ISSN 2087-3336 (Print) | 2721-4729 (Online)
TEKNOSAINS: Jurnal Sains, Teknologi dan Informatika
Vol. 12, No. 1, 2025, page. 161-170
http://jurnal.sttmcileungsi.ac.id/index.php/tekno
DOI: 10.37373

Implementation of the ANP method to overcome delays panel box raw materials in PT. Agrivito

Dwi Jayawan, Ribangun Bamban Jakaria*

* Universitas Muhammadiyah Sidoarjo, Indonesia. Jl. Mojopahit No. 666 B, Sidowayah, Celep, Kec. Sidoarjo, Kabupaten Sidoarjo, Jawa Timur 61215

* ribangunbz@umsida.ac.id

Submitted: 04/06/2024 Revised: 12/07/2024 Accepted: 21/08/2024

ABSTRACT

Choosing raw material suppliers is one of the most crucial elements. If the raw materials supplied by the supplier are of poor quality, this will affect the quality of the product produced. If suppliers are unable to provide raw materials, production schedules will be disrupted and the company will not succeed in achieving its vision. PT. A is a company that produces electrical panel boxes. In making a box, raw materials are needed, namely sheet metal for all parts of the box shape. The raw material system at PT. A experienced problems with delays in raw materials so that the production process did not run smoothly, PT. GC, PT. SSL and PT. SIPA is the supplier that provides the raw material for the plate. This has a direct impact on the smooth production of the company. This research aims to supply raw materials from the three companies smoothly by selecting one company to supply according to PT's needs. A. The method used in this research is the Analytic Network Process (ANP) method. Selection of raw material suppliers involves 6 criteria, 12 sub-criteria, and 3 alternative suppliers. The results of the calculation of the Analytic Network Process (ANP) method with the three best alternative suppliers based on the highest weight, PT SIPA obtained sub-criteria scores including ease of negotiation (0.63484), accuracy of quantities (0.63699), meeting sudden requests (0.63699), on-time delivery (0.63699), providing guarantees (0.66942), speed of responding to complaints (0.63699), and ability to respond to requests (0.63699). Meanwhile, PT GC excelled in the sub-criteria of meeting the increasing number of requests (0.73065), payment method (0.37129), free from physical contamination (0.73065), conformity to specifications (0.63699), and ease of communication (0.66942). Meanwhile for PT. SSL does not have the highest sub-criterion.

Keywords: Analytic network process (ANP); supplier; electrical panel box.

1. INTRODUCTION

The selection of raw material suppliers is one of the most vital components in supply chain management, where the company's short and long-term success is highly dependent on selecting the right supplier. If the raw materials supplied by the supplier are of poor quality, the quality of the product produced will be affected. If suppliers cannot provide raw materials according to the company's needs, production schedules will be disrupted, preventing the company from achieving its vision. One of the key factors for a company's success is supplier selection. Generally, the challenge faced is the difficulty in determining the best supplier from the various existing options, taking into account the desired criteria for potential suppliers

PT. A is a company that produces electrical panel boxes starting November 21, 2015. Electrical panel boxes are boxes made from several materials ranging from iron plates, aluminum, and iron bars, with various sizes according to needs whose main function is safety and neatness. an electrical installation. In making boxes, raw materials are needed, namely sheet metal for all parts of the box shape [1]. Whether or not a company can overcome delays in plate raw materials depends on whether

the company decides to collaborate with several suppliers to obtain the plate raw materials needed to expedite production process activities in the company. Supplier at PT. A is PT. GC, PT. SSL, and PT. SIPA provided the raw materials for the plates. This is very relevant because the percentage of material costs is high, making up 50% of the cost of a final product. So making 1 box of wall mounting panels costs IDR 2,500,000 with a box size of 700x500x250mm, due to delays in the raw material for the plates, the loss reaches IDR 1,000,000. The previous supplier often experienced delays which caused production to be disrupted due to inadequate iron plate raw materials. So this time the selection of suppliers is not only based on raw material costs but also other things such as on-time delivery [2]. This process is an initial step in ensuring smooth factory operations [3]. The process used is the PO or purchase order process [4][5].

