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Measurement of SC logistics performance with SCOR-FUZZY AHP method

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Abstract

Sector Logistics plays an important role in maintaining the smoothness and efficiency of national and global supply chains, especially for third-party logistics (3PL) service providers who face demands for reliability and speed of service amidst global competition. The complexity of the logistics process creates the need for a structured and measurable performance evaluation model. This study aims to apply the Supply Chain Operations Reference (SCOR) model in identifying and prioritizing key performance indicators (KPI) in a 3PL company . The method used involves distributing questionnaires to decision makers in operational and managerial fields. The weights of SCOR performance attributes including reliability, responsiveness, flexibility, cost measures, and asset management efficiency are calculated using the Fuzzy Analytic Hierarchy Process (FAHP) method. Furthermore, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is used to determine KPI priorities at PT.X. The results of the study show that there are 17 indicators to measure the performance of the freight forwarding sector with the largest weight being operator reliability (0.251) on the reliability attribute, the number of on-time deliveries (0.694) on the responsiveness attribute, load flexibility (0.317) on the flexibility attribute, shipping costs per km (0.379) on the cost attribute and cash-to-cash cycle time (0.479) on the asset management attribute. The SCOR model has proven effective as an initial framework in measuring the performance of 3PL logistics service providers, because it is able to integrate various aspects of performance systematically and quantitatively.

Keywords: Supply Chain Performance; SCOR; third party logistics; Fuzzy AHP; TOPSIS

1. Introduction

Supply Chain Management (SCM) plays a crucial role in ensuring the smooth flow of goods, information, and financial resources across a business network. In today's competitive environment, continuous performance measurement and improvement have become essential to achieving operational efficiency and maintaining a competitive edge. Over the years, researchers have introduced several conceptual frameworks to evaluate and manage supply chain performance, including the Descriptive and Normative Model (DNM), the Global Supply Chain Forum Framework (GSCF), the Value Reference Model (VRM), and the Sustainable Balanced Scorecard (SBS) [1]–[4]. These frameworks are widely adopted as benchmarks for developing performance measurement systems across diverse industrial sectors [5]. In an era of increasingly complex market competition, Third-Party Logistics (3PL) providers play a strategic role in supporting the effectiveness of supply chain operations. Rather than serving merely as transport and warehousing providers, 3PL companies act as strategic partners that enhance overall supply chain performance. To achieve this, they must be able to manage large volumes of operational data and transform them into meaningful insights that support informed decision-making. The application of Business Intelligence (BI) technologies—such as data warehousing and online analytical processing enables 3PLs to analyze operational performance in real time, improve service efficiency, and support data-driven managerial decisions [6].

Despite the potential benefits of BI, many 3PL companies in Indonesia continue to face difficulties in integrating these analytical tools with existing performance measurement systems. Current measurement practices tend to be fragmented and lack a standardized framework that can assess both efficiency and effectiveness in a balanced manner. A comprehensive and systematic performance measurement model is therefore needed, not only for internal improvement but also for benchmarking against other logistics service providers [7]. The Supply Chain Operations Reference (SCOR) model offers such a framework, providing a structured approach for evaluating performance across five key dimensions: reliability, responsiveness, agility, cost, and assets. Beyond internal metrics, the SCOR model also takes into account customer satisfaction and inter-organizational collaboration within the supply chain [8]. Several studies have demonstrated that integrating BI tools with the SCOR framework can yield a real-time performance measurement system that is more adaptive to market changes and customer expectations [8]. However, such research remains scarce in the context of Indonesia's logistics industry, particularly among large-scale national 3PL providers.

This gap underscores the need to explore how BI and SCOR can be effectively combined to measure and enhance logistics performance at the operational level. PT. X, the focus of this research, is a logistics service provider located in the Krian Industrial Area, East Java. The company offers land logistics solutions, including goods distribution, closed-box truck rentals, expedition services, transportation, and warehouse leasing. With over 400 fleets and four branch offices across Indonesia, PT. X operates on a substantial scale. Nonetheless, recent internal surveys have revealed a decline in customer loyalty, with around 15% of clients shifting to other logistics providers or managing their own deliveries. This trend reflects a decrease in service performance and the presence of operational inefficiencies that require systematic evaluation. Currently, PT. X's performance assessment is largely subjective and not based on measurable indicators. Hence, a comprehensive performance measurement system is essential to identify and prioritize areas for improvement. This study aims to develop a performance measurement model for 3PL service providers by prioritizing logistics performance indicators using a Multi-Criteria Decision-Making (MCDM) approach.

