

ANALISIS PEMILIHAN SUPPLIER SPAREPART KAPAL DI PT. PTK INDONESIA DENGAN PROSES PENDEKATAN HIERARCHY ANALYTIC

ANALYSIS OF THE SELECTION OF SHIP SPARE PARTS SUPPLIERS AT PT. PTK INDONESIA WITH AN ANALYTIC HIERARCHY PROCESS APPROACH

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ABSTRACT

This study aims to analyze the selection of ship spare parts suppliers at PT. PTK Indonesia using the Analytic Hierarchy Process method. The research method used to select ship parts suppliers is the Analytic Hierarchy Process (AHP) method. The data collection technique was carried out by distributing questionnaires to 4 respondents. The questionnaire design consists of a comparative assessment of the importance of the criteria and each criterion. For data processing used soft help Expert Choice. The results showed that the quality criterion was the most important selection criterion with a percentage of 55.8% (0.558) compared to other criteria. And PT. Askrindo is the most appropriate supplier in meeting the demand of PT. PTK Indonesia with the highest importance presentation compared to other suppliers, which is 55.3% (0.553). The limitations of this study lie in the number of respondents who only amounted to 4 companies (people), the number of criteria used to select suppliers, and the field of supplier selection. Meanwhile, the implications of the results of this study are in the form of determining criteria and potential suppliers that can be used by the Company to meet the needs of ship spare parts for PTK Indonesia. The origin of this research lies in case studies and the use of the AHP method as a decision-making tool in choosing criteria and potential supplier companies appropriately in meeting the needs of ship spare parts at PT. PTK Indonesia.

Keywords: *Analytic Hierarchy Process, Expert Choice, Supplier Selection*

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pemilihan supplier suku cadang kapal di PT. PTK Indonesia menggunakan metode Analytic Hierarchy Process. Metode penelitian yang digunakan untuk memilih pemasok suku cadang kapal adalah metode Analytic Hierarchy Process (AHP). Teknik pengumpulan data dilakukan dengan menyebarkan kuesioner kepada 4 responden. Desain kuesioner terdiri dari penilaian komparatif terhadap pentingnya kriteria dan masing-masing kriteria. Untuk pengolahan data digunakan soft help Expert Choice. Hasil penelitian menunjukkan bahwa kriteria kualitas merupakan kriteria seleksi yang paling penting dengan persentase 55,8% (0,558) dibandingkan kriteria lainnya. Dan PT. Askrindo merupakan supplier yang paling tepat dalam memenuhi permintaan PT. PTK Indonesia dengan tingkat kepentingan tertinggi dibandingkan pemasok lainnya yaitu sebesar 55,3% (0,553). Keterbatasan penelitian ini terletak pada jumlah responden yang hanya berjumlah 4 perusahaan (orang), jumlah kriteria yang digunakan untuk memilih pemasok, dan bidang pemilihan pemasok. Sedangkan implikasi dari hasil penelitian ini berupa penentuan kriteria dan calon supplier yang dapat digunakan oleh Perusahaan untuk memenuhi kebutuhan suku cadang kapal PTK Indonesia. Asal usul penelitian ini terletak pada studi kasus dan penggunaan metode AHP sebagai alat pengambilan keputusan dalam memilih kriteria dan perusahaan pemasok potensial secara tepat dalam pemenuhan kebutuhan suku cadang kapal di PT. PTK Indonesia.

Kata Kunci: Proses Hirarki Analitik, Pilihan Pakar, Seleksi Pemasok

INTRODUCTION

Suppliers are important actors in a supply chain. The smooth and successful operational activities of manufacturing companies depend heavily on the role of supplier companies as providers of raw materials and supporting materials for the needs of manufacturing companies. The

important role played by suppliers is even able to influence the main performance of manufacturing companies. To maintain the stability and continuity of the flow of raw materials and supporting materials, manufacturing companies must establish long-term cooperation and collaboration with suppliers appropriately (Pujawan,

2010). In addition, the selection of suppliers as the main supplier is important for manufacturing companies before deciding to establish long-term cooperation. Considering that mistakes in choosing the main supplier can be fatal to the smooth production process and quality assurance of the Company's products (Revanda, 2023).

In principle, supplier selection is a form of decision-making aimed at eliminating several suppliers obtained to get potential end suppliers. Decision-making is based on several determining criteria in quantitative and quality forms (Rodrigues et al., 2014). However, under certain conditions, the Company requires the search for new suppliers who are more potential for long-term collaboration. Because it is influenced by various factors and stakeholder perceptions, sometimes supplier selection becomes complex and long (Taherdoost & Brard, 2019). Amindoust et al., (2012) advise the Company in selecting suppliers should use references to past data. In addition, researchers and practitioners have suggested using the Multi- Criteria Decision Making (MCDM) method to solve problems in supplier selection. MCDM is designed to make it easier for stakeholders to make their choices based on several criteria and priority-based alternatives (Soylu, 2010). One of the recommended MCDM methods is the Analytic Hierarchy Process (AHP).