In research on selecting alternative rice suppliers for the catering industry using the Analytic Network Process (ANP) method at PT. AXC, there are several criteria to consider in choosing a rice supplier. These criteria include quality (0.139764), price (0.069145), service (0.046673), accuracy (0.031577), packaging (0.017274), responsibility (0.011191), and flexibility (0.010975). Based on these criteria, the priority order for the best rice suppliers at PT. AXC is PT. SM (0.186483), PT. BAS (0.101924), and PT. PAJ (0.038192) [7] [8] [9].

This research uses the ANP method because it can overcome the weaknesses of the Analytic Hierarchy Process (AHP) method in terms of its ability to accommodate relationships between criteria or alternatives. In ANP, there are two types of linkages, namely linkages within a set of elements (inner dependence) and links between different elements (outer dependence). The ANP method makes it possible to obtain the best and most systematic solution by considering the relationship between criteria and sub-criteria. Therefore, ANP can be used to increase the effectiveness of raw material procurement in companies.

2. METHOD

ANP (*Analytical Network Process*)

ANP (Analytical Network Process) has the advantage of overcoming the weaknesses of AHP by being able to accommodate the relationship between criteria or alternatives. In ANP, there are two types of linkages: linkages within a set of elements (inner dependence) and links between different elements (outer dependence). This linkage makes the ANP method more complex than AHP. Inner and outer dependencies are the best method for decision-makers to present the concept of mutual influence between clusters and between elements in a cluster. ANP can be used to solve problems that have dependencies between alternatives or criteria with each other [10]. The explanation of the ANP stage framework above is as follows [11]:

a. In carrying out this research, the ANP model construction stage was based on a thorough literature review, which would then be asked questions to LKMS experts and practitioners in West Sumatra.
b. The next step is to conduct in-depth interviews to explore the current HR management problems. Continued with the development of a solution framework and strategy to overcome HR management problems that arise at BMT Al-Furqon Padang Sibusuk.
c. The model quantification stage involves constructing a network model based on a previously established ANP framework, which is then implemented by designing questions using Super Decision Version 2.10 software. Apart from that, the results acquisition stage aims to process the data analyzed using Microsoft Excel. Overall, ANP is expected to be able to produce Geometric Mean, Rater Agreement, and data visualization in graphical form.
d. The first stage, model construction, and problem structuring, is a very important initial step in a complex analysis system. By clearly determining the form of the problem and organizing it in a rational system in the form of a network, the overall analysis process will be easier. Next, the second stage involves creating a pairwise comparison matrix, which is a crucial step in the decision-making process. Methods such as AHP and ANP will help to compare all elements in hierarchical subsystems and carry out comparisons between their control criteria. In addition, the use of eigenvectors in the pairwise comparison matrix will help determine the influence of each element on other elements.
e. The next stage is the formation of a super matrix, which is an important step in determining the global priorities of a system with interrelated criteria. By inserting local priority vectors into the appropriate columns in the matrix, the global priority of a system can be achieved more effectively. The super matrix itself is a combination of various sub-matrices that represent the relationship

between two levels in a model. The final stage after obtaining the priority weight values for each criterion and sub-criteria is to calculate the supermatrix and ranking. By normalizing the supermatrix, the priority weights of criteria and alternatives can be determined more accurately, thus facilitating the further decision-making process.