The SCOR model is adopted to define performance dimensions—reliability, responsiveness, agility, cost, and assets—while Fuzzy Analytic Hierarchy Process (FAHP) and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) are employed to determine the weighting and ranking of key performance indicators. By combining these methods, this study seeks to establish an objective and data-driven performance measurement system that will enable PT. X to improve its operational efficiency, competitiveness, and customer retention. In addition, this research provides a valuable theoretical contribution to the integration of BI and SCOR models for 3PL performance evaluation within Indonesia's logistics industry.

2. Method

Research objects and locations

This research was conducted at PT X , a third-party logistics (3PL) provider operating in the land transportation sector. PT X has a fleet of over 400 trucks and four operational branches in Indonesia. The company provides goods distribution, warehouse rental, and expedition services. In recent years, PT X has faced a decline in the number of customers by approximately 15%, which is suspected to be caused by decreased operational efficiency and limitations in the performance monitoring system.

Data collection and respondents

To support the analysis, primary data was collected through questionnaires and structured interviews with the company's management. Respondents consisted of three top managers and one middle manager, selected based on their involvement in operations, warehousing, and shipping. The questionnaire was designed to identify key performance indicators (KPIs) based on the five key performance attributes in the SCOR model, as shown in Table 1.

Table 1. Performance of attributes and level 1 matrix.

Attribute Performance	Description	Level 1 metrics
Reliability	*SC* performance delivers the right product, to the right place, at the right time, in the right condition and packaging, in the right quantity with the right documentation.	Perfect delivery performance, fill rates, order fulfillment
Responsiveness	The speed at which *SC* provide products to customers	Order fulfillment lead time

Attribute Performance	Description	Level 1 metrics
Flexibility	*SC* agility in responding to market changes or maintaining competitive advantage	*SC* response time , production flexibility
Cost Measurement	Costs associated with operating *the SC*	Cost of goods sold, total *SC management costs* , value added productivity, warranty/return processing costs
Asset management efficiency	The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed assets and working capital.	Cash-to-cash cycle time, days of inventory, return on assets.

Stages of Research Analysis

To identify benchmark years, performance measurement values were obtained from the company team's freight forwarding domain software product database. A hierarchical FAHP structure was created. The Fuzzy Analytic Hierarchy Process (FAHP) was applied to determine the benchmark performance within the Third-Party Logistics (3PL) sector, where performance attributes serve as the main criteria and defined Key Performance Indicators (KPIs) act as sub-criteria. The KPI values are illustrated in Figure 1, and the process follows these steps:

Step 1 – Data Collection: Gather KPIs and their relative rankings.
Step 2(a) – Hierarchy Construction: Organize KPIs according to the SCOR model framework and fuzzy decision warehousing. Create the X matrix for goods delivery.
Step 2(b) – Weight Calculation: Determine the weights using the FAHP procedure described earlier.
Step 3 – Normalization of Decision Matrix (X): Construct and normalize the decision matrix using the TOPSIS method.
Step 4(a) – Weighted Normalized Matrix: Compute the weighted normalized matrix based on FAHP-derived weights.
Step 4(b) – Ideal and Negative-Ideal Solutions: Identify the ideal and negative-ideal solutions using TOPSIS.
Step 5 – Relative Closeness: Calculate the relative closeness of each alternative using the given formula.
Step 6 – Ranking and Analysis: Rank the alternatives based on their relative closeness values and analyze the performance outcomes for the current year.

