

Supply Chain Management is an approach to optimize integration between suppliers, manufacturing, warehouses and storage, so that production and distribution of goods can be done in the right amount, right location, right time and minimize costs and provide service satisfaction to consumers [1]. Supply Chain Management includes more complex activities than just controlling the logistics system. Supply Chain Management is the management of procurement activities for goods and services, conversion into semi-finished goods and final products, and delivery through the distribution system [2]. The concept of supply chain management is increasingly important in determining the added value of today's products, because it not only deals with the problem of providing

Published:
May 31, 2025

Selection and Peer-review under the responsibility of the 6th BIS-STE 2024 Committee

products, but also plays a role in the design and development process of new products, development of information systems, to services to the community. Companies must pay attention to what is needed and sought after by consumers, product availability, and economical selling prices. This can only happen if there is good coordination between retail companies and parties in their supply chain, such as information on product availability and market information that can be useful for company planning. Lack of product inventory will result in lost sales, while excess product inventory will result in product accumulation and increased inventory maintenance costs [3].

PT. Bertho Chrisanta is a distribution company engaged in Fast Moving Consumer Goods (FMCG) located in Magelang City. Distribution is part of logistics that performs a basic function for the company. Logistics has the responsibility to ensure that a product, in the right situation and condition and price so that it can satisfy the end consumer [4] . This company continues to strive to provide the best performance to always meet product demand from consumers. One effort that can be made is to improve supply chain management performance. Operational competencies are improved in terms of logistics services including the company's ability to offer services such as on-time and inventory management to facilitate product availability to customers. In addition, this helps in adapting quickly to the distribution network to meet demands [5]. The role of all parties is essential in order to create an organized supply chain network. Supply chain management activities carried out in this company include inventory management and delivery management. The inventory management carried out is forecasting, product ordering schedules, and delivery schedules from the factory. While delivery management has also been arranged according to the schedule. In its direct implementation in the company, it is currently still not optimal, because there are still some schedules that are late from the specified time, there are empty stocks and many returns from customers.

PT. Bertho Chrisanta also does not know what indicators are needed in assessing supply chain management performance measurements. Therefore, the company needs to implement an appropriate and adequate supply chain management performance assessment system. Supply chain management performance assessment can be carried out using the Supply Chain Operations Reference (SCOR) method. This method was chosen because it can identify supply chain performance indicators by showing the company's supply chain process, so that it can be used as an evaluation in improving performance. SCOR is able to map parts of the supply chain with the activities of a company where, must regulate and supervise calculations for shipping and procurement of goods by taking into account the capital and profits obtained [6]. This SCOR method was also chosen because it can connect business processes, performance metrics, standard practices, and people skills into an integrated structure [7].

This study aims to identify indicators that affect supply chain management performance at PT. Bertho Chrisanta, conducted a performance assessment using the Supply Chain Operations Reference (SCOR) method, and evaluated the results of the assessment to

provide suggestions for improvements to improve the company's supply chain management performance. It is hoped that through this study, a deeper understanding of the key factors that influence supply chain efficiency at PT. Bertho Chrisanta can be obtained, as well as producing practical recommendations that can be implemented to optimize the company's business processes. In addition, this study is also expected to contribute to the development of science in the field of supply chain management, especially in the context of industry in Indonesia.

Method

Research conducted using the SCOR and AHP method approaches in conducting a more structured supply chain performance analysis. SCOR helps in understanding and mapping the supply chain process, while AHP provides tools for determining priorities and making better decisions. The integration of these two methods can improve supply chain performance and support the achievement of the company's strategic goals. Researchers use data collection techniques by conducting interviews with company parties who understand and are directly involved operationally in supply chain activities at PT. Bertho Chrisanta. In addition, researchers also distributed questionnaires based on indicators related to the supply chain in the company.

