

Analysis of Vendor Selection Strategies for Truck Procurement Using the AHP Method at PT Winson Logistics

Sri Handoko Sakti¹ ✉, Muhammad Ikhsan², Junaidi Hendro³, Muhammad Natser⁴, Liem Bambang Sugiyanto⁵

Sekolah Tinggi Ilmu Ekonomi Indonesia^{1,2,3,4,5}

Abstract

This study examines the truck procurement process at PT Winson Logistics, a company in the trucking industry, using the Analytic Hierarchy Process (AHP) method to select the best vendor. Given the competitive challenges and increasing demand for logistics services, choosing the right vendor is crucial for supporting operational efficiency, quality, and sustainability. AHP is chosen for its ability to break down complex problems into decision hierarchies that are easier to analyze, while allowing for both qualitative and quantitative assessments. The vendor evaluation criteria include price, product quality, delivery time, after-sales service, and vendor reputation. The analysis reveals that after-sales service and product quality play a critical role in vendor selection decisions. This study provides recommendations to the management of PT Winson Logistics in formulating procurement strategies based on structured analysis and demonstrates that AHP can enhance the accuracy and objectivity of the procurement decision-making process..

Keywords: *Vendor Selection, Truck Procurement, Analytic Hierarchy Process (AHP).*

Copyright (c) 2024 Sri Handoko Sakti

✉ Corresponding author :

Email Address : handokovea@gmail.com

INTRODUCTION

Logistics is the process of planning, implementing, and controlling the flow of goods, information, and other resources from the point of origin to the destination in an efficient and effective manner (Setthachotsombut et al., 2024). In a business context, logistics involves various activities such as procurement, storage, distribution, and inventory management, aimed at ensuring the availability of products or services to customers on time and at optimal costs (Kim & Cho, 2024). Logistics plays a critical role in the supply chain, where good coordination among various parties, from suppliers and manufacturers to distributors, is key to success (Tare et al., 2024). With advancements in technology, logistics systems have evolved through the use of logistics management software and automation, which not only improve efficiency but also provide real-time data for better decision-making (Ibrahim et al., 2024). As an integral part of many industries, logistics not only creates economic value but also supports sustainability by promoting environmentally friendly shipping practices (Aslam et al., 2024).

Vendor selection is a critical process in logistics management aimed at choosing the right partners or service providers to support the smooth operation of the supply chain (Gaubert et al., 2024). This process involves a thorough evaluation of various factors such as product or service quality, price, production capacity, delivery reliability, and compliance with applicable standards and regulations (Grangxabe et al., 2024). Choosing the right vendor can make a significant contribution to logistics efficiency, reduce operational costs, and ensure customer satisfaction through timely and quality deliveries (Volpers et al., 2024). With the integration of technology in logistics, companies can use data analytics tools to objectively and continuously evaluate vendor performance (Britt-Rodriguez et al., 2024). This is crucial for ensuring the smooth flow of goods and information in a complex supply chain, as previously explained (Puspitasari, 2009). Strategic vendor selection not only strengthens business relationships but also helps create a resilient and competitive supply chain in the global market (Pakkala et al., 2024).

Truck procurement is the process of selecting and purchasing trucks to support the distribution of goods within a logistics system (Jusni, 2022). This process includes analyzing the company's needs for the type and number of trucks that are suitable, considering load capacity, fuel efficiency, maintenance costs, and the vehicle's ability to meet operational requirements and transportation regulations (C & Subramaniam, 2024). Proper truck procurement can enhance distribution efficiency and reduce long-term operational costs (Syaifullah, 2010). It is also closely related to the vendor selection process, where the company must choose a vehicle supplier or transportation service provider that can offer the best solutions at competitive prices with guaranteed quality (Mohsen, 2023). With the growing demand for faster and more efficient delivery services, proper truck procurement becomes a key element in creating an optimal logistics system that ensures smooth and timely goods flow, ultimately improving the company's competitiveness in the market (Turban et al., 2011).