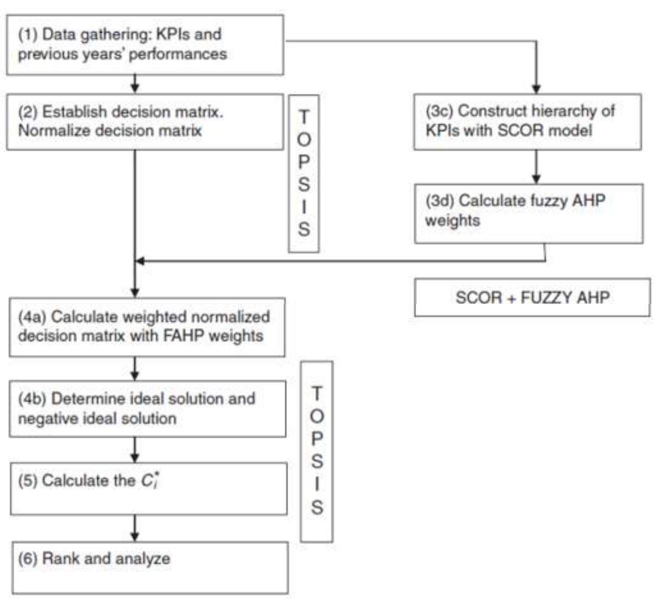

Figure 1. Data collection and processing stages.

SCOR Model

The Supply Chain Operations Reference (SCOR) model was developed in 1996 by the Supply Chain Council (SCC) [9]. It functions as a comprehensive framework that combines business process reengineering, benchmarking, and performance evaluation. To illustrate the structure of a supply chain (SC), the SCOR model categorizes it into five primary processes: Plan, Source, Make, Deliver, and Return [10]. The model is arranged hierarchically across three levels of detail—with Level I defining the key process types that connect overall supply chain performance to the organization's strategic goals. Level II represents the configuration level, categorizing processes to reflect different operational approaches. Level III details specific process elements, offering a deeper understanding of how each activity contributes to overall supply chain performance.

By providing a standardized framework, the SCOR model facilitates clear communication across functions and serves as an effective tool for top management to design, evaluate, and reconfigure supply chain operations. In measuring performance, the SCOR framework emphasizes performance attributes a set of metrics that guide strategic improvement. It identifies five key Supply Chain Performance (SCP) attributes: reliability, responsiveness, agility, cost, and asset management efficiency. These attributes form the foundation for assessing and comparing supply chain performance at Level I of the model.

Fuzzy AHP

Fuzzy AHP was developed by Chang in 1996 and is a development of the Analytical Hierarchy Process method. (AHP) which describes complex multi-factor or multi-criteria problems into a hierarchy, so that the problem will appear more structured and systematic. However, the decision results obtained using Fuzzy AHP are better because it is able to minimize the description of the same decision that is produced by the AHP method [11].
The steps for solving Fuzzy AHP are as follows [12];

a. Create a hierarchical structure of the problem to be solved and determine the pairwise matrix comparison between criteria with the Triangular Fuzzy Number (TFN) scale in the Table 2.

Table 2. AHP scale and triangular fuzzy number.

AHP Scale	Fuzzy Scale	Inverse Fuzzy Scale	Information
1	1,1,1	1,1,1	Equally important
2	1,2,3	1/3, 1/2, 1	The same and a little more important
3	2,3,4	1/4, 1/3, 1/2	A little more important
4	3,4,5	1/5, 1/4, 1/3	A little more and more important
5	4,5,6	1/6, 1/5, 1/4	More important
6	5,6,7	1/7, 1/6, 1/5	More and very important
7	6,7,8	1/6, 1/7, 1/8	Very important
8	7,8,9	1/9, 1/8, 1/7	Very and absolutely more important
9	8,9,9	1/9, 1/9, 1/8	Absolutely more important

Source: Sihombing, (2015).

b. Determine the priority *fuzzy synthesis (Si) value* using the formula:

$$Si = \sum_{j=1}^{m} M_i^j X \frac{1}{\sum_{i=1}^{n} \sum_j^m M_i^j} \quad (1)$$

