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Analysis of Determining Priority Stockpile Locations in Air Import Freight Forwarding Activities with The Analytic Hierarchy Process (AHP) Method (Case Study: Logistic Provider in Indonesia)

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ABSTRACT: The multinational companies engaged in logistics and one of its fields is export and import shipping activities. Determination of priority stockpile locations in air import activities has a role in efforts to improve the quality of facilities to minimize the cost, distance, and time of company activities. This research is expected to help provide information about the right location to be chosen by the company by considering factors and criteria that affect the company's shipping activities, the criteria used are Time, Quality, Location, Service. The method used is the Analytical Hierarchy Process (AHP) method using a quantitative approach with data collection techniques based on observations, interviews, and questionnaires. The results of the study based on the level of importance of the most dominant criteria in determining the location of priority stockpiling is the Time criterion, and then the second priority is service, then in the third priority is quality, finally in the fourth priority there is Location. From these results show that the Time criterion is very dominant in determining the location of priority stockpiling.

KEYWORDS: Prioritized Stockpiling, Analytic Hierarchy Process (AHP), Alternative Locations

BACKGROUND

The most important component in running a business or company is the Logistics section (Juwitasary, Martani, and Putra 2015). Logistics cannot be separated from all business fields that are being carried out. The definition of logistics itself is a series of transfer journeys which can be in the form of goods, services and other resources (Hasibuan et al. 2021). This series includes planning, implementation and supervision during the movement process from the initial place to the delivery destination. Logistics is very closely related to the supply chain.

According to Sumekar et al. (2022) the aim of logistics activities is to achieve accuracy in time, type and place in distributing goods or services and can save time and costs so that it is more effective in carrying out company operations, in carrying out industrial activities and logistics elements can also influence operational control. So that in the process of running a business or undertaking, especially in businesses engaged in goods delivery services, the meaning of logistics itself can be understood properly and correctly (Julyanthry et al. 2020). This aims to ensure that there are no errors in the implementation or process of moving the goods. Because if an error occurs in the shipping, sorting process and all forms of these errors, it can have fatal consequences for a company (Pardosi 2019).

The implementation of logistics activities, which are increasing day by day, requires the support of an appropriate logistics system, by creating a network that can reduce costs to be efficient. The aim of creating a network in the logistics system is to maximize cost efficiency. In the world of network logistics, this is known as Supply Chain (Nindaswari, 2022). By maximizing the design and planning of the Supply Chain network with Supply Chain management, it is hoped that it will create efficiency and minimize costs well. If the supply chain wants to be efficient, the available network is relatively centralized and has fewer facilities. For the decision to determine the location of facilities, the strategy in question is a strategy to minimize costs, distance and time. Thus, the strategy for determining facility locations requires a good combination of cost and speed (Hartanto, 2021).

Determining effective and strategic priority storage location facilities in supply chain management is part of efforts to overcome time inefficiencies and minimize costs incurred (Hartanto, 2021). In network planning, determining the location of priority storage areas will be carried out using the Process Hierarchy Analytical method. This method is appropriate in determining the location of priority storage areas. By using the AHP method, determining the location of priority storage facilities can maximize costs and distance based on predetermined criteria levels (Hartanto, 2021).

Planning for determining priority stockpiling locations needs to consider aspects of the placement location (economic & social factors) with the consideration that priority stockpiling has a more complex scale and there are activities involved in it (Nindaswari,

2022). It is hoped that the priority storage area will become a storage area that provides a solution and is adequate for carrying out land transportation logistics activities, especially the distribution of goods.

In network planning, determining the location of priority storage areas will be carried out using a method. The method that will be used is the Process Hierarchy Analytical method. Analytic Hierarchy Process (AHP) is a decision making method developed by Thomas L. Saaty. This method is used to handle complexity in decision making by breaking down a hierarchical problem into several simpler levels. AHP allows decision makers to assign relative weights or values to each element in the hierarchy, so that the level of priority or preference for each element can be calculated [S. Setiawansyah, et al 2023], [S. H. Hadad et al, 2023], [Laksono & Kristiantoro, 2017].

Based on the background that can be found, this research is entitled: "Analysis of Determining Priority Stockpiling Locations in Air Freight Forwarding Import Activities Using the Analytic Hierarchy Process (AHP) Method".

Based on the background of the problem that has been described previously, the problem formulation are what are the dominant criteria for determining priority storage locations in improving the quality of storage areas for distribution of goods and where is the right and optimal location for priority storage. The objective of research to determine criteria and sub-criteria are important and dominant in determining the location of priority storage areas the optimal location of priority storage areas. The paper assist companies to make decisions in determining priority storage locations appropriately that will result in time and distance inefficiencies being reduced or even eliminated.