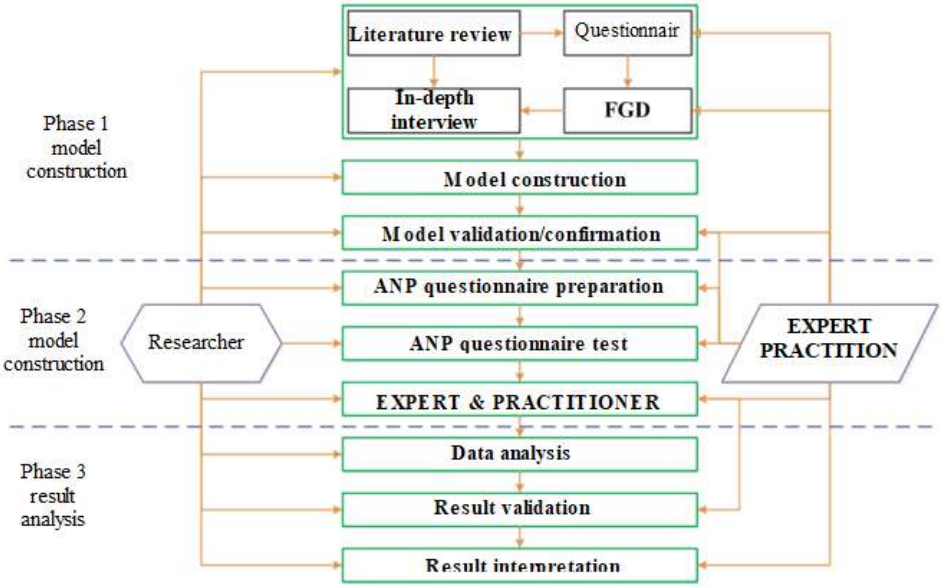

Figure 1. ANP stages

Super decisions

Super decisions software, developed by William J. Adams in collaboration with Thomas L. Tool that is very useful in decision-making processes involving dependencies and feedback with the application of the Analytic Network Process (ANP). Functioning as an extension of Analytical Hierarchy Process (AHP) software, Super Decisions Software uses a fundamental prioritization process similar to AHP, which focuses on deriving priorities through pairwise comparisons between elements. Thus, this software allows users to make decisions systematically based on in-depth analysis and comparison between the elements involved in a decision context [13].

3. RESULTS AND DISCUSSION

ANP structure design

Figure 2 below shows the ANP structure that will be used in this research. This structure is used to determine supplier selection in super decision software [11].

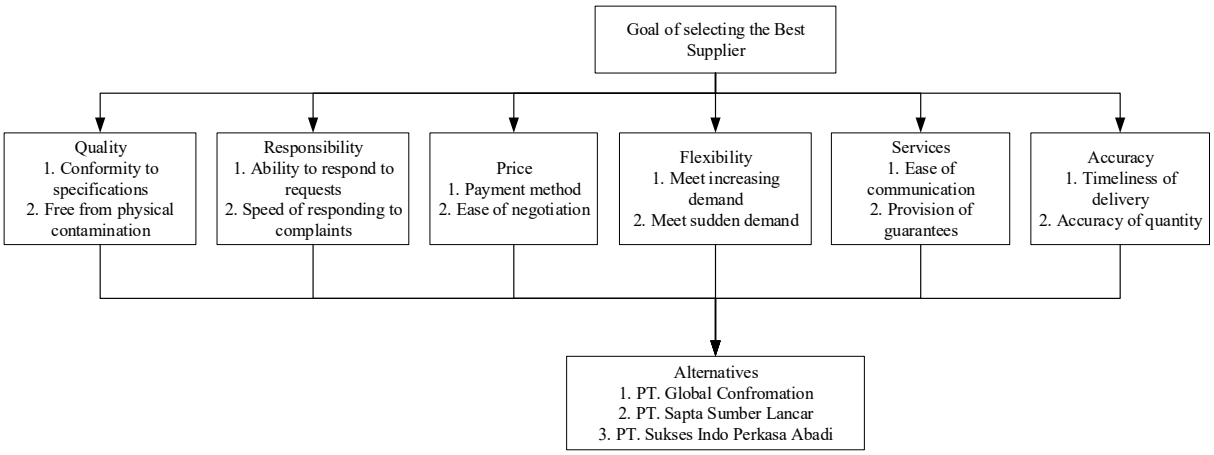

Figure 2. ANP structure

Figure 2, the structure has a goal, namely selecting the best supplier which has 6 criteria. Each criterion has sub-criteria which are used to determine the best 3 supplier alternatives.