Determine the vector value (V) and the Defuzzification Ordinate value (d').
For $k = 1,2,...n; k \neq i$, *the vector* weight value is obtained :

$$W' = (d'(A_1), d'(A_2),....,d'(An))^T. \quad (2)$$

Suppose A1= (l1,u1); A2= (l2,u2). Then the combined assessment matrix is formulated as follows:

$$A\ g\ (1,u) = \sqrt[2]{1^1 * 1_2), (u^1 * u_2)} \quad (3)$$

c. Normalization of fuzzy vector weight values *(W)*
The normalized vector weight value is as follows:

$$W = (d(A_1), d(A_2),...,d(An))^T. \quad (4)$$

Where W is a *non-fuzzy number*. The normalization formula is:

$$d(A\,n) = \frac{d'}{\sum_{i=1}^{n} d'(An)} \quad (5)$$

TOPSIS

TOPSIS is one of the main techniques for MCDM problems [13]. TOPSIS defines two types of solutions: ideal solutions, and negative ideal solutions. Ideal solutions are considered as the maximum benefit solutions. It consists of all the best criteria values. In contrast, negative ideal solutions are treated as the minimum benefit solutions; it consists of all the worst criteria values. TOPSIS defines a solution as the point that is closest to the ideal point and farthest from the negative ideal solution at the same time [14]. In this method, the selection of alternatives is based on the principle that the optimal option should be closest to the ideal solution and farthest from the negative ideal solution. The stages of the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) process are as follows:

(1) Construct the decision matrix (X).
(2) Normalize the decision matrix (X) to standardize the different measurement units of the criteria.
(3) Form the weighted normalized decision matrix (X) using weighting values derived from methods such as AHP or FAHP.
(4) Identify the ideal solution (A^*) and the negative ideal solution (A^-).
(5) Calculate the distance of each alternative from the ideal solution (S^*_i) and the negative ideal solution (S^-_i).
(6) Determine the relative closeness (C^*_i) of each alternative to the ideal solution.
(7) Rank the alternatives based on the value of C^*, where $0 \leq C^* \leq 1$. An alternative is considered closer to the ideal solution as its C^* value approaches 1, allowing alternatives to be ranked in descending order of preference.

Compared to other multi-criteria decision-making methods, TOPSIS offers an advantage due to its ability to quickly identify the most suitable alternative. Studies have shown that TOPSIS performs almost as effectively as Multiplicative Additive Weighting (MAW) and often better than AHP in fitting predictive models. When the number of criteria increases, TOPSIS tends to produce different results from Simple Additive Weighting (SAW) and is more sensitive to variations in weight assignments [15]. In this paper, TOPSIS is applied to normalize performance values with different measurement units, enabling accurate comparison and analysis of measurable performance indicators.

3. Result and Discussion

This section presents the results of data processing from questionnaires and PT X's internal database as well as a discussion of findings relevant to the research objectives, namely determining KPI priorities based on the SCOR model with FAHP weighting and TOPSIS assessment [16]. Pairwise comparison questionnaires were distributed to four key informants at PT X: Operations Manager, Marketing Manager, HRD Manager, and Purchasing Manager. Respondents were selected based on their direct involvement in operational processes and strategic decision-making.

Weighting with Fuzzy AHP

Based on the questionnaire results and a review of relevant literature, the level of importance for each criterion and alternative can be determined. Once the relative importance of each criterion is identified, a pairwise comparison matrix is constructed using a Likert scale to assess the consistency ratio and weighting derived from the questionnaire responses. These responses serve as a reference for evaluating the five performance attributes used in this study. The relative importance of one criterion compared to another is presented in the pairwise comparison table, followed by the normalization of the comparison matrix. The results of the weighting matrix, along with the normalized pairwise comparison calculations obtained from the respondents, are presented in Table 3.

Table 3. Matrix pairwise comparison attribute.

	Reliability	Responsibility	Flexibility	Cost measurement	Asset management efficiency
Reliability	(1,1,1)	(1,1.5,2)	(2,2.5,3)	(1,1.5,2)	(1,1.83,2.5)
Responsibility	(0.5,0.667,1)	(1,1,1)	(0.4,0.5,0.667)	(1,1.5,2)	(1,0.889,1)
Flexibility	(0.33,0.4,0.5)	(1.5,2,2.5)	(1,1,1)	(0.4,0.833,1)	(1,1.5,2)

	Reliability	Responsibility	Flexibility	Cost measurement	Asset management efficiency
Cost measurement	(0.5,0.667,1)	(0.5,0.667,1)	(11,1.33,2.5)	(1,1,1)	(1,1.67,1.33)
Asset management efficiency	(0.33,0.4,0.5)	(0.5,0.778,1)	(0.333,0.433,0.667)	(0.5,0.667,1)	(1,1,1)

