article category : Logistic Management

Analysis of Vendor Performance Appraisal In the Airfreight Export Division Using the Analytic Hierarchy Process Method

Lira Agusinta[1], Apsada Juhri[2], Peppy Fahrial[3], Mohammad Wisanggeni Ariohadi[4]

[1,2,3,4] Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia

ARTICLE INFORMATION	ABSTRACT
	The purpose of this study was to determine the results of measurements of the priority vendors of the two vendors used by the company in the process of shipping export goods or shipment. This study uses the AHP-Likert Scale (Analytic Hierarchy Process) method. Problem solving is done by making research using qualitative research methodology with descriptive elaboration. Data collection is done by giving or making questionnaires to get the weight of the assessment carried out by inferring with AHP and Likert from the data collected through questionnaires shared where the respondents came from respondents who have dedication and direct links as well as have the capability to provide vendor performance assessments. The results of the research that were tested from the level of consistency were divided into 4 criteria, namely; Price, Service, Quality and Reliability and from the results of the qualitative calculation method by distributing questionnaires from 10 experts for two existing vendors, namely MSA Kargo and Andima, where MSA Kargo got a weight value of 22.84 and Andima got a weight value of 10.66.

Corresponding Author:

Apsada Juhri
Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia
Email: pascasarjana@itltrisakti.ac.id

INTRODUCTION

DHL Global Forwarding is a company that is worldwide and has branches in almost all countries and in its line of business this company is engaged in freight forwarding and its daily activities are closely related to the process of exporting and importing goods between countries, and seeing the current developments in the industrial world, it must be admitted that every company has been demanded with the right moving speed in conducting product or service reviews provided to its customers in their daily activities. Every activity that occurs in one place can have an effect on a party in another place and in addition to activities that continue to be considered to anticipate market needs, companies must also improve efficiency and effectiveness. Efficiency is the accuracy of the way (work effort) of doing something without wasting time, effort and money [1]. From this it can be concluded that efficiency is a way to carry out an activity cheaply, easily and quickly while effectiveness is a way to carry out an activity correctly and correctly according to the purpose. The ultimate goal of assessing DHL Global Forwarding efficiency in practical terms is to maximize the productivity and effectiveness of processes or operations while minimizing the resources and costs required. This leads to improved performance, reduced waste, and better overall cost-effectiveness [2], [3].

DHL Global Forwarding, whose daily activities are very closely related to the activity of shipping exports and imports of goods between countries, it has become a demand that customer satisfaction is the main thing to take precedence. The corporate culture that is oriented towards customer satisfaction is very strong in this company, and this also applies to vendors who work together where an assessment will be carried out covering the criteria price, service, quality, reliability. AHP method was developed by Thomas L. Saaty, a mathematician. This method is a framework for making decisions effectively for the complex issue by simplifying and speeding up the decision-making process by solving the problem into its parts, arranging these parts or variables in a hierarchical arrangement, giving numerical scores to subjective judgments about the importance of each variable and synthesizing these considerations to determine which variable has the highest priority and act to influence the outcome of the situation [4], [5].

AHP method helps solve complex problems by structuring a hierarchy of criteria, interested parties, results and by drawing various considerations to develop weight or priority. This method also combines the strengths of the feelings and logic involved in various problems, then synthesizes various considerations into results that match our estimation intuitively as presented at the consideration that has been made [6]. Here are some common highlights of problems faced in the airfreight export division Regulatory Compliance is Navigating complex customs regulations and ensuring all documentation is accurate can lead to delays and penalties, Capacity Constraints is Limited cargo space on flights, especially during peak seasons, can result in increased costs and difficulty securing bookings. Cost Fluctuations is Volatile fuel prices and sudden changes in freight rates can impact budgeting and pricing strategies. Security Regulations is increased security measures can slow down processing times and require additional resources for compliance. Infrastructure Limitations is inadequate facilities or technology at airports can hinder efficient handling and processing of cargo. Weather Disruptions is adverse weather conditions can lead to flight delays or cancellations,

affecting delivery schedules. Supply Chain Disruptions is global events, such as pandemics or geopolitical tensions, can cause significant disruptions in supply chains [7], [8].