LITERATURE REVIEW

Supply Chain

According to (Tyagi & Agarwal, 2014) supply chain is a system where an organization distributes its production goods and services to its customers. This chain is also a network or network of various interconnected organizations that have the same goal, namely to organize the procurement and distribution of goods as best as possible. Meanwhile, according to Schroeder (2007, 189), supply chain is a series of business processes and information that provides products or services from suppliers to companies and distributes them to consumers. According to (Pujawan & Mahendrawathi, 2010) supply chain is a network of companies that work together to create and deliver a product to the end user. These companies usually include suppliers, factories, distributors, shops or retailers, as well as supporting companies such as logistics service companies.

According to I Nyoman Pujawan, Supply chain is a network of companies that work together to make and deliver products to end consumers. Supply chain or what is usually called the procurement chain was defined by Dr. Richardus Eko Indrajit and Drs. Richardus Djokopranoto as a system where organizations distribute goods and produce services to customers. This chain also consists of a network or networks of various organizations that are interconnected with the same goal of ensuring the best possible procurement or distribution of goods. Based on the two expert opinions above, the supply chain can be defined as a network consisting of a network of companies or networks of independent organizations connected to each other to create mutually beneficial cooperation in controlling, regulating and improving the flow of materials and information from suppliers to final consumers.

Supply Chain Management

Supply Chain Management is a system that coordinates all activities and information in logistics activities in an organization/company to provide products and services to consumers, which consists of demand and supply planning (plan), input sources (source), transformation process input becomes output (make), transportation, distribution, warehousing (deliver or delivery process), information and payment systems for goods, process of returning goods/products. (Martono, 2020).

According to I Nyoman Pujawan, Supply Chain Management is the systematic and strategic coordination of business functions within and between organizations to improve long-term performance for each organization and the supply chain as a whole.

In supply chain management, it will create an integration between all the chains in the supply chain itself so that the process of implementing activities runs well, meaning that determining the location of priority stockpiling facilities plays an important role in the company's Supply Chain Management in terms of the distribution process (Deliver).

Logistic

Logistics in its development to date has become a science that must receive special attention considering the history of increasingly complex economic growth, such as the productivity of goods produced by factories or companies, how they are distributed and stored as well as the overall management of product results that require special and serious handling. To achieve efficient and effective results, all of this absolutely requires good organization or what is often termed integrated logistics management so that there are no gaps in carrying out activities (Chandra, 2013) (Ikasari & Mulyana, 2022)

Logistics is the management of the flow of goods and services between the point of origin and the point of consumption to meet customer needs (Yasseri, Sumi, Rung, Kornai, & Kertész, 2012); Logistics is positioning resources at the right time, in the right place, for the right cost and for the right quality (Walker & Jones, 2012)

Supply Chain Management Versus Logistic

Based on the definition above, it can be explained more specifically the similarities and differences between Supply Chain Management and Logistics. The similarities between the two are (Indrajat and Djokoprantoro, 2002)

a. Both have a role in the flow of goods and services
b. Both are involved in management regarding purchasing, movement and storage
c. Both involve efforts to increase efficiency and effectiveness in the movement of the flow of goods

After explaining the similarities, there are fundamental differences between the two as follows:
Comparation Supply Chain Management & Logistics

Supply Chain Management	Logistics
Focus on managing the flow of a company	Focus on the management flow between companies from upstream to downstream.
SCM is built on these frameworks and seeks relationships and coordination between processes from other companies.	Orientation towards work planning that produces a single plan for the flow of goods and information

(Source: Garside dan Rahmasari, 2017)

Freight Forwarder

Freight forwarder is a business entity that operates in the field of document processing and transportation services, where the main role is as a "service provider" between shipper (sender/exporter) and consignee (recipient/importer) or airline (air transportation) and shipping line (sea transportation) (Andi Susilo, 2008) (Suryani, 2020). Freight forwarder is a business entity whose aim is to provide management services for all activities required for the delivery, transportation and receipt of goods using multimodal transport either by land, sea or air.

Freight Forwarders carry out procedures and documentation formalities required by government regulations in export countries, transit countries and import countries. And in accordance with the scope of their business, Freight forwarders also cover costs arising from transportation activities, handling cargo at ports/warehouses, processing documentation, and also cover insurance liabilities which are generally required by the owner of the goods. Freight forwarder is a business aimed at managing all activities necessary for the delivery and receipt of goods via land, sea and air transportation which can include the activities of receiving, storing, packing, weighing goods, processing, completing and issuing transport documents, calculating transport costs. , claims, insurance, settlement of bills and other costs relating to the delivery of goods until they are received by the entitled party. Freight forwarders are responsible from the time the goods are received at the sender's place until the goods are handed over to the recipient (consignee) and will arrange transportation using several modes of sea, land and air transportation. Freight forwarders can act on behalf of the sender of the goods and can also act on behalf of the recipient of the goods (Suryani, 2020).