Data collection

Interviews were conducted with the owner of PT A, the purchasing manager, and the production staff. The purpose of this interview is to find out the weaknesses, and strengths of suppliers. Data processing in this research is by processing the data from the ANP questionnaire given to the resource person, namely the owner of PT. A. This questionnaire data is the result of supplier selection from this source which has 3 alternative suppliers, namely PT. GC, PT. SSL, and PT. SIPA as in Table 1.

Table 1. Alternative suppliers

No	Alternative Supplier
1	PT. GC
2	PT. SSL
3	PT. SIPA

Selection of criteria and sub-criteria

In this research, criteria and sub-criteria are selected based on previous research, and then respondents will choose criteria that are appropriate to existing conditions in the company. Selected criteria and subcriteria are shown in Table 2.

Table 2. Criteria and sub-criteria [14]

No.	Criteria	SubCriteria
1	Quality	Specification compliance Free of physical contamination
2	Responsibility	Ability to respond to requests Speed of responding to complaints
3	Price	Ease of negotiation Payment method
4	Flexibility	Meet the increasing number of requests Fulfill sudden requests
5	Service	Ease of communication Providing guarantees
6	Accuracy	On-time delivery Quantity accuracy

In this research, 3 questionnaires were designed which had to be filled out sequentially to collect the necessary data. The first questionnaire focused on the relationship between criteria and subcriteria to understand the dependencies between them as a basis for creating the ANP model. The second questionnaire is for pairwise comparisons to determine the weight of the influence of each subcriterion. The final questionnaire aims to evaluate the judgment value of each sub-criteria for each alternative supplier of iron plate components in panel boxes. The pairwise comparison process was carried out using an importance scale from 1 to 9, as listed in Table 3.

Table 3. Importance Value [10]

Importance Value	Understanding
1	Equally Important
3	An element is relatively more important than other elements
5	One element is more important than other elements
7	One element is more important than other elements
9	An element is more important than other elements
2,4,6,8	Values that are between two adjacent values

At this stage, the research focuses on determining the dependency relationship between sub-criteria using the voting method. In this context, interdependence relationships are intended to be

determined by research results based on the respondent's perspective. In this research, we received participation from 3 respondents who had different roles in PT. Agrivito, namely company owner, purchasing manager, and production staff. If the results of the questionnaire show that the number of respondents who choose a relationship between sub-criteria is greater than or equal to half of the total respondents (≥ 1.5), this indicates that there is a significant relationship between the criteria in question.

Data processing using the ANP method

Data processing was carried out based on the assessment results from questionnaires that had been filled out by respondents using the help of Superdecision software. The following are the calculation steps using Superdecision Software [15]:

a. Calculate the geometric mean value to cumulate respondents' answers in a formula to get one answer or a decision. The formula for creating a geometric mean is shown in the following equation [16].

$$\left(\prod_{i=1}^{n} x_i\right)^{\frac{1}{n}} = \sqrt[n]{X_1 X_2 \ldots X_n} \quad (1)$$

b. Enter the geometric average calculation results in the Superdecision software.
c. Calculate the consistency ratio, where the consistency ratio must be equal to or less than 10%. If the value is more than 10% then the decision data assessment must be corrected [17].
d. Create a supermatrix as a priority vector result from pairwise comparisons between clusters, criteria, and alternatives. The supermatrix consists of three stages, namely the Unweighted Supermatrix, the Weighted Supermatrix, and the Limit Supermatrix [18].
e. Carry out synthesis to determine the order of the best suppliers based on predetermined criteria.

ANP network structure

An image of the ANP network structure in Super decisions 2.2.0 Software is shown in Figure 3.