Based on the results of the fuzzy pairwise comparison presented in Table 3, it can be seen that reliability is the attribute with the highest level of importance among all evaluated criteria. The fuzzy values (2, 2.5, 3) obtained from the comparison between reliability and flexibility indicate that reliability is considered significantly more important in assessing the supply chain performance of PT X. Similarly, reliability also ranks higher than responsiveness and cost, with fuzzy values of (1, 1.5, 2), reaffirming that the company places top priority on its ability to deliver products accurately, punctually, and in proper condition. On the other hand, cost and asset management efficiency show lower weighting values, suggesting that PT X is currently emphasizing improvements in service quality and operational reliability rather than focusing on cost reduction or asset optimization. Overall, these findings highlight that PT X's Business Intelligence (BI) system development strategy should prioritize enhancing reliability and responsiveness indicators, as these are the key factors in sustaining customer satisfaction and improving the company's overall performance.

Table 4. Matrix pairwise comparison reliability.

	Operator reliability	Geographic coverage	Service failure	Cargo damage	Customer reference value
Operator reliability	(1,1,1)	(2,2.5,3)	(0.4,0.5,0.667)	(1.5,2,2.5)	(2,2.5,3)
Geographic coverage	(0.333,0.4,0.5)	(1,1,1)	(0.4,0.5,0.667)	(1.5,2,2.5)	(1,1,333,2)
Service failure	(1.5,2,2.5)	(1.5,2,2.5)	(1,1,1)	(1,1,167,2)	(1.5,2.33,3)
Cargo damage	(0.4,0.5,0.667)	(0.4,0.5,0.667)	(0.5,0.889,1)	(1,1,1)	(1,1.5,2)
Customer reference value	(0.33,0.4,0.5)	(0.5,0.778,1)	(0.333,0.433,0.667)	(0.5,0.667,1)	(1,1,1)

Based on the pairwise comparison results presented in Table 4, it can be observed that operator reliability holds the highest level of importance among all sub-criteria within the reliability attribute. The fuzzy values (2, 2.5, 3) obtained from the comparison between operator reliability and geographic coverage indicate that reliable operators are considered more critical than expanding the company's service area. This finding confirms that the accuracy and consistency of operators in executing delivery tasks are key determinants of PT X's logistics service success. Moreover, operator reliability also demonstrates higher importance compared to service failure and cargo damage, with fuzzy values of (1.5, 2, 2.5). This suggests that the company prioritizes effective human resource management and operational precision over minimizing the risk of product damage. Additionally, the customer reference value sub-criterion shows a relatively high level of importance, with fuzzy values of (2, 2.5, 3), emphasizing that customer perceptions and feedback serve as essential benchmarks in evaluating company reliability. Overall, the results indicate that PT X must continue to strengthen its operational capabilities and personnel reliability to enhance customer satisfaction and maintain loyalty in an increasingly competitive logistics market.

Table 5. Matrix pairwise comparison responsiveness.

	Response delay index	Number of shipments responded to on time
Response delay index	(1,1,1)	(1,1.833,2.5)
Number of shipments responded to on time	(0.4,0.611,1)	(1,1,1)

Based on the pairwise comparison results presented in Table 5, it is found that the number of deliveries responded to on time holds a higher level of importance compared to the response delay index, with fuzzy values of (1, 1.833, 2.5). This indicates that, within the responsiveness attribute, the timeliness in responding to customer requests serves as the primary benchmark for assessing PT X's responsiveness performance. Therefore, the company must ensure that its communication processes and operational coordination are carried out swiftly and accurately to guarantee that deliveries are completed as scheduled.

Table 6. Matrix pairwise comparison flexibility.

	Route flexibility	Load flexibility	Handling of separation of goods	Capacity utilization
Route flexibility	(1,1,1)	(1,1,167,2)	(1,1.5,2)	(1,1,1)
Load flexibility	(0.5,0.893,1)	(1,1,1)	(1,1.5,2)	(1,1,167,2)
Handling of separation of goods	(0.5,0.667,1)	(0.5,0.667,1)	(1,1,1)	(0.5,0.667,1)
Capacity utilization	(1,1,1)	(0.5,0.889,1)	(1,1.5,2)	(1,1,1)

Based on the pairwise comparison results presented in Table 6, it is shown that load flexibility is the most dominant sub-criterion within the flexibility attribute, with fuzzy values of (1, 1.167, 2) when compared to route flexibility, goods separation handling, and capacity utilization. This finding indicates that the company's ability to adjust the type and quantity of cargo according to customer demand is a critical factor in ensuring the smooth flow of logistics operations. These results highlight that PT X's main focus within the flexibility dimension should be directed toward optimizing cargo adjustment processes to enhance overall distribution performance.