The role of freight forwarders in the world of transportation is increasingly important and greater because there is a tendency for goods owners to prefer to only deal with one party, who will take over all responsibility from the time the goods are handed over to the sender's warehouse until the goods are received at the recipient's one stop shipping warehouse.

Supporting Factors for Supply Chain Management

Supply chains must achieve a balance between responsiveness and efficiency to support competitive company strategies. To understand how supply chain management can increase responsiveness and efficiency, namely by examining the logistics driving factors for successful implementation of supply chain management, among these factors are facilities, inventory, transportation, information, resources, and price. The goal is to devise drivers to achieve the desired level of response at the lowest possible cost with the goal of improving the company's supply chain.

Facilities

According to Kotler & Kevin Lane 2012 quoted by (Muhammad Hasbi, 2017) Facilities are things that are provided or can be used and enjoyed intentionally by consumers. A facility is an actual physical place or location in the supply chain network where products are stored, assembled or manufactured. In making decisions regarding the role of facilities, facility location, capacity and facility flexibility have an important impact on the quality of supply chain management. The availability of many services and facilities offered to consumers, more and more consumers use these products or services. Facilities are also supporting facilities for each implementation of a company activity for the menu.

Analytical Hierarchy Process (AHP)

In application in the industrial world, the AHP method has contributed to decision makers, especially for multi-criteria problems. The use of AHP in the real world has proven that AHP is a method that can be used to organize information and judgment used in decision making. Determining alternative rankings, comparing benefit costs (Laksono & Kristiantoro, 2017).

The Analytical Hierarchy Process (AHP) method was developed by Thomas L. Saaty in the period 1971 – 1975 at the Wharton School, University of Pennsylvania). This method is a framework for effective decision making on complex issues by simplifying and speeding up the decision making process. This method will divide the problem into its parts, arrange these parts or variables in a hierarchical order, assign numerical values to subjective judgments about the importance of each variable and synthesize these various considerations to determine which variables have the highest priority and act to influence outcome in that situation determine which variables have the highest priority and act to influence outcome in that situation which variables have the highest priority and act to influence outcome in that situation.

Framework

Based on the explanation of the background of the problem and the theoretical basis that has been explained, a framework for thinking in this research was formed, namely decision making for determining priority stockpiling locations. The method used in determining priority landfill locations is the Analytical Hierarchy Process (AHP) method with a decision-making method using criteria and alternatives selected based on expert reviews and recapitulation of available criteria.

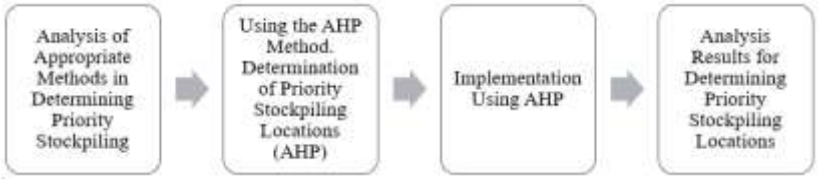

Figure 1. Framework

RESEARCH METHODOLOGY

Research design

Research approach

In writing this research, the author used a quantitative approach method. Cresweel (2010, p. 24) stated that, "a quantitative approach is the measurement of quantitative data and object statistics through scientific calculations derived from samples of people or residents who are asked to answer a number of statements about a survey to determine the frequency and percentage of their responses."

According to Cresweel (2010), in this quantitative approach, research will be pre-determinate, analyzing statistical data and interpreting statistical data. Researchers who use a quantitative approach will test a theory by detailing specific hypotheses, then collecting data to support or refute these hypotheses. The approach that will be taken in this research is a quantitative analysis approach based on statistical information. A research approach that answers research problems requires careful measurement of the variables of the object under study to produce conclusions that can be generalized regardless of the context of time, place and situation.

Research Population & Sample

Population

According to Arikunto (2013, p. 173), "the population is the entire research subject". Meanwhile, according to Sugiyono (2012, p. 80) states that: Population is a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by researchers to be studied from which conclusions can then be drawn. The population is the entire subject or object that is the focus of the research by paying attention to several characteristics that are appropriate to the research being carried out.

Research Sample

According to Sugiyono (2011, p. 118) "... the sample is part of the number and characteristics of the population. The sampling technique that will be used in this research is a saturated sample or total sample, which is a sampling technique when all members of the population are used as samples. In this study, the sample used was 7 experts or experts who worked for a working period of 5 – 10 years.

