

Third Party Logistic Selection Analysis with the Analytical Hierarchy Process

(A Case Study on PT Pro Health International)

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Abstract—This research aims to understand how to determine third party logistic at PT. Pro-Health International using Analytical Hierarchy Process (AHP) method. Sampling technique used nonprobability sampling with saturated sampling method, because AHP method require depend on the group of experts as according to relevant specialist in decision making so that all members of eligible population are used as sample. Related respondent must to know third party logistic performance which serve as an alternative choice, then the respondent is determined as many as six persons. AHP method is done through five steps (to construct a hierarchical structure of the problem, to make a matrix of pairwise comparison, calculate the weight/priority of each criterion, then calculate the weight/priority of each alternative choice, and to make a choice). The final rating of relative importance third party logistic selection criteria was found: priority I is price (0,289), priority II is punctuality (0,210), priority III is access (0,181), priority IV is communication (0,175), and priority V is responsiveness (0,144). The final rating of relative importance alternative was found: first priority is DHL (0,390), second priority is FedEx (0,359), and the last priority is TNT (0,250). From this result, we can suggest if company will develop partner relationship, majored to chosen DHL as the third logistic party, because DHL third party logistic with the highest overall value.

Keywords—AHP; third party logistic selection; price; punctuality; access

I. INTRODUCTION

In the business world, every policy must be decided by decision makers carefully, including in making decisions when choosing partners. Most companies need work partners in terms of shipping goods, distribution of goods, and other logistics activities. Goods delivery service providers can usually be referred to as third party logistics (abbreviated third party logistics) abbreviated as third party logistic. 3PL is one of the important things in corporate activities such as pharmaceutical companies, where the company is often involved in export-import activities and product delivery activities to each branch.

The use of the Analytic Hierarchy Process (AHP) method in the process of selecting partners is expected to reduce the behavior of corruption in the company, with AHP calculation,

the selection of partners is more transparent [1, 2] because the decisions are based on logical calculations, so the company can find partners in this company delivery services that are truly optimal for PT. Pro-Health International. AHP is a decision-making method developed for giving priority to several alternatives when several criteria must be considered. This method includes qualitative and quantitative measures, and allows decision makers to arrange complex problems into a hierarchical form or series of integrated levels [3].

AHP is an ideal method to provide an alternative ranking / sequence when the criteria in decision making are very varied [3]. Some criteria that are influential and commonly used in the selection of shipping service companies include price criteria with sub criteria, lower prices, price suitability with benefits gained, company reputation, convenience, delivery criteria with timely delivery criteria, secure delivery process, criteria for long-term cooperation with discount sub-criteria for members, service quality criteria and information technology criteria with sub-criteria for easy tracking of goods, and ease of online transactions. Almost similar criteria are also faced with PT. Pro-Health International in determining the best shipping service company. PT. Pro-Health International is a company engaged in pharmacy as a provider of medical devices. The aim of this company is to achieve mutual success through strong partnerships based on high quality products (medical equipment) from various countries [4].

In the AHP method, the criteria are usually arranged in a hierarchical form. The criteria in this study are the criteria used by companies in choosing a shipping service company. Electoral problems are arranged in three hierarchical levels. At the highest level of the hierarchy, stated the goals, the objectives of the system that are sought solutions. The next level is the elaboration of these objectives, namely the criteria that must be considered in decision making. The lowest level is the alternative choices to be chosen [3].

In order to be easily understood, the hierarchy concept described above is outlined in the picture below.