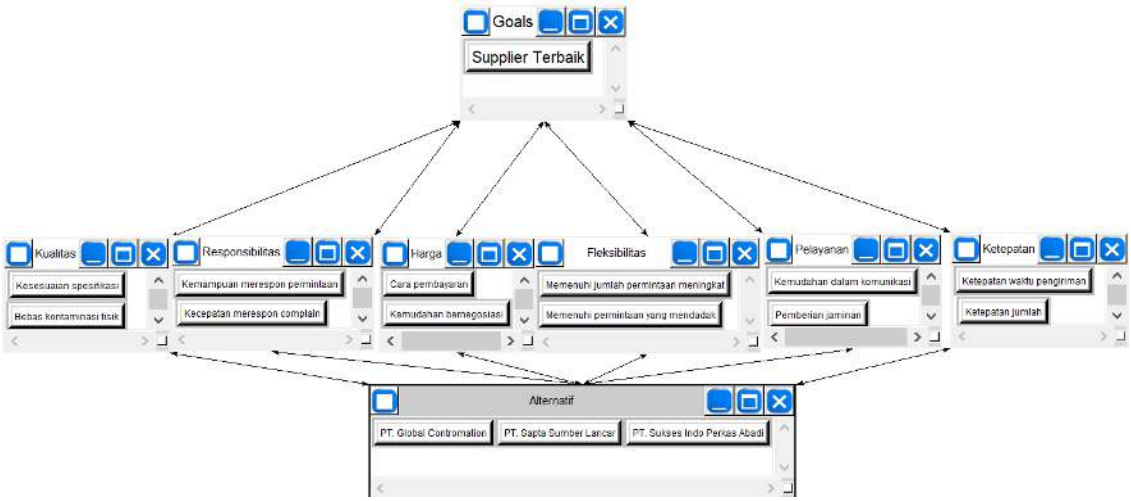

Figure 3. ANP network structure

Figure 3 shows the form of the ANP network structure for selecting the best supplier at PT. A by using super decision software. The network structure has 6 criteria branches with each criterion having 2 sub-criteria which if added together are 12 sub-criteria. The six criteria and 12 sub-criteria are used to determine 3 alternative suppliers of raw materials for electrical panel boxes.

Consistency testing is an important step in analyzing data to ensure its continued credibility. When performing pairwise comparison analysis, it is important to check the resulting consistency ratio values. A consistency ratio value of less than or equal to 0.1 indicates that the data being evaluated has reached an acceptable level of consistency. For example, when using Super decision software, the consistency test results can be displayed as shown in Figure 4. The consistency test results show that

the inconsistency value obtained is 0.08585, which is within the range that is considered consistent (≤ 0.1), so It can be concluded that the data evaluated has been well-tested for consistency.

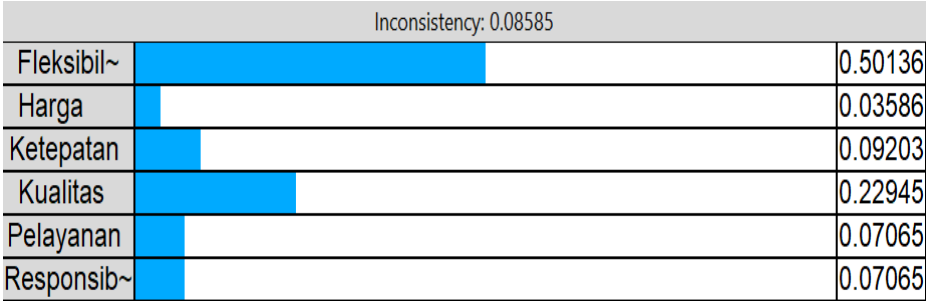

Figure 4. Consistency test

Super decisions software, the Computation command is used to carry out the necessary weighting to determine the priority of pairwise comparison results between clusters, criteria, and alternatives. The next step involves the formation of a super matrix, consisting of an unweighted super matrix, a weighted super matrix, and a Limit Super matrix. After that, the process continues by compiling a recapitulation of alternative results obtained from the Super decisions software, as shown in Figure 4.

Table 4. Recapitulation results

No.	Alternative Supplier	Recapitulation results
1	PT. GC	4,303
2	PT. SSL	2,748
3	PT. SIPA	4,949

Figure 4, the results are a recapitulation of the weighting results for each sub-criteria for each alternative raw material supplier for electrical panel boxes using Superdecision software. These results show that the highest total weight is at PT. SIPA with a result of 4,949. The second highest is PT GC with a result of 4,303, and the last is PT. SSL with a result of 2,748.