Data collection technique

Data source

This research uses quantitative data from primary sources and secondary sources. According to Arikunto (2010, p. 172) "the source of research data is the subject from which data can be obtained".

From the research planning in determining priority stockpiling in air import activities, reference is made to data on the volume of imports that occurred in the past 5 years in the Airfreight Import department. The data collected is primary data and secondary data. Secondary data is data that researchers have previously conducted regarding similar problems at Logistic Service Provider. Meanwhile, primary data will be obtained using observation techniques, surveys using questionnaires, and in-depth interviews as well as group discussion forums involving the Airfreight Import department at Logistic Service Provider, as well as carrying out data collection directly at the relevant activity locations.

Data collected to determine the main criteria, namely identifying and analyzing problems with Air Imported goods activities, such as data on the number of air imports for the period 2019 – 2023.

Data analysis technique

At this stage, the data that has been obtained and collected will then be processed with the aim of simplifying and presenting the data in a simpler and neater arrangement for later analysis. The following are the analysis stages used in this research.

Method of Analytic Hierarchy Process (AHP)

The AHP method helps solve complex problems by structuring a hierarchy of criteria, interested parties, results and by drawing on various considerations to develop weights or priorities. This method also combines the power of feelings and logic related to various problems, then synthesizes various diverse considerations into results that match our intuitive estimates as presented by the considerations that have been made (Saaty, 1994).

According to (Mulyono, 1991), AHP is used to determine the ratio scale for both discrete and continuous pairwise comparisons. These comparisons can be drawn from actual measures or from basic scales that reflect the relative strength of feelings and preferences. AHP has particular concerns about deviations from consistency, measurability and dependability within and between groups of its structural elements. AHP is often found in decision making for many criteria, planning/prediction, resource allocation, preparing input matrices, coefficients, determining priorities of players' strategies in conflict situations and so on. AHP helps people deal with rational and irrational intuitions, and with risk and uncertainty in complex settings.

The Analytical Hierarchy Process (AHP) developed by Saaty is based on a series of thoughtful comparisons between decision makers represented by the intrinsic human ability to organize perceptions hierarchically, compare pairs of similar things given criteria or common property and assess the intensity of importance of one thing from the other side. It is also necessary to determine the level of aspiration and/or priority factors from the weight that must be given to decision elements that are based on human judgment which is often intrinsically inaccurate (Mulyono, 2008).

According to Saaty, hierarchy is defined as a representation of a complex problem in a multilevel structure where the first level is the goal, followed by the levels of factors, criteria, subcriteria, and so on down to the last level of alternatives. With hierarchy, a complex problem can be broken down into groups which are then arranged into a form of hierarchy so that the problem will appear more structured and systematic. (Nindaswari, 2022).

Table 1. Comparative Rating Scale

Level	Definition	Information
1	Equally Important	Both Elements Have the Same Elements
2	Average	These values require a compromise
3	A Little More Matters	Experience and Judgment Strongly Favor One Element Compared to Its Partner
4	Average	These values require a compromise
5	More important	One Element Is Very Favored And Practically Its Dominance Is Very Real, Compared To Its Partner Element.
6	Average	These values require a compromise
7	Very important	One element is proven to be very popular and practically its dominance is very obvious, compared to its partner element.
8	Average	These values require a compromise
9	Absolutely Very Important	One Element Is Absolutely More Favorable Than Its Partner, At The Highest Level Of Confidence.

Sumber: Saaty, T. Lorie 1993

It is believed that determining samples in conducting observations, interviews and literature studies is primarily based on the quality of the respondent's data and does not depend on quantity (Saaty, 1993). Therefore, an AHP assessment requires experts as respondents in making decisions for selecting alternatives. All the experts here are competent people who really control, influence policy making, and/or really know the information needed. The number of respondents in research using the AHP method does not have a specific formulation, but there is only a minimum limit of two respondents. (Saaty, 1993).

Hierarchy Preparation Steps

The first step in AHP is to build a problem solving hierarchy. The principle of constructing a hierarchy is to describe and describe it hierarchically, by breaking down the problem into separate elements. The way to do this is by breaking down our complex knowledge and thoughts into its main elements, then this part into its parts, and so on hierarchically. The explanation of lower hierarchical goals is basically aimed at obtaining measurable criteria. Although in fact this is not always the case. In some cases, it may be more advantageous to use objectives higher up the hierarchy in the analysis process. The lower you describe an objective, the easier it is to determine objective measures and criteria. However, there are times when the decision-making analysis process does not require a very detailed explanation. So one way to express the measurement of achievement is to use a subjective scale.