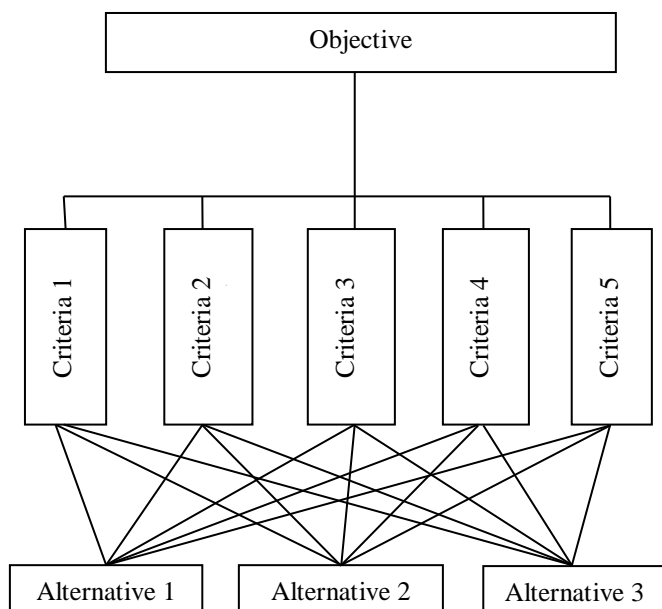


Fig. 1. Structure Hierarchy AHP

Service is any action or activity that can be offered by a party to another party, basically intangible and does not result in any ownership transfer [5]. Based on this understanding it can be concluded that services are economic activities with intangible out-put offered by service providers namely a service company to service users, whether individual consumers or other companies. Service characteristics are a characteristic of services offered by a party to another party that functions to differentiate from goods [5]. The quality of service is an expected level of excellence and control over the level of excellence to meet customer desires [6]. Kotler revealed that there were five dominant factors or determinants of service quality, including tangible, reliability, responsiveness, assurance, empathy [5]. However, according to Tjiptono there are ten main factors that determine the quality of service that can be used in the analysis, including reliability, responsiveness, competence, access, courtesy, communication, credibility, understanding [6]. In addition to the ten main factors that determine the quality of services above, based on some literature there are the most influential criteria in choosing a shipping service company, namely the price criteria. Price is the amount of money that must be paid by customers who want to get an item or service [5].

Analytical hierarchy process (AHP) was developed by Thomas L. Saaty in the 1970s. This method is one of the multi-criteria decision-making models that can help the human frame of mind become organized so that it is possible to make effective decisions on the problems faced [3]. AHP is a decision-making method developed to give priority to several alternatives when several criteria must be considered, and allow decision makers to arrange problems into an integrated hierarchy or series of levels, then enter numerical values instead of human perceptions in making comparisons. Furthermore, these values are processed systematically so as to produce logical priorities [3]. AHP is often used in solving

alternative determination problems, priority setting, policy selection, optimization, and performance measurement [3].

II. METHOD

A. Design

The research conducted is a case study design. Case studies include in-depth and contextual analysis of similar situations in other organizations. The method chosen is the method of analytical hierarchy process (AHP). This method was chosen because it was able to solve problems and provide decision-making solutions in the selection of freight forwarding companies at PT. Pro-Health International. The population consists of objects or subjects that have certain qualities and characteristics set by the researcher to be studied and then drawn conclusions [7]. Therefore, the AHP method requires dependence on a group of experts according to the type of specialists involved in decision making, then the selected respondents must also represent parties who have decision-making authority. In this study are managers related to the selection of shipping or expedition service companies. The researcher conduct depth interview, observation and literature research as a method collecting data.

The selected respondents are as many as 6 people from the entire population, so it can be concluded that the sampling technique in this study is nonprobability sampling with saturated sampling method [8, 9]. Saturated sampling is a sample determination technique if all members of the population are used as samples [7]. Based on Table 1, the scale used to measure the research instrument is a scale developed by Saaty with the aim of forming an initial matrix pattern as the basis for pairwise comparisons in the AHP method [3].

TABLE I. CRITERIA AND RESEARCH ALTERNATIVE

Objective	Criteria	Alternative
Selection of the right shipping service for PT. Pro-Health International	In the price criteria which alternative is superior	Fedex
		DHL
		TNT
	On the timeliness criteria which alternative is superior	Fedex
		DHL
		TNT
	On the timeliness the alternative criteria is superior	Fedex
		DHL
		TNT
	In which alternative access criteria are superior	Fedex
		DHL
		TNT
	In which alternative communication criteria are superior	Fedex
		DHL
		TNT

The next step in the analysis is to test the consistency ratio. Ratio consistency indicates the level of consistency of decision makers in pairwise comparisons. Consistency ratios also reflect the quality of decisions or choices. If the value of the consistency ratio is greater than 0.10, it indicates that the decision maker must re-evaluate its response to filling out the questionnaire. However, if the value of consistency ratio is

smaller or equal to 0.10, the comparison of the results of filling out the questionnaire can be said to be consistent so that the evaluation value of the factors (criteria) can be accepted [3].

B. Data Analysis Technique

Data processing in the AHP method can be done manually using Microsoft excel or with the help of expert choice software. However, in this study data processing was done manually using Microsoft Excel. Presentation of data in the form of calculation tables, starting from the initial matrix table to calculating the weight of priority determination in the AHP method. Data analysis used in this research is AHP method. The steps in selecting a freight forwarder / freight forwarding company using the AHP method are as follows:

1) *Develop a hierarchical structure of problems:* To explain the application of the AHP method, it starts by making a lay-out of the entire hierarchy of decisions. The decision hierarchy in AHP has three different levels. The top level explains the entire decision, namely choosing the best shipping / expedition service company for PT. Pro-Health International. The middle level in the hierarchy explains the general factors / criteria in choosing a shipping / expedition service, including criteria for price, timeliness, company reputation, safety and comfort. The lowest level of the decision hierarchy shows the alternatives, Fedex, DHL and TNT.