SCOR (Supply Chain Operation Reference)

SCOR was developed and managed by the Supply Chain Council (SCC) as a comprehensive supply chain diagnostic tool [8]. The SCOR model provides a framework that combines benchmarking, business process engineering, and best practices in supply chain management [9]. In an industrial context, the SCOR model can be used to measure the performance of supply chain management as a whole. The application of the SCOR method can be applied to describe supply chain performance indicators by detailing each existing process so that later it can be used as a reference in evaluation to improve performance [10].

Based on the SCOR performance metric structure the SCOR model is divided into 3 main aspects of the metric system [11], namely:

a. Costumer facing, which is to measure a performance attribute of Supply Chain Delivery Reliability, Responsiveness and Agility towards customers and suppliers.

b. Internal facing, which is to measure a supply chain cost and asset management efficiency.

c. Shareholder facing, which is to measure profitability, efficiency of return and share performance.

According the general dimensions used in SCOR are Reliability, Responsiveness, Flexibility, Costs, and Assets [8].

Table 1. Performance attributes

Performance Attributes	Definition
Reliability	The ability to carry out work as expected: on time, quality according to the required standards, and quantity according to the required standards.
Responsiveness	The speed of carrying out work, among others, is measured in the order fulfillment cycle time.
Agility	The ability to respond to external changes in order to remain competitive in the market. The measuring tools include flexibility and adaptability.
Cost	The cost of running supply chain processes. Includes labor costs, material costs, transportation costs, and storage costs. The measuring tools include Cost of Goods Sold.
Asset Management	The ability to utilize assets productively, among other things, is demonstrated by low levels of inventory and high capacity utilization.

AHP (Analytic Hiearchy Process)

AHP is a decision support model developed by Thomas L. Saaty in the period 1971-1975. Analytical Hierarchy Process (AHP) is a decision-making method that integrates the principles of subjectivity and objectivity, allowing for more comprehensive and structured decision-making [12]. AHP is perceptional, where the level of importance is based on the respondent's point of view or perspective in making an assessment. The level of importance can be seen in Table 2.

Table 2. Pair comparison rating scale

Intensity of Interest	Definition	Information
1	Equal Importance (equally important)	Both elements have equal influence
3	Weak importance of one over (slightly more important)	Experience and judgment strongly favor one element over its counterpart
5	Essential or strong importance (more important)	One element is more important than the other
7	Demonstrated importance (very important)	One element is more absolutely important than the other
9	Extremeimportance (absolutely more important)	One element is absolutely important than the other
2,4,6,8	Intermediate values between the two adjacent judgments	Values between two adjacent considerations

Some principles that need to be understood in solving problems using the AHP method include Decomposition, Comparative judgment, Synthesis of priority, and Logical consistency.

a. Decomposition (Creating a Hierarchy)
   This principle involves breaking down large problems into smaller components in the form of a decision-making process hierarchy where each element is interconnected [13]. To ensure accurate results, the problem is divided until it is impossible to divide further, resulting in several different levels of problems. The decision hierarchy structure can be categorized into complete and incomplete. A hierarchy is considered complete if all elements at a level are connected to all elements at the next level, while an incomplete decision hierarchy means the opposite.

b. Comparative Judgment (Criteria and Alternative Assessment)
Giving weights to criteria and alternatives is done using a scale of 1 to 9 to make paired comparisons. This scale is used to express opinions about the level of importance or preference for each criterion and alternative in the decision-making process [14].

c. Synthesis of Priority (Determining Priority)
This principle presents a pairwise comparison matrix which is then searched for its eigenvector to obtain local priority [15]. Because the pairwise comparison matrix is present at each level, synthesis can be carried out between local priorities to obtain global priority.

d. Logical Consistency (Logical Consistency)
Logical consistency states a measure of whether or not an assessment or weighting of pairwise comparisons is consistent. This test is necessary because in actual conditions there will be some deviations from the relationship, so that the matrix is not perfectly consistent. This can occur due to inconsistency in a person's preferences[16].