There are 2 vendors that work together with DHL Global Forwarding, namely MSA Kargo and Andima where in their activities their performance is monitored and maintained according to the criteria mentioned above. Performance appraisal is a formal system for reviewing and viewing and evaluating periodically one's performance and criteria [9], [10]. Performance appraisal as a way to measure the contribution of individuals (employees) to the organization where they

work [11]. By integrating these appraisal methods, DHL Global Forwarding can ensure that their partners, MSA Kargo and Andima, consistently meet the required performance standards and contribute to the overall success of the logistics operations. The foundational work on AHP offers detailed methodologies for structuring and analyzing complex decision-making problems, including vendor selection and performance evaluation [12], [13].

The research model image of the researcher formulates a hierarchy analysis model of relationships between variables as follows in figure 1.
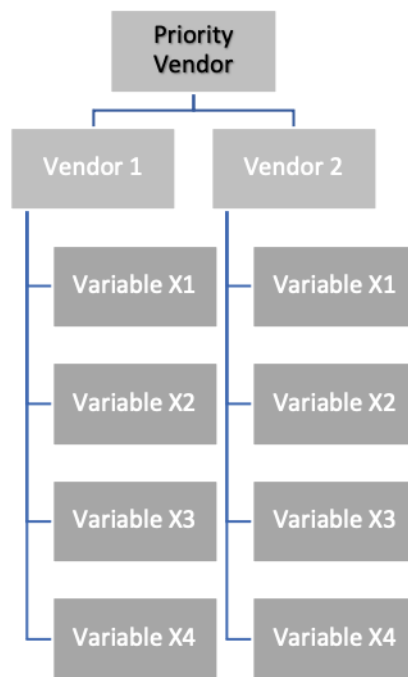

Figure 1. Research Paradigm

RESEARCH METHOD

The research method uses the AHP - Likert Scale method as the right method in getting superior vendors who are priorities, and this method is easy to understand and implement

where the AHP method itself is taken to obtain decisions from several problems or assessments that are multicriteria in nature. With the Likert Scale method to be able to measure attitudes and opinions by giving questionnaires to respondents where

respondents were asked to be able to complete the questionnaire in order to be able to indicate the level of approval of a series of questions given [14].

Research Population
The population in this study was all employees PT. DHL Global Forwarding Indonesia as many as 10 employees (Decision Maker).

Sample
All 10 employees (decision maker) were sampled (saturated samples).

Data Source
Research data were obtained using the survey method, by distributing questionnaires to respondents.

Data Collection Technique
The data collection method is carried out by the questionnaire method, the way it gives a questionnaire to the participants and instructs them to choose different responses from the five-option at questionnaire I and paired matrix menu for questionnaire II until questionnaire IV when responding to a question.

Data Analysis Technique
The data were analyzed using the Analytical Hierarchy Process method with the help of the SPSS for Windows version 26 program.

RESULT AND DISCUSSION

As stated in this study respondents totaled 10 employees consisting of men and women who were in PT. DHL Global Forwarding Indonesia. Determination of priority vendors from the assessment indicators which include 4 criteria, namely: price, quality, service and reliability. It can be concluded that MSA Cargo has the highest value even though it does not occur in every variable that is the object of determination. The results of the study show the priority value of each criterion and sub-criteria. where those with the highest results are then used as priority vendors and are also still required to continue to provide room for improvement for vendors who have scores that are still below the average.

The calculation of the weight of the results of the questionnaire given to the respondents showed various results as shown below in table 1, and the highest partial weight for the criteria was price. From the summarized criteria data which is done with the five options by questionnaire I, the average respondent thinks that the criteria and sub-criteria listed in the questionnaire are important to be used as vendor evaluation criteria. The results of the average respondent's rating are 3.6, which shows that all criteria are important and can be included in the paired matrix.

Table 1. Criteria Data Questionnaire 1

Variable	Average	Total
Price		
Appropriateness and appropriateness of the price for the services provided	3.4	34
Ability to grant discounts	3.3	33
Quality		
Conformity of services provided with company specifications (KPI = Key Performance Indicator).	3.4	34

Variable	Average	Total
Ability to anticipate work accidents	3.2	32
Ability to provide consistent service levels	3.4	34
Service		
Ease of access to communication	3.2	32
Speed in responding (response)	3.3	33
Ability to present clear and easy-to-understand information	3.2	32
Reliability		
The ability to deliver goods according to time and place	3.5	35
Ability to handle problems in the field	3.6	36

From the summarized criteria data which is done with the paired matrix by questionnaire 2, it can be seen in table 2 below that price has the largest percentage with 0.29 or 29% of the four criteria used. And the other three criteria also have a percentage above 0.10 or 10%. This shows that the four criteria have an important role as well.