AHP is an MCDM-based problem-solving method with the basic principle of choosing the best alternative from several alternatives and evaluating determining criteria (Fu, 2019). AHP is equipped with a framework for comprehensive problem-solving decision-making by measuring subjective assessment results (Liao et al., 2015). Some literature discusses the use of the AHP method for supplier selection, such as Rajesh & Malliga, (2013), Fu, (2019), Rodrigues et al., (2014), Rajesh & Malliga, (2013) dan Revanda, (2023). Given that AHP is able to describe

complex problems in selecting potential suppliers based on a comprehensive framework, choosing the best alternative and being able to evaluate determining criteria, this study uses the AHP method to determine potential suppliers of ship parts for PT. PTK Indonesia.

PT. PTK is one of the subsidiaries of state-owned enterprises owned by the Indonesian government engaged in the procurement of fuel distribution to all ports in Indonesia. As one of the important companies in order to support the operational activities of PT. Pertamina, PT. PTK considers it important to select potential suppliers for the procurement of ship spare parts. However, in the supplier selection process, PT. PTK has problems in terms of using determining criteria and potential suppliers among existing suppliers. For this reason, this study aims to analyze the selection of ship spare parts suppliers at PT. PTK Indonesia using the AHP method. The results of this research, it is expected to be a reference for the Company in designing and determining the best supplier based on priority criteria for supplier selection

METHOD

This research uses the Analytical Hierarchy Process (AHP) method to determine the selection of ship spare parts suppliers appropriately. AHP is a method or tool of decision-making based on criteria with a nine-point rating scale (Saaty, 2004). AHP was chosen as the analysis method in this study because it considers criteria and subcriteria for the selection of the most suitable alternative. Through AHP, the process of selecting alternatives for complex decision-making can be simplified into small and limited decisions.

Data collection techniques are carried out by distributing questionnaires to respondents. The respondents in this study are each director of PT. Askindo, PT. Kapal Jaya, PT. Samudra Emas and PT. Sea Flower. Then, the questionnaire distributed consists of a comparative assessment

between criteria and the assessment of each criterion. The criteria used to select a ship parts supplier are shown in Table 1. While the criteria assessment uses a paired comparison scale as shown in Table 2 (Saaty, 1980).

Table 1. Supplier Selection Criteria

No.	Criteria	Source
1	Quality	(Ardiantono et al., 2019; Helianty et al., 2021)
2	Delivery	(Muhammad et al., 2020; Pitaloka, Adelia Amanda; Barry, Husnil; Sofa, 2022; Rivaldi et al., 2023)
3	Service	(Azzahra & Saroso, 2018; Wahid et al., 2022)
4	Price	(Noviandri et al., 2015; Safira & Susanty, 2021)

Table 2. Paired Comparison Rating Scale

Level of Importance	Meaning
1	Both elements are equally important
3	One element is slightly more important than the other
5	One element is more important than the others
7	One element is clearly more important than the other
9	One element is absolutely more important than the others
2, 4, 6, 8	Values between two values of adjacent considerations

Data processing and analysis in this study follow the basic principles of AHP including (1) compiling a hierarchy; (2) arranging the order of priority; and (3) determining logical consistency. The software used for the application of AHP in this study is Expert Choice version 11. Results of data processing.

Adjusted to consistency provisions to find out whether the processed data is declared feasible or not. The standard used is If the Consistency Ratio (CR) = 0, then the hierarchy is declared consistent; if $CR < 1$, then the hierarchy is expressed as fairly consistent; and if $CR > 1$, then the hierarchy is declared inconsistent and must re-collect data.

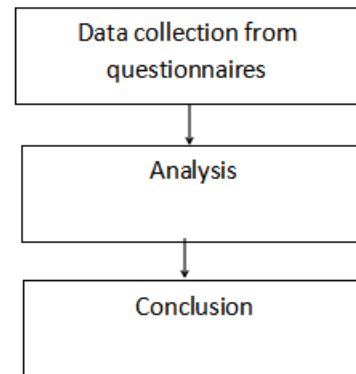


Figure 1. Analytical Hierarchy Process

RESULT AND DISCUSSION

The initial stage in this section is decomposition. Decomposition is solving or dividing a complete problem into its elements in a hierarchical form of the decision-making process, where each element or element are interconnected. The hierarchy that is arranged contains the objectives, criteria and alternatives of ship parts suppliers as shown in Figure 1. The picture displays 4 criteria (Quality, Delivery, Service and Price) and 4 alternative suppliers of ship spare parts.