Snorm de Boer Normalization

Each performance indicator has a different unit value, therefore normalization is carried out to equalize the unit value of each performance indicator . The normalization process is carried out using the Snorm De Boer normalization formula. There are three measurements in Snorm De Boer normalization, namely lower is better indicating that the smaller the metric value, the better the quality, higher is better indicating that the larger the matrix value, the better the quality, and normal is better is determined by a certain nominal [17]. The Snorm de Boer measurement equation can be seen in equation 1 and equation 2. The measurement results are then analyzed referring to the performance value standards in Table 3.

$$\text{Snorm} = \frac{(Smax - SI)}{Smax - Smin} \text{ x } 100 \quad (1)$$

Measurement is of a higher is better nature

$$\text{Snorm} = \frac{(SI - Smin)}{Smax - Smin} \text{ x } 100 \quad (2)$$

Information:

SI : Actual achievement of the performance metric.

Smax : Maximum achievement value of the performance metric.

Smin : Minimum achievement value of the performance metric.

Table 3. Supply chain performance value standards

Monitoring System	Performance Indicators	Information
< 40	Poor	Very less
40 - 50	Marginal	Marginal
50 – 70	Average	Medium
70 – 90	Good	Good
>90	Excellent	Very Good

Results and Discussion

The supply chain management performance value of PT. Bertho Chrisanta can be known through a calculation process involving two components, namely the final value of the performance indicator (KPI) and the AHP weight. The performance indicators at PT. Bertho Chrisanta Besaudara are arranged using the Supply Chain Operation Reference (SCOR) model. The process of determining the Performance Indicators (KPI) is carried out by distributing questionnaires to the Manager of PT. Bertho Chrisanta, resulting in 17 KPIs that are in accordance with the objectives of measuring the company's supply chain performance. The 17 KPIs are then arranged into a hierarchy to determine each weight and performance value. The hierarchical arrangement can be seen in Figure 1.