Based on the results of data processing using Super decisions software, PT. A has succeeded in determining the priority order of criteria in selecting their suppliers. These results reveal that quality criteria are the most prioritized by companies in this process, as seen in Table 5. Data analysis also shows that the Flexibility criterion has a significant weight, namely 0.50136 or the equivalent of 50.13% of its influence on the supplier selection process. The high weight on this quality criterion indicates PT's seriousness. An in prioritizing high flexibility in the components to be used. This is strategic considering the need for electrical panel box components which must be able to quickly adapt to fluctuating demand to maintain a smooth production process and meet consumer needs promptly. Details of the weights of criteria and sub-criteria can be seen in Figure 5.

Table 5. Criteria and sub-criteria weights

No	Criteria	Weight	SubCriteria	Weight
1	Quality	0,22945	Specification compliance	0,05999
			Free of physical contamination	0,04783
2	Responsibility	0,07065	Ability to respond to requests	0,03210
			Speed of responding to complaints	0,02617
3	Price	0,03586	Ease of negotiation	0,07229
			Payment method	0,02172
4	Flexibility	0,50136	Meet the increasing number of requests	0,12651
			Fulfill sudden requests	0,22915
5	Service	0,07065	Ease of communication	0,15245
			Providing guarantees	0,03969
6	Accuracy	0,09203	On-time delivery	0,08711
			Quantity accuracy	0,10498
	Total	1		1

Figure 5 is the weighting result of each criterion and sub-criteria in selecting the best supplier at PT. A using super decision software. The flexibility criteria seen so far from suppliers is if the supplier always supplies goods in large quantities suddenly and can fulfill purchasing requests well. Next, namely, the Quality criteria which gets a weight of 0.22945 or 22.95% influences supplier selection process.

Quality criteria affect the quality of the electrical panel box produced and the quality of the iron plate must comply with specifications and be free from physical contamination. These criteria greatly influence the production of electrical panel boxes because the weight obtained is very high. Each criterion has 2 sub-criteria which are details of the criteria needed to select the best supplier.

The weight for each sub-criterion is shown in Table 5. The highest weight of the sub-criterion for fulfilling sudden requests is 0.22915 or 22.92%. This sub-criterion is contained in the flexibility criterion which also has the highest weight.

Analysis of Supplier Selection Results using the ANP Method

Processing using super decision software produces a weighting of each sub-criteria for alternative suppliers. These results can be a benchmark for determining the best supplier for PT. A. The following are the results of super decision software data processing.

Explains the electrical panel box component suppliers who are suppliers at PT. A, namely PT. GC, PT SSL, and PT SIPA. The results of PT SIPA's data processing obtained the highest score in almost all sub-criteria including the sub-criteria of ease of negotiation (0.63484), accuracy of quantities (0.63699), meeting sudden requests (0.63699), on time delivery (0.63699), providing guarantees (0.66942), speed of responding to complaints (0.63699), and ability to respond to requests (0.63699). Meanwhile PT GC only excels in the sub-criteria of meeting the increasing number of requests (0.73065), payment method (0.37129), free from physical contamination (0.73065), conformity to specifications (0.63699), and ease of communication (0, 66942). Meanwhile for PT. SSL does not have the highest sub-criterion.

3. CONCLUSION

The conclusion of this research is that the selection of raw material suppliers involves six criteria, twelve sub-criteria and three alternatives. The criteria and sub-criteria obtained have their respective weights when processing using ANP. The criterion with the highest weight is flexibility of 0.50135 or 50.13%. Meanwhile, the sub-criterion that has the highest weight is fulfilling sudden requests of 0.22915 or 22.91%. This weight really influences the results on priorities in selecting the best supplier. It was found in research from selecting suppliers of iron plate for electrical panel boxes using the highest number of sub-criteria based on the ANP method. The supplier chosen was PT SIPA because it had the highest sub-criteria in seven sub-criteria.