Table 7. Matrix pairwise comparison cost.

	Shipping cost per km	Additional cost index	Claim as a percentage of the fees to be paid
Shipping cost per km	(1,1,1)	(0.5,1.222,2)	(0.5,0.667,1)
Additional cost index	(0.5,0.944,2)	(1,1,1)	(1,1,1)
Claim as a percentage of the fees to be paid	(1,1.5,2)	(1,1,1)	(1,1,1)

Based on the pairwise comparison results presented in Table 7, it can be observed that within the cost attribute, the shipping cost per kilometer criterion holds the highest level of importance compared to the additional cost index and claims as a percentage of payable costs, with fuzzy values of (1, 1.22, 2). This finding indicates that the efficiency of shipping costs per kilometer is the primary factor that the company must focus on to reduce total operational expenses. The additional cost index ranks second, with fuzzy values of (0.5, 0.944, 2), suggesting that managing additional costs such as fuel, tolls, and extra service charges remains important, though not the main priority. Meanwhile, claims as a percentage of payable costs have the lowest weight (0.5, 0.667, 1), implying that this factor exerts minimal influence on overall expenses, as it primarily represents a form of supplementary compensation.

Table 8. Matrix pairwise comparison asset management.

	Cash to cash cycle time	Unpaid debt	Utilization of equipment for special purpose
Cash to cash cycle time	(1,1,1)	(1,1,1)	(1,1.167,1.5)
Unpaid debt	(0.5,0.5,0.5)	(1,1,1)	(1,1,1)
Utilization of equipment for special purpose	(0.4,0.467,0.5)	(0.5,0.833,1)	(1,1,1)

Based on Table 8, the pairwise comparison results for asset management attributes show that cash-to-cash cycle time has a level of importance that is equal to that of outstanding accounts payable, with a fuzzy value of (1, 1, 1). This indicates that both play a significant role in maintaining the company's financial stability. Meanwhile, the utilization of special-purpose equipment has a fuzzy value of (1, 1.167, 1.5), meaning this indicator is considered slightly more important because it is directly related to the effectiveness of the company's asset utilization in supporting operational activities. Thus, companies need to maintain a balance between cash flow management, payment of liabilities, and optimization of asset utilization to achieve overall asset management efficiency. The weights obtained after applying Fuzzy AHP for each KPI are shown in Table 9.

Table 9. Weight of each KPI.

Attribute	Kpi	Weight
Reliability	Operator reliability	0.251
	Geographic coverage	0.231
	Service failure	0.250
	Level of damage	0.158
	Customer reference value	0.108
Responsibility	Response delay index	0.306
	Number of shipments responded to on time	0.694
Flexibility	Route flexibility	0.163
	Load flexibility	0.317
	Handling of separation of goods	0.231
	Capacity utilization	0.289
Cost measurement	Shipping cost per km	0.379
	Additional cost index	0.308
	Claims as a percentage of what is due	0.313
Asset management efficiency	Cash to cash cycle time	0.479
	Unpaid debts	0.208
	Utilization of special purpose equipment	0.313

Based on the weighting results of Key Performance Indicators (KPIs) using the *Supply Chain Operations Reference* (SCOR) model, each attribute has a different level of influence on supply chain performance at PT X. In the Reliability aspect, the indicator with the highest weight is operator reliability (0.251), followed by service failure (0.250) and geographical coverage (0.231). These results indicate that the operator's ability to maintain service quality is a major factor in improving the reliability of the distribution system at PT.X. The level of damage (0.158) and customer reference value (0.108) have a smaller influence on the reliability dimension. In *the* Responsiveness attribute , the indicator of the number of deliveries responded to on time (0.694) obtained the highest weight. This confirms that timeliness is an important factor in maintaining customer satisfaction. The response delay index (0.306) has a lower influence, so the speed in responding to requests still needs to be improved.