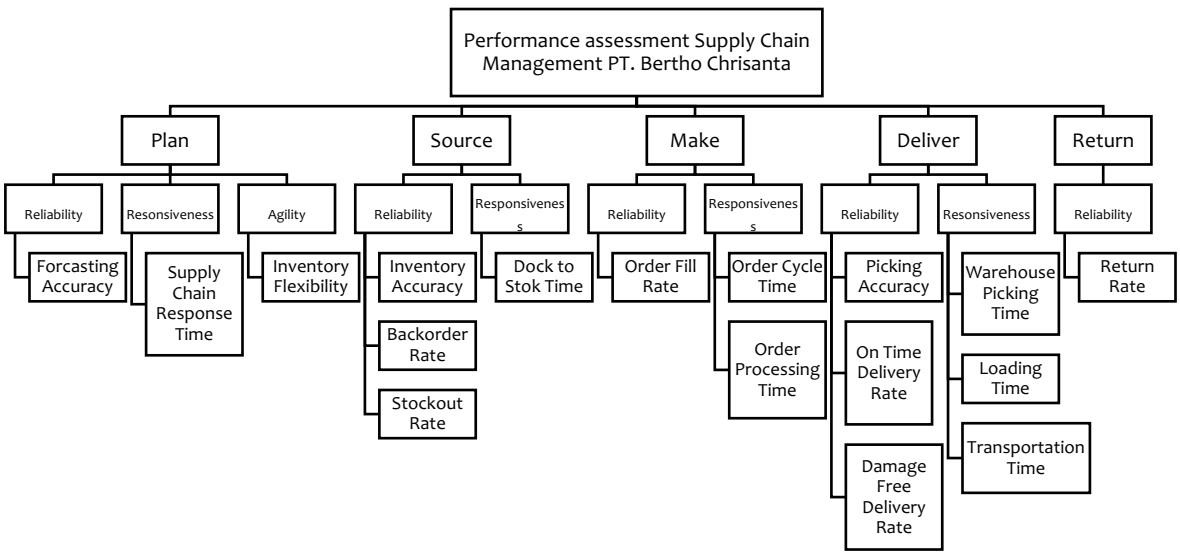

Figure 1. SCM performance hierarchy

Based on Figure 1, it can be seen that in the level 1 hierarchy there are five main processes in SCOR, namely plan, source, make, deliver and return. These five processes are the foundation of the SCOR model that covers all supply chain activities from planning to product return. Furthermore, in the level 2 hierarchy there are attributes used to determine the criteria for Performance Indicators (KPIs). These attributes function as more specific parameters to measure the performance of each main process. They help identify key aspects that need attention in each stage of the supply chain, allowing companies to focus improvement efforts on the most relevant areas. Meanwhile, in the level 3 hierarchy there are KPIs that have been determined based on the company's needs to assess supply chain performance. This KPI is a metric that can be measured

quantitatively and is used to evaluate the effectiveness and efficiency of the company's supply chain. Choosing the right KPI is very important because it will be the basis for strategic and operational decision making in supply chain management. This KPI also allows companies to identify areas that require improvement or innovation. The weight value can be seen in Table 4.

Table 4. Final weight of performance indicator

Process	Weight	Attribute	Weight	Performance Indicator	Weight	Final Weight
Plan	0,290	*Reliability*	0,4	*Forcasting Accuracy*	1	0,116
		Responsiveness	0,4	*Supply Chain Response Time*	1	0,116
		Agility	0,2	*Inventory Flexibility*	1	0,058
Source	0,274	*Reliability*	0,5	*Inventory Accuracy*	0,6	0,082
				Backorer Rate	0,2	0,027
				Stockout Rate	0,2	0,027
		Responsiveness	0,5	*Dock to StockTime*	1	0,136
Make	0,152	*Reliability*	0,5	*Order Fill Rate*	1	0,075
		Responsiveness	0,5	*Order Cycle Time*	0,5	0,037
				Order Processing Time	0,5	0,037
Deliver	0,194	*Reliability*	0,5	*Picking Accuracy*	0,4	0,039
				On Time Delivery Rate	0,35	0,034
				Damage Free Delivery Rate	0,23	0,022
		Responsiveness	0,5	*Warehouse Picking Time*	0,33	0,032
				Loading Time	0,33	0,032
				Transportation Time	0,33	0,032
Return	0,086	*Reliability*	1	*Return Rate*	1	0,086

It can be seen in Table 4 that the AHP weighting results show the dominance of the Plan process with a weight of 0.290 indicating planning as the main foundation of the supply chain. This requires an in-depth discussion of resource and technology allocation for planning optimization. The balance between Reliability and Responsiveness is a critical aspect, where it is necessary to examine the trade-off between process consistency and speed of response to market changes. The low weight of the Return process (0.086) indicates a potential area for improvement in returns management and its impact on customer satisfaction. The KPI with the highest weight is Dock to Stock Time (0.136) in the Source process. This indicates the importance of efficiency in the process of receiving and storing goods.

Based on the data calculation, it is clear which indicators have good performance and which are still lacking and need improvement. The Snorm de Boer method is very helpful in equating the value units for each performance indicator. The very good performance category with a value of 90-100 covers the majority of PT. Bertho Chrisanta's KPIs, indicating good operational excellence. A perfect order fill rate indicates the company's ability to fulfill customer orders consistently. High inventory accuracy and flexibility indicate very effective inventory management, allowing the company to meet demand accurately while remaining flexible. Forecasting accuracy with a value of 95 helps in efficient planning. A low stockout rate and high on-time delivery rate indicate excellent

customer service. Operational efficiency can be seen from warehouse picking time, supply chain response time, and loading time. Performance that is included in the good category with a value of 80-89 indicates areas where the company is performing well, but there is still room for minor improvements. A good backorder rate indicates effective order management, although it can still be improved slightly. Order Processing Time with a value of 87 reflects a good order processing system. Transportation Time with a value of 80 indicates effective logistics management, although there is potential for further optimization. Performance assessment results presented in Table 5.