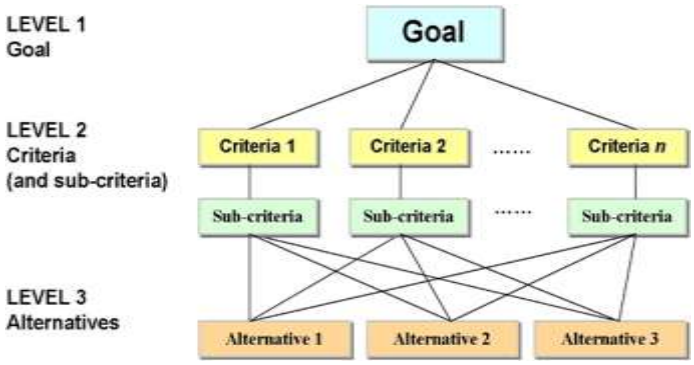

Figure 2. Hierarchy Illustration

The main idea of AHP is to brainstorm complex problems, sort important ideas and alternative factors, then arrange them in a hierarchy that allows comparing the elements and their derivatives with all the elements at the level above. This is a creative way to exploit human thinking abilities to simplify a problem by grouping it into constituent elements, including overall goals, criteria and decision alternatives (Saaty, 1990).

In carrying out this process, a lot of information is needed to be combined into a problem structure that describes the system as a whole. After the hierarchy has been structured, the next step is to set priorities for the elements (criteria and alternatives) presented in the hierarchy. AHP uses pairwise comparisons to do this individual into ratio scale measurements.

Selection & Decision Making of Experts

The respondents in this research were experts at client, totaling 7 experts who were selected to complete the questionnaire for this research. All experts appointed are experts who are competent in the field of imports and storage areas.

Selection of Criteria and Sub Criteria

Secondary data sources were used to determine the data in this research which came from literature studies, evaluation of activity practices, previous research experience. As a goal to expand reliable and valid research, the criteria and sub-criteria for determining this location were assessed and revised to meet validity, clarity, completeness, relevance and direct application. This activity was carried out based on the results of discussions and feedback obtained from client's experts.

Table 2. Criteria and Sub-Criteria

Criteria	Sub-Criteria	Description
Time	Timeliness of Goods Release, Priority Console Shipment and On time Delivery	Study of literature, Company criteria, Expert feedback
Quality	Reliability and Ability to present information well	Study of literature, Company criteria, Expert feedback
Location	Traffic, Condition and Location close to the airport and availability of transportation modes	Study of literature, Company criteria, Expert feedback
Service	Ability to Provide Cost Discounts, Special cargo handling & Warehouse activity control	Study of literature, Company criteria, Expert feedback

Improvement Analysis

From the results of research with analysis of determining the location of priority storage locations using the Analytical Hierarchy Process (AHP) method carried out by the author for the client, improvements have been made that are given to the company as a reference to improve the quality in determining Priority Storage locations.

Conclusion & Suggestions

With the results of data processing, the conclusion is the determination of priority stockpiling locations using the Analytical Hierarchy Process (AHP) method to find out the right location using the selected criteria required by the company. Then the company can use suggestions in selecting priority storage locations from the research results which can be used by future researchers to carry out further research**.**

Research Framework

The research conceptual framework is a method used to explain the relationship or connection between the variables to be studied (Notoatmodjo, 2018, p. 83).