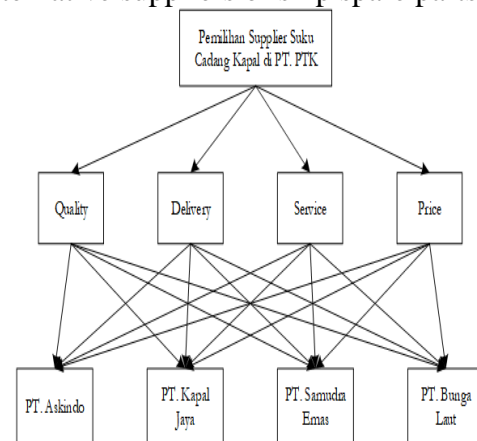


Figure 2. Hierarchy Of Ship Parts Supplier Selection Process

After creating a hierarchy of

supplier selection processes, the next step is to determine the most important criteria through a pairwise comparison matrix between criteria. This matrix allows decision-makers to compare each pair of criteria and determine to what extent one criterion is more important than the other. Calculation of importance value using expert choice software. The calculation results are displayed in the pairwise comparison matrix table between criteria as follows.

Table 3. Pairwise Comparison Matrix Between Criteria

	Quality	Delivery	Service	Price
Quality	-	3,7224	3,80675	4,28139
Delivery	-	-	2,05977	2,44949
Service	-	-	-	1,18921
Price	-	-	-	-

Based on the calculation results displayed in the pairwise comparison matrix between the criteria above, it shows that of the 4 criteria, the quality criterion has a higher level of importance than the other 3 criteria. The comparison value between Quality and Delivery is 3.7224, between Quality and Service, is 3.80675, and between Quality and Price is 4.28139. This shows that quality is considered more important than delivery, service, and price.

After calculating the importance of each criterion, the next step is to determine the order of priority for the criteria in supplier selection. The priority order of criteria is presented in Table 4 and Figure 2 as follows.

Tabel 4. Order of Priority Supplier Selection Criteria

Goal: Selection of Ship Spare Parts Supplier at PT. PTK Indonesia	
Quality	0,558
Delivery	0,215
Service	0,122
Price	0,105

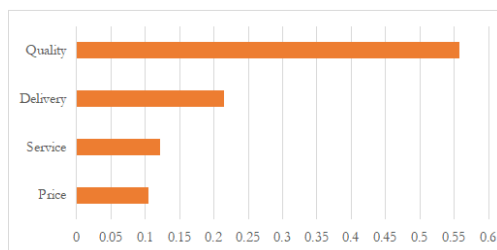


Figure 3. Order of Priority Supplier Selection Criteria

Based on the results shown in Table 4 above, it shows the priority order of criteria used for the supplier selection process. Quality has a weighting of 0.558, which indicates that the quality of ship parts is considered the most important factor in supplier selection. Delivery has a weight of 0.215, which shows that the supplier's ability to deliver on time is considered an important factor. Service has a weight of 0.122, which indicates that the service provided by suppliers in meeting customer needs and requests is considered an important factor. Price has a weighting of 0.105, which indicates that the price of ship parts is considered a relatively less important factor in supplier selection. From these results, it can be seen that the quality of ship parts is the most important factor in supplier selection, followed by delivery, service, and price. In addition, the processing results obtained a CR Consistency Ratio of 0.03. This means that the results of weighting the value of the criteria are declared feasible or consistent.

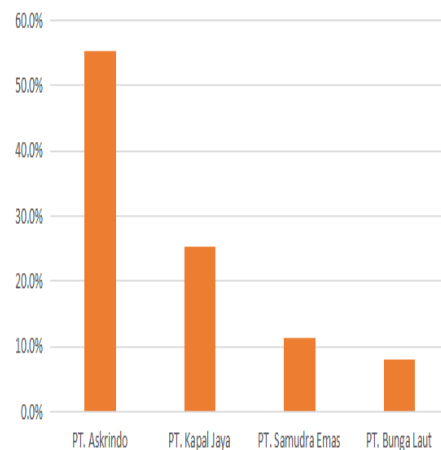


Figure 4. Nilai Alternatif Keempat Supplier

The graph shown in Figure 3 above shows the calculation results of the four suppliers based on 4 criteria. From these results can be known PT. Askrindo with a nipa weight presentation of 55.3% (0.553), PT. Kapal Jaya by 25.3% (0.253), PT. Samudra Emas 11.3% (0.113) and PT Bunga Laut 8.1%. from this result, it can also be said that PT. Askrindo is considered the most appropriate supplier company to supply ship spare parts for PT. PTK Indonesia. Followed by the second, third

and fourth positions, namely PT. Kapal Jaya, PT. Kapal Jaya, PT. Samudra Emas and PT. Seaflower

CONCLUSION

Based on the results of the research obtained, it can be concluded that the criteria and value presentation of choosing a ship spare parts supplier for PT. PTK Indonesia is Quality 55.8%, Delivery 21.5%, Service 12.2% and Price 10.5%. Quality criteria are the most priority criteria for choosing a ship spare parts supplier company, according to delivery, service and price criteria. In addition, from the four suppliers, PT. Askrindo is the most appropriate supplier company to meet the needs of shipping spare parts for PT. PTK Indonesia with a percentage of importance value of 55.3% (0.553).

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