In the Flexibility attribute, the load flexibility indicator (0.317) ranks highest, followed by capacity utilization (0.289), handling of goods separation (0.231), and route flexibility (0.163). These findings indicate that a company's ability to adjust delivery capacity to customer needs is a crucial aspect for maintaining efficiency and responsiveness to changes in market demand. In the Cost Measurement attribute, the shipping cost per kilometer indicator (0.379) has the highest weight, followed by claims for costs to be paid (0.313) and the additional cost index (0.308). These results indicate that transportation cost efficiency is a top priority in supply chain cost management.

The final attribute, Asset Management Efficiency, the cash-to-cash cycle time indicator (0.479) has the greatest influence, followed by the utilization of special-purpose equipment (0.313) and outstanding accounts payable (0.208). These findings indicate that a company's ability to accelerate cash turnover plays a significant role in maintaining financial efficiency and liquidity. Overall, the weighting results show that PT X focuses on improving cost efficiency, service speed, and asset management. However, the reliability and flexibility aspects still need to be strengthened so that the company's supply chain remains stable, adaptive, and able to compete in the face of dynamic market changes.

4. Conclusion

Based on the KPI weighting results using the SCOR model, each attribute has a different level of influence on PT X's supply chain performance. For the Reliability attribute, operator reliability has the highest weight (0.251), followed by service failure (0.250) and geographical coverage (0.231). This means that the reliability of operators in maintaining service quality is a key factor in improving the company's distribution performance. The level of damage (0.158) and customer reference value (0.108) have a smaller influence. In the Responsiveness attribute, the number of deliveries responded to on time (0.694) has the highest weight, showing that timeliness is the main factor in maintaining customer satisfaction. The response delay index (0.306) is less influential, meaning that response speed still needs improvement. For Flexibility, load flexibility ranks the highest (0.317), followed by capacity utilization (0.289), handling of goods separation (0.231), and route flexibility (0.163). This shows that the company's ability to adjust delivery capacity according to customer needs is very important for efficiency and responsiveness. In the Cost attribute, shipping cost per kilometer has the highest weight (0.379), followed by claims as a percentage of costs (0.313) and the additional cost index (0.308). This means that transportation cost efficiency is the main focus in managing overall costs. Finally, in Asset Management Efficiency, cash-to-cash cycle time has the highest influence (0.479), followed by use of special-purpose equipment (0.313) and outstanding accounts payable (0.208). This shows that faster cash flow is very important for maintaining financial stability and liquidity. Overall, the results show that PT X focuses on cost efficiency, service speed, and asset management, but still needs to strengthen reliability and flexibility to remain competitive in a dynamic logistics market.

Reference

[1] B. Fahimnia, "Green supply chain management: A review and bibliometric analysis," *Int. J. Prod. Econ.*, vol. 162, pp. 101–114, 2015, doi: https://doi.org/10.1016/j.ijpe.2015.01.003. https://doi.org/10.1016/j.ijpe.2015.01.003

[2] R. L. C. A. Márcia Maria Penteado Marchesini, "Logistics activities in supply chain business process. A conceptual framework to guide their implementation," *he Int. J. Logist. Manag.*, pp. 6–30, 2016, doi: https://doi.org/10.1108/IJLM-04-2014-0068. https://doi.org/10.1108/IJLM-04-2014-0068

[3] V. Maruna, T. Mercer, I. Ze, B. Periši, and P. Bjeljac, "The Business Process Transformation Framework Implementation through Metamodel Extension," no. April, 2016.

[4] G. Erik, "The Sustainability Balanced Scorecard : A Systematic Review of Architectures Publication date : The Sustainability Balanced Scorecard : A Systematic Review of Architectures Erik G . Hansen * Leuphana University of Lüneburg Innovation Incubator and Centre for Sustainability Management (CSM) Scharnhorststr . 1 , D-21335 Lüneburg , Germany Stefan Schaltegger Leuphana University of Lüneburg Centre for Sustainability Management (CSM) Scharnhorststr . 1 , D-21335 Lüneburg , Germany Acknowledgements We are thankful for the valuable contributions by various discussants in our paper session on performance management at the British Academy of Management Conference 2013 as well as two anonymous reviewers . Further , we appreciate the intense discussions with Professor Sven Modell and Roger Burritt on an earlier version of the paper .," 2016, doi: 10.1007/s10551-014-2340-3. https://doi.org/10.1007/s10551-014-2340-3