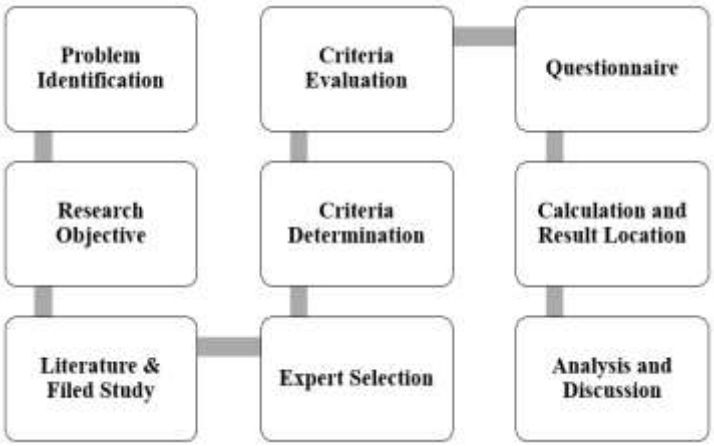

Figure 3. Research Framework

AHP Calculation Flow

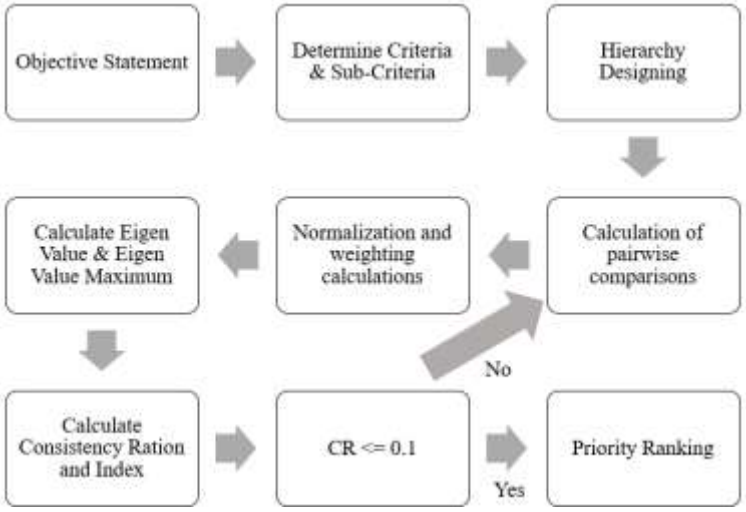

Figure 4. AHP Method Calculation Flow

DISCUSSION

Research Description

This research began by carrying out in-depth interviews and observations to discuss the criteria and sub-criteria that would be needed in determining priority landfill locations. The results of interviews obtained from 7 experts, namely 4 Airfreight managers and 3 Import staff, resulted in 4 criteria for determining priority stockpiling locations, and there are sub-criteria for each of the criteria that have been determined. The description of the criteria and sub-criteria will be explained through the AHP hierarchical structure.

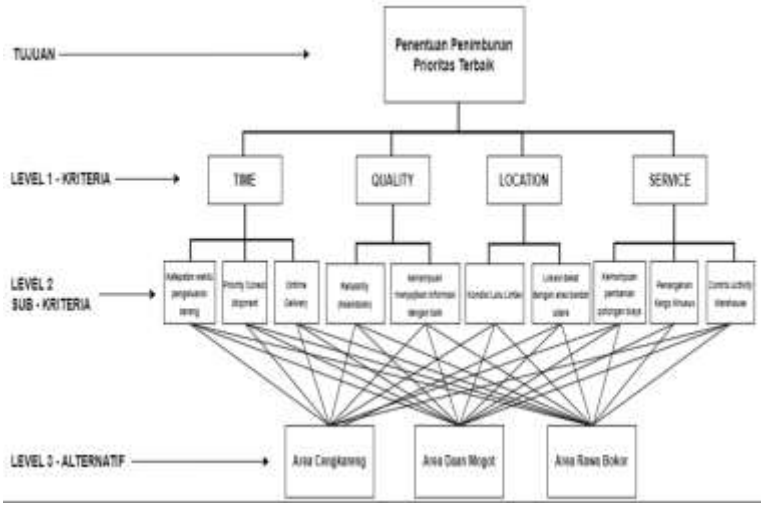

Figure 6. Stockpiling for PT DHL Global Forwarding. Source: (Syarfi, 2018)

Figure 6. explains the author's hierarchical structure in determining priority accumulation which is arranged into three hierarchical levels. The top level or level zero is the goal or purpose of research using the
Analytical Hierarchy Process (AHP) method, while level one is the sequence of criteria for determining priority stockpiling, then level two is the sub-criteria for research determining priority stockpiling, finally level three or alternatives in selecting the right location to determine PT DHL Global Forwarding's priority storage location.

Priority stockpiling location candidates

Based on the criteria selected through the AHP hierarchical structure, currently there are 3 candidate locations for the establishment of priority storage sites. The area and building area of priority storage areas are the same, regardless of location. So what differentiates these three candidate locations from one another is the traffic conditions and location access.

Calculation of the Analytical Hierarchy Process (AHP) method between criteria

Pairwise Comparison Matrix Between Criteria

Data for calculating the priority importance of the criteria in determining priority landfill locations were given to 7 expert respondents. After the assessment results from 7 respondents were obtained, the processing results were averaged using the geometric average. The results are shown in table 4.1 as follows:

Table 3. Pairwise Comparisons Between Criteria

	Time	Quality	Location	Service
Time	1	3	2	1
Quality	0.3	1	3	1
Location	0.5	0.3	1	0.3
Service	1	1	3	1
Total	2.8	5.3	9	3.3

Source: processed by the author

The pairwise comparison matrix from the table above explains that a weight value of 1 is a balanced pairwise comparison, while the largest weight value in each row is the best choice criterion from each column of criteria.

Calculation of Weights Between Criteria

After the assessment criteria are compared in the pairwise comparison table between criteria, normalization is then carried out by dividing the value of each cell by the total number of values in each column. This calculation is carried out to determine the results of the average value or weight of each criterion. If the weight value or average value of all criteria is added up and the result is 1 then the weight value calculation is declared correct.