2) *Create a pairwise comparison matrix:* Pairwise comparison is the most important aspect in using AHP. Pairwise comparisons are done by comparing two different alternatives using a scale that varies from equally preferred to extremely preferred.

3) *Calculate the weight / priority of each criteria:* Calculate the weight / priority of the predetermined criteria, namely the criteria of price, timeliness, company reputation, security, and comfort.

4) *Calculate the weight / priority of each alternative choice:* The same calculation as the above step is done to determine the evaluation value of each alternative choice for each criterion that becomes a consideration in determining the decision.

5) *Determine choices:* After knowing the weight of each criterion and the weight of each alternative, then the alternative is chosen with the highest overall value, which is the total number of alternative weights multiplied by the criteria weight.

III. RESULTS AND DISCUSSION

A. Finding and discussion

The finding revealed that the most influential criteria in the selection of shipping services at PT. Pro-Health International is a price criterion with a weight of 0.289. The second criterion that is influential is the timeliness criteria with a weight of 0.210. The third criterion that is influential is the access criteria with a weight of 0.181. The fourth criterion that

influences is the communication criteria with a weight of 0.175, and the fifth criterion that influences is the criteria for responsiveness with a weight of 0.144. Based on the price criteria, alternative 2 (DHL) occupies the first priority with a weight of 0.385, the second priority is alternative 1 (FedEx) with a weight of 0.336, and the last priority is alternative 3 (TNT) with a weight of 0.278. The best alternative choice for the timeliness criteria in a row is alternative 2 (DHL) with a weight of 0.385, alternative 1 (FedEx) with a weight of 0.330, and alternative 3 (TNT) with a weight of 0.284. In the access criteria, alternative 2 (DHL) with a weight of 0.412 is the best alternative, then alternative 1 (FedEx) with a weight of 0.322 and the last alternative 3 (TNT) with a weight of 0.264.

In the communication criteria, the best alternative is alternative 2 (DHL) with a weight of 0.390, then alternative 1 (FedEx) with a weight of 0.359 and the last one is alternative 3 (TNT) with a weight of 0.250. Based on the responsiveness criteria, the first priority is also alternative 2 (DHL) with a weight of 0.412, the next is alternative 1 (FedEx) with a weight of 0.327, and the last is alternative 3 with a weight of 0.260. Based on the criteria in choosing a shipping service company at PT. Overall Pro-Health International Alternative 2 (DHL) is rated as the best (optimal) shipping service company with a weight of 0.395. The next priority is alternative 1 (FedEx) with a weight of 0.335 and the last priority is alternative 3 (TNT) with a weight of 0.269.

The results of this study differ from the results of other studies, this difference may be due to differences in the interests of decision makers in each company. In the research conducted by Verra Sofica the results of his research using AHP on the selection of goods delivery services for online shops revealed that the area coverage criteria were the most important criteria. Meanwhile, the research conducted by Nunu Custody in the selection of goods delivery services on E-Commerce Online transactions resulted in service being the most important criteria compared to other criteria. Whereas in the research conducted by Dewi Hajar, and Satria Perdana Arifin revealed that the criteria for collaboration are the most important criteria.

Responsiveness criteria are the most important criteria based on the results of research conducted by Soon-hoo So, JaeJon Kim, KiJu Cheong, and Geon Cho. In other studies, operational performance criteria are the most important criteria compared to other criteria according to the results of research conducted by Erdal Cakir, Hakan Tozan, and Azalp Vayvay in other words, AHP is very flexible and can be used in the interests of decision makers. decision makers with each other will differ depending on the point of view and the way to determine priorities based on the needs to be achieved by the decision maker.

IV. CONCLUSION

Based on the research objectives and the results of the research that has been done, it can be concluded the following points:

- How to determine the right shipping service company using the analytical hierarchy process (AHP) method, among others, is the importance of formulating criteria

for a good shipping service company for the company, then identifying alternative options based on the objective criteria to then conduct an assessment / comparison between criteria and inter-choice comparison for each subsequent criterion, the weight obtained from the results of the summed comparisons to determine priorities in choosing a shipping service company.

- The most influential criteria in choosing a shipping service company at PT. Pro-Health International is a price criterion, because based on calculations on normalization the price criteria matrix has the highest weight compared to other criteria.
- Overall based on the criteria in choosing a shipping service company at PT. Pro-Health International, the best shipping service company to be used as a partner / long-term partner is alternative 2 (DHL) because overall this company has the highest weight / priority compared to 2 other shipping service companies.

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