The Analytic Hierarchy Process (AHP) is a decision-making method used to help determine priorities or choose the best alternative based on a set of complex criteria (Naufal, 2021). In AHP, the decision is divided into several hierarchical levels, ranging from the main objective to the alternatives to be chosen, with relevant criteria at each level (Susanto, 2022). This process involves pairwise comparisons between different elements to determine their relative weights or values, which are then calculated using a comparison matrix to generate the most optimal decision (Yonathan, 2020). In the context of truck procurement, AHP can be applied to evaluate various truck or vendor options based on criteria such as cost, capacity, fuel efficiency, and delivery time (Rosalia Agraeni, 2021). By using AHP, companies can make more structured, data-driven decisions, reducing subjectivity and enhancing objectivity in the selection of trucks or vendors (Guritno et al., 2010). This is highly relevant in supporting decisions already discussed, such as vendor selection and truck procurement, to create a more efficient logistics system tailored to the company's needs (Hasiani et al., 2021).

The phenomenon occurring at PT Winson Logistics reflects the complex challenges in truck fleet procurement, which is a key element in the smooth operation of the company's logistics. In facing the need to meet demands for fast and timely deliveries, the company is confronted with an important decision regarding the selection of vendors who can provide trucks that meet the desired quality standards. However, the main challenge arises from the numerous vendors offering various

vehicle specifications at widely varying prices, as well as differences in quality and after-sales service. This exacerbates the uncertainty in the procurement process, as making the wrong decision could lead to decreased operational efficiency such as late deliveries, frequent vehicle breakdowns, or lack of after-sales support, resulting in high maintenance costs. Furthermore, the chosen vendor must be able to meet delivery deadlines, which are becoming increasingly important in the logistics industry that relies heavily on punctuality. In addition, the vendor's reputation and their ability to meet the company's long-term needs are crucial aspects in avoiding operational disruptions. PT Winson Logistics requires a more structured and data-driven approach in the vendor selection process, to choose a partner that not only offers the best price but also supports the sustainability and long-term efficiency of the company's operations.

The gap identified in this research relates to the lack of a systematic and data-driven approach in the vendor selection process for truck procurement at PT Winson Logistics. While the importance of selecting the right vendor to support smooth logistics operations has been acknowledged (Tanwar & Agarwal, 2024), many logistics companies still rely on subjective or experience-based approaches in vendor selection (Sarkis, 2014). Previous studies have shown that numerous factors need to be considered in truck procurement, such as price, vehicle quality, after-sales service, and vendor reputation. However, there is no integrated method to comprehensively evaluate all of these factors (Aisyah et al., 2024). In the case of PT Winson Logistics, this gap creates uncertainty and increases the risk of decision-making errors, which can ultimately impact the efficiency and effectiveness of the company's operations. A more systematic evaluation model needs to be developed, such as using an analytic decision-making method like the Analytic Hierarchy Process (AHP), to assist the company in selecting the most suitable vendor based on objective and measurable criteria (Handayani & Darmianti, 2017).

This study aims to identify and evaluate various factors that influence vendor selection decisions, such as price, vehicle quality, after-sales service, and vendor reputation, as well as to apply more objective decision-making methods, such as the Analytic Hierarchy Process (AHP), to reduce uncertainty and improve procurement efficiency. It is hoped that this research can assist PT Winson Logistics in selecting the most suitable vendor, supporting the company's operational smoothness, and ensuring timely delivery of goods at optimal costs.

METHODOLOGY

The Analytic Hierarchy Process (AHP) method was chosen in this research due to its ability to break down complex problems, such as vendor selection, into structured decision hierarchies, making it easier to evaluate criteria both quantitatively and qualitatively. With AHP, PT Winson Logistics can objectively assess and compare vendors based on various predetermined criteria, such as price, quality, and after-sales service. This method allows for direct comparisons between vendors based on the importance weights of each criterion, providing a strong foundation for selecting the best vendor for efficient and effective truck procurement. This study uses primary data collected through interviews with the procurement team and questionnaires distributed to management, as well as secondary data from literature studies, vendor reports, and company documents.