Table 2. Criteria Data Questionnaire 2

Criteria	Partial Weight	Sub-Criteria	Partial Weight
Price	0.29	Appropriateness and appropriateness of the price for the services provided	0.50
		Ability to grant discounts	0.50
Quality	0.23	Conformity of services provided with company specifications (KPI = Key Performance Indicator).	0.25
		Ability to anticipate work accidents	0.29
		Ability to provide consistent service levels	0.47
Service	0.28	Ease of access to communication	0.34
		Speed in responding (response)	0.39
		Ability to present clear and easy-to-understand information	0.28
Reliability	0.19	The ability to deliver goods according to time and place	0.50
		Ability to handle problems in the field	0.50

Price

Price is one of the important things monitored by the company. Based on the results of the questionnaire, the highest result was obtained, namely 0.29 or 29%. From the results of the analysis it can be described the proportion of the weighting of the price sub-criteria:

- Appropriateness of the price for the services provided = 0.50
- Ability to provide discounts = 0.50

Quality

Quality is one of the important things monitored by the company. Based on the results of the questionnaire, the third result was 0.23 or 23%. From the results of the analysis it can be described the proportion of the weighting of the quality sub-criteria:

- Conformity of services provided with company specifications (KPI) = 0.25
- Ability to anticipate work accidents = 0.29
- Ability to provide consistent service levels = 0.47

Services

Service is one of the important things monitored by the company. Based on the results of the questionnaire, the second result was 0.28 or 28%. From the results of the analysis it can be described the proportion of the weighting of the service sub-criteria:

- Access to communicate = 0.34
- Speed in responding = 0.39
- Ability to present clear and easy-to-understand information = 0.28

Reliability

Reliability is one of the important things monitored by the company. Based on the results of the questionnaire, the fourth result was 0.19 or 19%. From the results of the analysis it can be described the weighting proportion of the time sub-criteria as follows:

- Ability to deliver goods according to time and place = 0.50
- Ability in handling problems in the field = 0.50
- Analysis of Expert Responses in Priority Vendor Criteria as follows in table 3.

Table 3. Priority Vendor Criteria

Sub-Criteria	Rating			Weight Score	
	MSA	Andima	Weight	MSA	Andima
Appropriateness and appropriateness of the price for the services provided	0.69	0.31	3.4	2.35	1.05
Ability to grant discounts	0.66	0.34	3.3	2.16	1.14
Conformity of services provided with company specifications (KPI)	0.69	0.31	3.4	2.35	1.05
Ability to anticipate work accidents	0.57	0.43	3.2	1.82	1.38
Ability to provide consistent service levels	0.72	0.28	3.4	2.46	0.94
Ease of access to communication	0.69	0.31	3.2	2.22	0.98
Speed in responding (response)	0.70	0.30	3.3	2.31	0.99
Ability to present clear and easy-to-understand information	0.57	0.43	3.2	1.81	1.39
The ability to deliver goods according to time and place	0.77	0.23	3.5	2.71	0.79
Ability to handle problems in the field	0.73	0.27	3.6	2.63	0.97
				22.84	10.66

The method used is to combine the results of questionnaire 1 (at the level of importance) with the results of questionnaire 2 until questionnaire 4 (on

the comparison chart). The results of the first questionnaire will be used as the weight component, while the results from the 4 questionnaire will be used as the rating component. The multiplication of the two produces a weight score which will be calculated for each level at the vendor.

From the results of the assessment carried out, it is necessary to determine the maximum value and minimum value because the results of the assessment are not integers with the aim of grouping the assessment intervals. The maximum score is obtained if all assessments are scored 4 while the minimum score is obtained if all assessments are scored 1. The following is a summary of the grouping of assessments carried out:

- Maximum Value : 27.33
- Minimum Score : 3.20
- Value Range (Max – Min): 24.00
- Value of Each Interval (Range/n): 6.00

Author group of vendor ratings as follows in table 4.

Table 4. Score Vendor Ratings

Interval	Range	Result
1	3.20 s/d 9.20	Not Good
2	9.21 s/d 15.21	Pretty Good
3	15.22 s/d 21.22	Good
4	21.33 s/d 27.33	Very Good

Author group of vendor ratings as follows. And from the final results obtained according to the information mentioned above, it is concluded that MSA Kargo has the highest score with the following values in table 5.