Table 5. Performance assessment results

Performance Indicator	Final score	Final Weight	Performance Value
Forcasting Accuracy	95	0,116	11,02
Supply Chain Response Time	100	0,116	11,6
Inventory Flexibility	92	0,058	0,070
Inventory Accuracy	99	0,082	8,118
Backorer Rate	89	0,027	2,403
Stockout Rate	94	0,027	2,538
Dock to StockTime	50	0,136	6,8
Order Fill Rate	100	0,075	7,5
Order Cycle Time	67	0,037	2,479
Order Processing Time	87	0,037	3,219
Picking Accuracy	93	0,039	3,627
On Time Delivery Rate	90	0,034	3,06
Damage Free Delivery Rate	98	0,022	2,156
Warehouse Picking Time	90	0,032	2,88
Loading Time	100	0,032	3,2
Transportation Time	80	0,032	2,56
Return Rate	64	0,086	5,504
Amount			**85,682**

Performance in the sufficient category with a value of 60-79 in this category requires attention for improvement. Order cycle time of 67 indicates that there is room to improve the efficiency of the overall process from ordering to delivery. Return rate of 64 at this level indicates the need for further evaluation of product quality or delivery process to reduce the return rate. Meanwhile, performance with a value of less than 60 in this category, only dock to stock time of 50 requires serious attention. This value indicates that the process of receiving goods to storage in the warehouse requires significant improvement. This can be a major focus area for improving the company's operational efficiency. Moreover, dock to stock time is a very important indicator in the smooth running of all company activities, because the faster the goods become stock, the faster the goods can be sold and distributed to customers.

Overall, PT. Bertho Chrisanta shows good performance as evidenced by a performance value of 85.682. This advantage provides a strong foundation for customer satisfaction and operational efficiency. However, there are several areas that need improvement, especially in terms of dock to stock time, order cycle time and return rate. More completely, it can be explained as follows:

First, Dock to Stock Time: To improve Dock to Stock Time, optimize the warehouse layout, improve the technology used and develop clear SOPs (Standard Operating Procedures) for each stage of the process. A well-organized warehouse layout can make it easier to classify product types, so that the process of receiving goods in the warehouse can be faster and more efficient. Improving the technology used also greatly affects the speed of the goods receipt process, so that work becomes faster and more accurate.

Second, Order Cycle Time. For Order Cycle Time, the main focus should be on optimizing the ordering process, improving inventory management, and increasing the efficiency of picking or preparing orders. Optimizing shipping routes and improving coordination between departments are also important to reduce the overall order cycle time. Coordination between sales and shipping plays an important role in increasing the efficiency of order cycle time. Smooth communication between these two departments allows for more accurate planning and anticipation of customer needs. The sales department can provide real-time information about incoming orders and volume estimates to the shipping department. This allows them to optimize routes and fleet capacity. Conversely, the shipping department can notify the sales department of logistical constraints or potential delays. By improving this coordination, the company can reduce delays, improve delivery accuracy, and speed up the overall order cycle time. Third, Return Rate: To reduce the Return Rate, PT. Bertho Chrisanta needs to focus on preparing orders to reduce damage during shipping. Analysis of the causes of product returns must also be carried out regularly to understand the main reasons for returns so that the company can take appropriate preventive measures. Periodic review and improvement of the return policy can also be carried out to ensure that the policy is fair to customers but also protects the company's interests. By implementing the proposed improvements.

Conclusion

The overall performance assessment result of supply chain management at PT. Bertho Chrisanta is worth 85.682. This value indicates that the company's performance is in the good category. PT. Bertho Chrisanta is improving performance focused on optimizing order cycle time through better coordination between sales and shipping departments, reducing return rates by implementing a stricter recheck process before shipping, and improving technology to monitor and optimize the supply chain process. The company is committed to making continuous improvements to improve operational efficiency and increase customer satisfaction in the long term.

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