[5] E. N. Ntabe, A. D. M. L. LeBel, and L. A. Santa-Eulalia, "A systematic literature review of the supply chain operations reference (SCOR) model application with special attention to environmental issues," *Int. J. Prod. Econ.*, vol. 169, pp. 310–332, 2015, doi: https://doi.org/10.1016/j.ijpe.2015.08.008. https://doi.org/10.1016/j.ijpe.2015.08.008

[6] L. Ziora, "THE APPLICATION OF BUSINESS INTELLIGENCE SYSTEMS IN LOGISTICS . REVIEW OF SELECTED PRACTICAL Input data," *SCIENDO*, vol. 1, no. 1, pp. 1028–1035, 2019, doi: 10.2478/czoto-2019-0130. https://doi.org/10.2478/czoto-2019-0130

[7] K. Selviaridis and M. Spring, "Third party logistics : a literature review and research agenda," *Int. J. Logist. Manag.*, no. May 2007, 2015, doi: 10.1108/09574090710748207. https://doi.org/10.1108/09574090710748207

[8] T. C. . C. Lai, Kee-Hung, E.W.T Ngai, "An empirical study of supply chain performance in transport logistics," *Int. J. Prod. Econ.*, vol. 87, no. 3, pp. 321–331, 2004, doi: https://doi.org/10.1016/j.ijpe.2003.08.002. https://doi.org/10.1016/j.ijpe.2003.08.002

[9] Ö. Özkanlısoy, "Measuring Supply Chain Performance as SCOR v13.0-Based in Disruptive Technology Era: Scale Development and Validation," *logistics*, 2023. https://doi.org/10.3390/logistics7030065

[10] E. Nugraha, “Development Strategies Analysis Using the SCOR Method : A Case Study from a Medical Device Company,” *J. Theor. Appl. Manag.*, vol. 15, no. 1, 2022. https://doi.org/10.20473/jmtt.v15i1.34441

[11] C. O. Doaly, P. Moengin, and G. Chandiawan, “Pemilihan Multi-Kriteria Pemasok Department Store Menggunakan Metode Fuzzy Ahp Dan Topsis,” *J. Ilm. Tek. Ind.*, vol. 7, no. 1, pp. 70–78, 2019, doi: 10.24912/jitiuntar.v7i1.5037. https://doi.org/10.24912/jitiuntar.v7i1.5037

[12] D. J. C. Sihombing, A. J. Santoso, and S. Rahayu, “Model Perangkingan Proyek Kontruksi Pada Asosiasi Kontraktor Menggunakan Fuzzy AHP,” *Sci. J. Informatics*, vol. 2, no. 1, pp. 73–81, 2016, doi: 10.15294/sji.v2i1.4531. https://doi.org/10.15294/sji.v2i1.4531

[13] C. O. Doaly, P. Moengin, and G. Chandiawan, “PEMILIHAN MULTI-KRITERIA PEMASOK DEPARTMENT STORE,” *J. Ilm. Tek. Ind.*, vol. 7, no. 1, pp. 70–78, 2019. https://doi.org/10.24912/jitiuntar.v7i1.5037

[14] A. G. and P. K. Rajesh Kr. Singh, “Third party logistics (3PL) selection for cold chain management: a fuzzy AHP and fuzzy TOPSIS approach,” *EconPapers*, vol. 267, no. 1, p. 553, 2018, doi: 10.1007/s10479-017-2591-3. https://doi.org/10.1007/s10479-017-2591-3

[15] R. V. Vargas, “Using the Analytic Hierarchy Process (AHP) to Select and Prioritize Projects in a (AHP) TO SELECT AND PRIORITIZE PROJECTS IN A PORTFOLIO,” no. January 2010, 2016.

[16] Y. A. Kusuma, L. Ardyansah, and D. S. Avandy, “Management of ABC project through performance measurement and strategy improvement determination,” *TEKNOSAIN J. Sains, Teknol. dan Inform.*, vol. 12, no. 2, 2025. https://doi.org/10.37373/tekno.v12i2.1554