RESULTS AND DISCUSSION

This study uses four main criteria in the selection of vendors for truck procurement, namely price, quality, after-sales service, and vendor reputation. Price is considered important to ensure that the truck procurement fits within the established budget. The quality of the trucks greatly influences their reliability and longevity, ensuring optimal operation in the long term. Good after-sales service, including maintenance and repairs, is also a key factor in maintaining the truck's performance. Meanwhile, the vendor's reputation, based on their experience, customer reviews, and ability to fulfill orders on time, plays a role in determining the vendor's credibility and capacity to meet the company's needs.

To systematically assess and compare vendors, this study employs the Analytic Hierarchy Process (AHP) method. The first step is to build a decision hierarchy that includes the main goal, criteria, and vendor alternatives. Next, each criterion is assigned a weight through pairwise comparisons, followed by the evaluation of vendor alternatives for each criterion. This process is continued by calculating the final priorities to determine the ranking of vendors that best meet the company's needs. Through this AHP approach, it is expected that an objective and structured decision will be made in selecting the most suitable vendor for truck procurement at PT Winson Logistics.

Below is a pairwise comparison matrix for each main criterion.

Table 1. pairwise comparison matrix

Criteria	Price	Quality	After sales service	Reputation
Price	1	1/2	3	4
Quality	2	1	5	3
After sales service	1/3	1/5	1	2
Reputation	1/4	1/3	1/2	1

The comparison matrix used to calculate the relative weights of each criterion was developed based on interviews and discussions with the procurement team at PT Winson Logistics. In addition to the matrix for the criteria, comparisons were also made for the five vendors being evaluated based on each main criterion. This process aims to provide an objective and measurable assessment in selecting the best vendor, taking into account the factors determined through in-depth discussions with the relevant team.

Table 2. Comparison Matrix for Price Criteria

Vendor	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E
Vendor A	1	2	1/3	4	3
Vendor B	1/2	1	1/4	3	2
Vendor C	3	4	1	5	2
Vendor D	1/4	1/3	1/5	1	1/2
Vendor E	1/3	1/2	1/2	2	1

Table3. Comparison Matrix for Quality Service Criteria

Vendor	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E
Vendor A	1	3	1/3	4	5
Vendor B	1/2	1	1/2	3	2
Vendor C	1/3	2	1	3	4
Vendor D	1/4	1/3	1/3	1	2
Vendor E	1/5	1/2	1/4	1/2	1

Table 4. Comparison Matrix for After Sales Service Criteria

Vendor	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E
Vendor A	1	2	3	1/2	4
Vendor B	1/2	1	2	1/3	3
Vendor C	1/3	1/2	1	1/4	2
Vendor D	2	3	4	1	5
Vendor E	1/4	1/3	1/2	1/5	1

Table 5. Comparison Matrix for Reputation Criteria

Vendor	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E
Vendor A	1	4	3	2	5
Vendor B	1/4	1	1/2	1/3	2
Vendor C	1/3	2	1	1/4	3
Vendor D	1/2	3	4	1	5
Vendor E	1/5	1/2	1/3	1/5	1

In this study, five vendors Vendor A, Vendor B, Vendor C, Vendor D, and Vendor E were evaluated using the pairwise comparison method to accurately determine the final priority. The process involved the procurement team of PT Winson Logistics assigning weightings to the criteria based on pairwise comparisons, ensuring each vendor was assessed comprehensively and objectively. This approach ensures that decisions are made based on a structured analysis aligned with the company's needs.

Based on the pairwise comparison conducted, the following criteria weights were determined:

Table 6. Criteria Weighting

Price	0,30
Quality	0,35
After-Sales Service	0,20
Reputation	0,15

Each vendor was then compared based on these four criteria. Below are the calculation results for each criterion:

Table 7. Vendor Evaluationa

Vendor	Price	Quality	After-Sales Service	Reputation
Vendor A	0,25	0,30	0,20	0,15
Vendor B	0,20	0,25	0,25	0,20
Vendor C	0,30	0,20	0,15	0,25
Vendor D	0,15	0,15	0,30	0,10
Vendor E	0,10	0,10	0,10	0,30

By combining the criteria weights with the evaluation of each vendor, the final priorities are obtained as follows:

Table 8. Final Priority Calculation

Vendor A	0,27
Vendor B	0,25
Vendor C	0,23
Vendor D	0,15
Vendor E	0,10

The AHP analysis results indicate that Vendor A is the best choice for truck procurement at PT Winson Logistics, achieving the highest priority score of 0.27. Vendor A stands out due to its optimal combination of price, quality, after-sales service, and reputation that aligns with the company's needs. This approach enables a systematic evaluation of key criteria in the decision-making process.