ACKNOWLEDGEMENT

This research can run well and smoothly with the help of all parties concerned. Therefore, thanks are given to PT. Agrivito as a research site.

REFERENCE

[1] E. A. Sambudi, “Analisa pemilihan supplier dengan metode Analytic Hierarchy Process: Kasus Perusahaan Otomotif di Sunter,” *Oper. Excell. J. Appl. Ind. Eng.*, vol. 11, no. 3, p. 322, 2019, doi: 10.22441/oe.v11.3.2019.040. https://doi.org/10.22441/oe.v11.3.2019.040

[2] D. Rivaldi, F. Pulansari, and A. P. Kartika, “Analisis Pemilihan Supplier Baut Menggunakan Metode Ahp-Topsis Pt. Stechoq Robotika Indonesia,” *J@ti Undip J. Tek. Ind.*, vol. 18, no. 2, pp. 79–87, 2023, doi: 10.14710/jati.18.2.79-87. https://doi.org/10.14710/jati.18.2.79-87

[3] M. N. S. Hendra Perdana, “Sistem Pendukung Keputusan Dalam Pembelian Rumah Menggunakan Metode Analytical Network Process,” *Bimaster Bul. Ilm. Mat. Stat. dan Ter.*, vol. 8, no. 3, pp. 579–588, 2019, doi: 10.26418/bbimst.v8i3.34092. https://doi.org/10.26418/bbimst.v8i3.34092

[4] A. Bakhtiar, D. Rahmadani, D. Lathuihamalo, and B. Maulana, "Analisis Pemilihan Supplier Menggunakan Metode Analytical Network Process (Anp) Pada Pengadaan Komponen Rail Pad 158-7 (Studi Kasus : Pt Pindad (Persero))," *J@ti Undip J. Tek. Ind.*, vol. 16, no. 1, pp. 1–9, 2021, doi: 10.14710/jati.16.1.1-9. https://doi.org/10.14710/jati.16.1.1-9

[5] A. V. S. T. Wijaya, A. Setiawan, and A. Noertjahyana, "Aplikasi Rekomendasi Supplier Supermaket Greensmart dengan Metode Analytical Network Process," *J. Infra*, vol. 8, no. 1, pp. 152–158, 2020.

[6] W. Yusnaeni and R. Ningsih, "Analisa Perbandingan Metode Topsis, Saw Dan Wp Melalui Uji Sensitifitas Untuk Menentukan Pemilihan Supplier," *J. Inform.*, vol. 6, no. 1, pp. 9–17, 2019, doi: 10.31311/ji.v6i1.4399. https://doi.org/10.31311/ji.v6i1.4399

[7] S. Sandi, "Sistem Pendukung Keputusan Pinjaman Kredit Dengan Metode Analytical Network Process," *J. Ris. Sist. Inf. dan Teknol. Inf.*, vol. 2, no. 2, pp. 25–38, 2020, doi: 10.52005/jursistekni.v2i2.44. https://doi.org/10.52005/jursistekni.v2i2.44

[8] M. N. Y. MAMAN HILMAN*1, NANDANG HENDRI PURNAMA2, "PENENTUAN SUPPLIER BAHAN BAKU KOPI GIRIBASMA DENGAN MENGGUNAKAN METODE ANALYTICAL NETWORK PROCESS (ANP) PADA KELOMPOK TANI GIRI RAHAYU DI DESA CILUMPING KECAMATAN DAYEUHLUHUR KABUPATEN CILACAP," *J. Bimbing. dan Konseling*, vol. 07, no. 1, pp. 53–60, 2017.