Table 5. Value Vendor

Interval	Vendor	Mark	Result
1	MSA	22.84	Very Good
2	Andima	10.66	Pretty Good

The score of 10.66 for Andima, while still good, is lower compared to MSA Kargo. This implies that Andima is ranked below MSA Kargo in the performance evaluation. Based on the scores and the intervals provided MSA Kargo should be considered the preferred vendor due to its higher score and superior rating. This implies that MSA Kargo is the top-performing vendor among those assessed, making it a better choice for the criteria evaluated. Andima, while still performing well, is rated lower and might not meet the same high standards as MSA Kargo. Depending on the decision criteria and business needs, Andima might still be a viable option but not the top priority [15], [7].

CONCLUSION

Based on the results of research and discussion, the following conclusions can be drawn, MSA is a very good vendor for the period March 2021 while Andima can further improve its performance in the future. This research provides recommendations for using AHP (Analytic Hierarchy Process) – This Likert Scale is because the preparation of research is easier withbased on the opinion or

selection of experts or experts in the company wheredevoted to the Purchasing and Procurement, Quality, Operations, Custom Clearance and Finance. Combining AHP with the Likert Scale provides a comprehensive and structured approach to decision-making. It leverages expert opinions while maintaining an objective and systematic process, making it suitable for complex evaluations like vendor prioritization. This methodology ensures that decisions are informed by both qualitative judgments and quantitative analysis To realize the performance improvement of this vendor, of course it is also needed make a commitment from each of these departments for the best results. Besides that,needs to be focused on assessing what needs to be done first. For example, the results of the criteria questionnaire that are considered most important at this time are price and both services. So that you can focus on these two things which can then be seen in terms of which sub-criteria or indicators need improvement by the vendor who has problems. It can be effectively use AHP to maintain high vendor performance, encourage improvement where needed, and make informed, data-driven decisions in vendor management process.

REFERENCES

[1]   T. Anindita and M. T. Siregar, "Analytical hierarchy process (AHP) for selecting freight forwarder services to get minimum shipping cost for export goods," *International journal of innovation, creativity and change,* vol. 9, no. 5, pp. 270-284 %@ 2201-1323, 2019.

[2]   S. Gupta, G. Dangayach, A. K. Singh, and P. Rao, "Analytic hierarchy process (AHP) model for evaluating sustainable manufacturing practices in Indian electrical panel industries," *Procedia-Social and Behavioral Sciences,* vol. 189, pp. 208-216, 2015.

[3]   D. W. Bratzler, "Interview with a quality leader: Dale W. Bratzler, DO, MPH on performance measures. Interview by Jason Trevor Fogg," *Journal for Healthcare Quality: Official Publication of the National Association for Healthcare Quality,* vol. 32, no. 2, pp. 24-28, 2010.

[4]   Y. Boujelbene and A. Derbel, "The performance analysis of public transport operators in Tunisia using AHP method," *Procedia Computer Science,* vol. 73, pp. 498-508, 2015.

[5]   B. Render, J. Heizer, and C. Munson, *Principles of operations management: Sustainability and supply chain management*. Pearson, 2017.

[6]   S. Dozic, T. Lutovac, and M. Kalic, "Fuzzy AHP approach to passenger aircraft type selection," *Journal of Air Transport Management,* vol. 68, pp. 165-175, 2018.

[7]   D. E. Cahyono and H. C. Wahyuni, "Penilaian Teknologi Mengunakan Analytical Hierarchy Process Dan Teknometrik Di Departemen Produksi," *Jurnal Ilmiah Teknik Industri,* vol. 14, no. 2, pp. 122-129, 2015.

[8]   S. W. Pratiwi, A. Juhri, N. A. S. Nasution, N. Irenita, and T. Budiman, "Evaluating Analyses Trucking Vendor Performance in Covid-19 Vaccine Delivery: A Strategic Assessment Utilizing Analytic Hierarchy Process And Technic For Order Of Preference By Similarity To Ideal Solution Methodologies (Case Study: Indonesian Freight Forwarder's Role In 2020 Vaccine Shipment)," *Dinasti International Journal of Education Management & Social Science,* vol. 5, no. 6, 2024.

[9]   A. J. da Silva Neves and R. Camanho, "The use of AHP for IT project priorization–a case study for oil & gas company," *Procedia Computer Science,* vol. 55, pp. 1097-1105, 2015.

[10]   N. Yusuf and Y. Nursyanti, "Analisis Pergudangan Di Bagian Gudang Barang Jadi (Finishgoods) Pt Nipress Tbk Cileungsi Bogor," *Jurnal Manajemen Industri dan Logistik (JMIL),* vol. 1, no. 1, pp. 7-13 %@ 2598-5795, 2017.