The following are the results of weight calculations between the criteria referred to in table below:

Table 5. Priority importance (weight) of criteria

	Time	Quality	Location	Service	Bobot
Time	0.35	0.56	0.22	0.3	0.35
Quality	0.11	0.18	0.33	0.3	0.23
Location	0.17	0.06	0.11	0.1	0.11
Service	0.35	0.18	0.33	0.3	0.29

Source: processed by the author

The table above shows that the criteria for selecting LSP's first priority storage location is the Time criterion with a weight value of 0.359, and then the second priority is service with a weight value of 0.293, then the third priority is quality with a weight value of 0.234, finally the fourth priority there is a Location with a weighted value 0.112.

Calculation λmaks, Consistency Rasio, Consistency Indeks

This calculation stage is carried out to see the consistency of the responses given to respondents. If the CR value is <0.1 then the pairwise comparison value in the given criteria matrix shows a consistent value. On the other hand, if CR is >0.1 then the pairwise comparison value in the given criteria matrix does not show a consistent value and the calculation must be done again. To find out the process of calculating the Consistency Ratio (CR) value, first calculate λmax and Consistency Index (CI). The λmax value is calculated by multiplying each cell for the number of criteria columns by the criteria weight cell, then adding up all the values.

Overall Consistency Ratio (CR) Measurement

The results of this consistency measurement aim to see the consistency of the responses given by respondents/experts. If CR < 0.1 then the comparison value of the criteria matrix produces a consistent value, conversely if CR > 0.1 then the pairwise comparison value in the matrix is inconsistent, then the criteria values and alternative values must be recalculated.

Table 48. Overall Consistency Ratio (CR).

Pairwise comparison	**CR**	**Remarks**
Between Criteria	0.086	Consistent
Between Time Sub-Criteria	0.025	Consistent
Between Quality Sub-Criteria	0	Consistent
Between Location Sub-Criteria	0	Consistent
Between Service Sub-Criteria	0.006	Consistent
Between Alternative Sub-Criteria Timeliness of goods release	0.069	Consistent
Between Sub-Criteria Alternatives Priority Console Shipment	06068	Consistent
Between Alternative Sub-Criteria On Time Delivery	0.006	Consistent
Between Alternative Sub-Criteria Reliability	0.062	Consistent
Between Alternative Sub-Criteria Ability to present information well	0.095	Consistent
Between Alternative Sub-Criteria traffic conditions	0.002	Consistent
Between Alternative Sub-Criteria locations near the airport area	0.001	Consistent
Between Alternative Sub-Criteria the ability to provide discounts	0.025	Consistent
Between Sub-Criteria Alternatives for special cargo handling	0.025	Consistent
Between alternative warehouse activity control sub-criteria	0.056	Consistent

Source: processed by the author

Table 48. above shows that all respondents' assessments from experts are consistent and valid so there is no need to recalculate.

Selection of Optimal Priority Stockpiling Locations (Global Priority)

After all the calculation processes for each criterion and alternative, synthesis or recapitulation is then carried out to obtain the overall alternative weight value (Global Priority) by multiplying the average local weight value (Local Priority) with the average priority value of the level above (parent). Criterion) and below are the results of the overall global priority calculation and in detail. The overall results of the weighting of criteria, sub-criteria and alternative calculations can be seen in the following table:

Global Priority Calculation: = (Criterion weight x Sub Criteria weight x Alternative Weight)

From the results of the global priority recapitulation, the overall weight of each alternative is obtained by adding up the global priorities at each location for determining priority storage locations.

Table 49. Overall Alternative Weights

Alternative	Alternative 1	Alternative 2	Alternative 3
Weight	0.0329	0.0581	0.0517
Priority	I	II	II

Table 49. above shows that overall, the results of these weight values can be seen that the highest weight value for the alternative is alternative 1 or the Daan Mogot area, namely with a weight value of 0.0581, then for the second priority, namely the Bokor swamp area with a weight value of 0.0517, then the third priority is Cengkareng area.

Analytic Hierarchy Process Analysis After Calculation

Based on the results of the research after distributing questionnaires to 7 respondents or experts to obtain quantitative data from the results of the distribution to determine the order of weight values for each criterion, sub-criteria, and also the location of the landfill which was then analyzed using the Analytic Hierarchy Process method (AHP), the results of which have been presented in the table above. Based on the results of the AHP analysis, the most important criterion in determining priority storage locations at PT DHL Global Forwarding is the time criterion with a weight value of 0.3594, and then the second priority is service with a weight value of 0.2934, then the third priority is quality with a weight value of 0.2346, finally in the fourth priority there is Location with a weight value of 0.1125.