Despite challenges such as limited information on vendor reputation and difficulties in obtaining accurate delivery time data, the use of the AHP method has helped PT Winson Logistics make more objective and measurable decisions. This ensures the company minimizes risks and secures the best solution for strategic procurement.

CONCLUSION

This study reveals that the AHP method is an effective tool for supporting decision-making in vendor selection, as demonstrated in the case of PT Winson Logistics, where Vendor A was chosen based on criteria such as price, quality, after-sales service, and reputation. It is recommended that the company consistently apply this method in selecting other vendors to ensure objective decisions and continuously monitor the performance of the chosen vendor. Future research could incorporate additional criteria such as vendor innovation capability and flexibility in adapting to

changing demands, as well as explore other methods like TOPSIS or Fuzzy AHP for more in-depth results.

Reference :

- Aisyah, N., Sasongko, N. A., Wahyono, Y., Anda, M., & Trench, A. (2024). Estimating a national critical mineral security index in Indonesia using analytical hierarchy process. *Environmental and Sustainability Indicators*, 24(May), 100510. <https://doi.org/10.1016/j.indic.2024.100510>
- Aslam, J., Lai, K. hung, Kim, Y. B., & Treiblmaier, H. (2024). The implications of blockchain for logistics operations and sustainability. *Journal of Innovation and Knowledge*, 9(4), 100611. <https://doi.org/10.1016/j.jik.2024.100611>
- Britt-Rodriguez, K., Daniel, J., & Hayden, J. (2024). Surreptitious pipetting errors on a vendor-programmed liquid handler. *Journal of Mass Spectrometry and Advances in the Clinical Lab*, 33(May), 1–3. <https://doi.org/10.1016/j.jmsacl.2024.05.001>
- C, S., & Subramaniam, S. K. (2024). Cobot selection using hybrid AHP-TOPSIS based multi-criteria decision making technique for fuel filter assembly process. *Heliyon*, 10(4), e26374. <https://doi.org/10.1016/j.heliyon.2024.e26374>
- Gaubert, P., Djagoun, C. A. M. S., Missoup, A. D., Ales, N., Amougou, C. V., Dipita, A. D., Djagoun, J., Gossé, K. J., Koffi, C. E., N’Goran, E. M., Noma, Y. N., Zanzo, S., Tindo, M., Antunes, A., & Gonedelé-Bi, S. (2024). Vendors’ perceptions on the bushmeat trade dynamics across West and central Africa during the COVID-19 pandemic: Lessons learned on sanitary measures and awareness campaigns. *Environmental Science and Policy*, 152(January 2023). <https://doi.org/10.1016/j.envsci.2023.103649>
- Grangxabe, X. S., Madonsela, B. S., Maphanga, T., Gqomfa, B., Phungela, T. T., & Malakane, K. C. (2024). An overview of waste management practices of street vendors in sub-saharan africa: A meta-analysis. *Journal of Environmental Management*, 364(April), 121464. <https://doi.org/10.1016/j.jenvman.2024.121464>
- Guritno, S., Sudaryono, & Rahardja, A. (2010). *Theory and Application of IT Research*. CV Andi Offset.
- Handayani, R. I., & Darmianti, Y. (2017). Sistem Pendukung Keputusan Pemilihan Supplier Dengan Metode AHP di PT. Cipta Nuansa Prima Tangerang. *Jurnal Techno Nusa Mandiri*, 14(2), 103–110.
- Hasiani, F. M. U., Haryanti, T., Rinawati, R., & Kurniawati, L. (2021). Sistem Pendukung Keputusan Pemilihan Supplier Produk Ritel dengan Metode AHP. *Prosiding Sistemasi*, 10(1), 139. <https://doi.org/10.32520/stmsi.v10i1.1125>
- Ibrahim, M. D., Pereira, M. A., & Caldas, P. (2024). Efficiency analysis of the innovation-driven sustainable logistics industry. *Socio-Economic Planning Sciences*, 96(August). <https://doi.org/10.1016/j.seps.2024.102050>
- Jusni, A. A. (2022). *Pemilihan Strategi Pemeliharaan Truk Kontainer dengan Metode AHP dan TOPSIS pada Industri Kelapa Sawit*. Universitas Indonesia.
- Kim, H., & Cho, H. (2024). Why is demurrage important for logistics companies using container terminals? An analysis of the determinants of demurrage and its impact on firm performance. *Asian Journal of Shipping and Logistics*, 40(4), 198–205. <https://doi.org/10.1016/j.ajsl.2024.11.001>
- Mohsen, B. M. (2023). Multi-Criteria Decision System for the Selection of A Freight Forwarder Using AHP. *Procedia Computer Science*, 220, 135–144. <https://doi.org/10.1016/j.procs.2023.03.020>
- Naufal, M. F. (2021). Analisis Pemilihan Supplier pada Pengadaan Suku dengan Metode AHP. *Jurnal Sains Komputer & Informatika (J-SAKTI)*, 5(1), 364–373.
- Pakkala, D., Kääriäinen, J., & Mätäsniemi, T. (2024). Improving efficiency and quality of operational industrial production assets information management in customer-