[11]   A. R. Naufal, D. A. Nawangnugraeni, and M. Z. Abdillah, "Fuzzy-Analytical Hierarchy Process (F-AHP) untuk Menentukan Keluarga Tidak Mampu Akibat Covid-19," *Techno. Com,* vol. 21, no. 1, pp. 12-25, 2022.

[12]   C.-H. Chen, "A novel multi-criteria decision-making model for building material supplier selection based on entropy-AHP weighted TOPSIS," *Entropy,* vol. 22, no. 2, p. 259, 2020.

[13]   E. Darmanto, N. Latifah, and N. Susanti, "Penerapan metode AHP (Analythic Hierarchy Process) untuk menentukan kualitas gula tumbu," *Simetris: Jurnal Teknik Mesin, Elektro Dan Ilmu Komputer,* vol. 5, no. 1, pp. 75-82, 2014.

[14]   M. Güldeş, Ö. F. Gürcan, U. Atıcı, and C. Şahin, "A fuzzy multi-criteria decision-making method for selection of criteria for an e-learning platform," *Avrupa Bilim ve Teknoloji Dergisi,* no. 32, pp. 797-806, 2022.

[15]   H. Kurniawan, M. R. Tanjung, A. P. Swondo, E. P. Sari, and W. S. Negoro, "Decision Support System for Employee Performance Assessment for Administration Promotion Using Analytic Hierarchy Process," in *2021 IEEE 7th International Conference on Smart Instrumentation, Measurement and Applications (ICSIMA)*, 2021: IEEE, pp. 276-279.

BIOGRAPHIES OF AUTHORS

Author 1	
	Dr. Lira Agusinta, S.E., M.M is a Permanent Postgraduate Lecturer at the Trisakti Institute of Transportation and Logistics. Born in Jakarta 5 August 1964. Completed his final doctoral program at Pajajaran University in 2017. Subjects taught at Masters in Multimodal Marketing and Transportation Management and Basic Cargo at S1 FMB. Certificates that have been obtained between 2020 and now are Initial Dangerous Goods Type A and Certified Motivator Academy. Certified Trainer of Positive Thinking Trainer and Mental Block Therapy. Active as an administrator at the Indonesian Doctoral Gathering Forum DPW DKI Jakarta Province for the period 2021-2026 and administrator for the Indonesian Lecturer Association for the period 2022-2027

Author 2	
	Apsada Juhri is a practical lecturer at the Trisakti Institute of Transportation and Logistics. A practitioner in the world of supply chain, freight forwarding and warehouse with 10 years of experience, and has experience in leading an international logistics and warehousing organization for more than 5 years. Completed Bachelor's Degree Education at the Trisakti Institute of Transportation and Logistics and graduated in 2014 with Cumlaude predicate. Then proceed to Masters in Management at the Trisakti Institute of Transportation and Logistics and graduate in 2022 with Cumlaude predicate. The certifications held are Initial Dangerous Goods Type A and Certified International Freight Forwarding Manager.

Author 3	
	Mohamad Wisanggeni Ariohadi is a practical lecturer at the Trisakti Institute of Transportation and Logistics. A practitioner in the world of freight forwarding and logistics with 27 years of experience, and has experience in leading an organization in various strategic managerial level positions in several local and multinational logistics companies and state-owned companies for 23 years. Completed his Diploma IV and Strata 1 education at the Trisakti Institute of Transportation and Logistics and then continued his Masters in Management education until he obtained a Doctorate degree with a cum laude graduation in the Logistics Management specialization in 2022. In the field of expertise related to customs, he also attended customs education and has also received a Customs Expert certificate issued by the Customs & Excise Education Institute.

Author 4	
	Peppy Fachrial is an assistant professor at the Trisakti Institute of Transportation and Logistics. He completed his bachelor's degree in Geological Engineering at the Faculty of Technology, Trisakti University. He went on to complete a Master's Degree in Human Resource Management at Padjadjaran University and finally completed his Doctoral Degree in Managerial Studies with a concentration in Human Resources Management at Jakarta State University. Apart from experienced academics, Peppy Fachrial has more than 23 years of professional experience. Practitioner experience in Strategic Management, Human Resources and Organizational management where he was involved in various managerial management processes, including organizational behavior & development, Talent Management, Organizational Culture, change management and transformation in various sectors, such as mining, energy, manufacturing, heavy equipment , Financial Institutions, Logistics and transportation.