The time criteria in this research include 3 sub-criteria, namely timeliness of goods release, priority console shipment, and on time delivery. Based on all three sub-criteria, the sub-criterion on time delivery is the dominant criterion among respondents with a weight value of 0.4795, then the second priority is the sub-criterion of timely release of goods with a weight value of 0.4054, then the priority conciliation sub-criteria is the third priority with a weight value 0.1149.

Quality criteria in this research consist of 2 sub-criteria, namely reliability, and the ability to present information well. From the results of these 2 sub-criteria, the sub-criterion of speed in responding to the condition of the goods is the first priority with a weight value of 0.9, then the reliability sub-criterion is the second priority with a weight value of 0.1.

The location criteria in this research discussion include 2 sub-criteria, namely traffic conditions and location near the airport area. From the calculation results of these two sub-criteria, it is clear that the first priority is the traffic condition sub-criteria with a weight value of 0.875, while the location sub-criteria close to the airport area is the second priority with a weight value of 0.125.

The service criteria selected in the research are 3 sub-criteria, namely, ability to provide discounts, special cargo handling, warehouse activity control. Of the three sub-criteria, the warehouse activity control sub-criteria is the first priority with a weight value of 0.489, then the special cargo handling sub-criteria is the second priority with a weight value of 0.450, and the ability to provide discounts is the last or third priority with a weight value of 0.059.

From the overall AHP analysis above, the sub-criteria that have the most influence in determining PT DHL Global Forwarding's priority stockpiling locations, respectively from the first priority to the last priority, are as follows: the sub-criterion of ability to present information well with a weight value of 0.0954, the sub-criterion of Reliability with a weight of value 0.0622, Sub-Criteria Timeliness of release of goods with a weighted value of 0.0697, Sub-Criteria control activity warehouse with a weighted value of 0.0567, Sub-Criteria for the ability to provide discounts with a weighted value of 0.02523, Sub-Criteria for special cargo handling with a weighted value of 0.02518, Sub -Priority console shipment and ontime delivery criteria with a weight value of 0.006, Sub-Criteria for traffic conditions with a weight value of 0.0031, and the last priority is Sub-Criteria for location close to the airport area with a weight value of 0.0017.

From the results of all calculations based on criteria & sub-criteria in determining priority landfill locations, alternative 2 or the Daan Mogot area dominates with a value of 0.0581, then in second priority is alternative 1 or the Cengkareng area with a weighted value of 0.0517, and alternative 3 or the Bokor Swamp area with a value 0.0329 as third priority.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of the research conducted, it can be concluded that the order of criteria in determining priority stockpiling locations is the Time, Quality, Location, Service criteria.

1. Priority criteria in determining priority storage locations at PT DHL Global Forwarding are:
   a. Time is an important index in providing an assessment of the speed of releasing goods and the timeliness of delivery.
   b. Service is a service provided to customers in handling goods that will be stored in priority storage areas.
   c. Quality, explains that the benefits of these criteria can provide good information in import activities that use priority storage areas

d. Location, explains that priority storage places must look at several aspects such as traffic conditions, distance and time of activity.

2. Overall results with reference to criteria and sub-criteria in determining priority landfill locations;
   a. Alternative 1 or daan mogot
   b. Alternative 2 or Bokor swamp area
   c. Alternative 3 or Cengkareng area

Suggestion

Based on the results of the analysis, the author provides suggestions that can be implemented to PT DHL Global Forwaring to overcome the problem of limited space capacity for air import goods activities. So the author's suggestions include the following:

1. Companies can use the Analytic Hierarchy Process (AHP) method in determining priority stockpiling locations as analysis material and need to pay attention to the following things to optimize the stockpiling locations, namely:
   a. Criteria for the ability to present information well
   b. Traffic condition criteria
   c. Criteria for timeliness of goods release
   d. On time delivery criteria
   e. Warehouse activity control criteria
   f. Special cargo handling criteria
   g. Reliability criteria
   h. Location criteria are close to the airport area
   i. Console shipment priority criteria
   j. Criteria for the ability to grant discounts.

2. Based on the author's observations during the research, it is hoped that the company will soon add new locations for priority stockpiling so that activities can be maximized, and it is hoped that the presence of new priority stockpiling locations can improve the quality of service the company provides to customers. My suggestion is that for further research you can use a combination with two other methods such as ANP, TOPSIS, Gravity Location Model in order to maximize comparisons in future research.

Research Limitation

So that the discussion in writing this thesis does not deviate too far from the theme raised, it is necessary to limit the scope of the study. These restrictions are:

1. The object of this research is determining priority storage locations at PT DHL Global Forwarding
2. This research focuses on determining the location of priority storage areas in the Jabodetabek area.
3. Service users who are the object of this research are those who send goods using PT DHL Global Forwarding services
4. The method used is method Analytic Hierarchy Process (AHP)

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