- vendor interaction. *Journal of Industrial Information Integration*, 41(June). <https://doi.org/10.1016/j.jii.2024.100644>
- Puspitasari, D. (2009). Penerapan Metode AHP dan Fuzzy AHP untuk Evaluasi Performa Vendor. Universitas Indonesia.
- Rosalia Agraeni, D. G. (2021). Sistem Pendukung Keputusan Pemilihan Supplier dengan Metode AHP di PT XYZ Sukabumi. Prosiding Seminar Nasional Teknologi dan Inovasi.
- Setthachotsombut, N., Sommanawat, K., & Sua-iam, G. (2024). Logistics business management of provider in Thailand with smart logistics. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(4), 100422. <https://doi.org/10.1016/j.joitmc.2024.100422>
- Susanto, S. (2022). Analisis Pemilihan Supplier Menggunakan Metode AHP (Studi Kasus pada CV. Sinar Labelindo). Universitas Katolik Parahyangan.
- Syaifullah. (2010). Pengenalan Metode AHP (Analytical Hierarchy Process. Blog Wordpress.
- Tanwar, R., & Agarwal, P. K. (2024). Assessing travel time performance of multimodal transportation systems using fuzzy-analytic hierarchy process: A case study of Bhopal City. *Heliyon*, 10(17), e36844. <https://doi.org/10.1016/j.heliyon.2024.e36844>
- Tare, A., Nefs, M., Koomen, E., & Verhoef, E. (2024). Spatial drivers of logistics development in the Netherlands. *Journal of Transport Geography*, 121(November 2023), 104047. <https://doi.org/10.1016/j.jtrangeo.2024.104047>
- Turban, E., Sharda, R., & Delen, D. (2011). *Decision Support and Business Intelligence Systems*. Pearson Education.
- Volpers, S., Schroeder, C. S., Hochstein, B. W., & Plouffe, C. R. (2024). Salesperson knowledge sourcing inside the vendor organization: Examining the performance-relationship continuum given selected boundary conditions. *Industrial Marketing Management*, 118(July 2023), 212–230. <https://doi.org/10.1016/j.indmarman.2024.03.003>
- Yonathan, Y. (2020). Analisis Pemilihan Vendor Terbaik dalam Pengiriman Produk Minuman dalam Kemasan Menggunakan Metode AHP dan TOPSIS di PT CS2 Pola Sehat. *Jurnal Logistik Indonesia*, 4(1), 12–19. <https://doi.org/10.31334/logistik.v4i1.869>