[9] I. Ermis and E. Oktariza, "Aplikasi Pemilihan Supplier Menggunakan Metode Profile Matching (Studi Kasus: Toko Maju Jaya)," *Multinetics*, vol. 5, no. 1, pp. 9–15, 2019, doi: 10.32722/multinetics.vol5.no.1.2019.pp.9-15. https://doi.org/10.32722/multinetics.Vol5.No.1.2019.pp.9-15

[10] M. P. R. Silitonga, "Analisa Pemilihan Supplier Bahan Baku Pasir Pada Industri Beton Dengan Metode Integrasi AHP dan TOPSIS.," *Rekayasa Sipil*, vol. 8, no. 1, p. 39, 2019, doi: 10.22441/jrs.2019.v08.i1.05. https://doi.org/10.22441/jrs.2019.V08.i1.05

[11] I. Mouludi, M. Ramdhanti, and F. Jamsan, "Decision Support System Menggunakan Analytic Hierarchy Process dan Analytical Network Process Pada Pemilihan Supplier Bahan Baku," *Invent. Ind. Vocat. E-Journal Agroindustry*, vol. 3, no. 1, p. 26, 2022, doi: 10.52759/inventory.v3i1.80. https://doi.org/10.52759/inventory.v3i1.80

[12] D. R. D. Arfan Bakhtiar, "ANALISIS PEMILIHAN SUPPLIER MENGGUNAKAN METODE ANALYTICAL NETWORK PROCESS (ANP) PADA PENGADAAN KOMPONEN RAIL PAD 158-7 (STUDI KASUS: PT PINDAD (PERSERO))," vol. 7, pp. 1–23, 2016.

[13] A. Y. Mauludhin and R. B. Jakaria, "Implementation of the Customer Relationship Management Scorecard and AHP Methods in the Manufacturing Industry," *Procedia Eng. Life Sci.*, vol. 4, no. June, pp. 0–7, 2023, doi: 10.21070/pels.v4i0.1402. https://doi.org/10.21070/pels.v4i0.1402

[14] K. Fadlulloh and M. F. F Mu'tamar, "PEMILIHAN ALTERNATIF PEMASOK BERAS INDUSTRI CATERING MENGGUNAKAN ANALYTICAL NETWORK PROCESS (Studi Kasus di PT. AXC)," *Agroindustrial Technol. J.*, vol. 3, no. 1, p. 1, 2019, doi: 10.21111/atj.v3i1.3791. https://doi.org/10.21111/atj.v3i1.3791

[15] S. T. Haidar, D. Andreswari, and Y. Setiawan, "Pemilihan Desain Rumah Minimalis 3D Dengan Menggunakan Analytical," *J. Rekursif*, vol. 7, no. 1, pp. 10–21, 2019.

[16] H. P. Ashri Ramadhani*1 , Rizal2, "ANALISIS PROBLEMATIKA MANAJEMEN SUMBER DAYA INSANI PADA BMT AL-FURQON PADANG SIBUSUK (STUDI ANALISIS MELALUI PENDEKATAN ANALYTICAL NETWORK PROCESS)," *J. Tamwil J. Ekon. Islam*, vol. 8, no. 2, pp. 1–9, 2022. https://doi.org/10.31958/jtm.v8i2.7843

[17] D. N. Artati Rut P. Girsang, Dyah Ika Rinawati, "USULAN STRATEGI PENGEMBANGAN WISATA YANG BERKELANJUTAN DI BUKIT CINTA RAWA PENING DENGAN MENGGUNAKAN SWOT ANALYSIS DAN PENDEKATAN ANALYTICAL NETWORK PROCESS (ANP)," vol. 3, p. 282, 2018.

[18] A. A. Khairun Nisa, S. Subiyanto, and S. Sukamta, "Penggunaan Analytical Hierarchy Process (AHP) Untuk Pemilihan Supplier Bahan Baku," *J. Sist. Inf. Bisnis*, vol. 9, no. 1, p. 86, 2019, doi: 10.21456/vol9iss1pp86-93. https://doi.org/10.21456/vol9iss1pp86-93

[19] M. K. Nasoik, R. B. Jakaria, A. S. Cahyana, and B. I. Putra, "Talas Cripic Packaging Design Using Kansei Engineering And Analytical Hierarchy Process (Ahp) Method," *Procedia Eng. Life Sci.*, vol. 4, no. June, 2023, doi: 10.21070/pels.v4i0.1399. https://doi.org/10.21070/pels.v4i0.1399