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Implementation of Analytic Hierarchy Process Method In the Decision Support System for Selecting Department in University

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Abstract

Every year, high school graduates show a strong desire to pursue higher education. However, many of them experience limitations in choosing a Department or study program, creating the "Wrong Department" phenomenon and facing a serious dilemma. The selection of a Department in the Faculty of Science and Technology is considered a crucial stage in the academic journey. Errors in decision-making not only affect students' career development, but also have implications for their contribution to the progress of society and the world. In this case, a systematic and measurable approach is needed to provide assistance to prospective students in making the right decision in choosing a Department. Decision Support System (DSS) becomes a crucial instrument in overcoming the complexity of the decision-making process. One method that is often applied in DSS is the Analytic Hierarchy Process (AHP). AHP helps to explicitize key factors through the formation of a hierarchy of relevant criteria, but in situations of uncertainty, Fuzzy Logic is integrated. Fuzzy Logic allows handling data uncertainty by modeling it as a membership variable in a set. The results of this study show that the most influential criteria in choosing a Department are interest and talent.

Keyword: Analytic Hierarchy Process, Decision Support System, Selecting Department, University

1. INTRODUCTION

Every year, high school graduates face significant challenges in determining the choice of Department they will pursue at the university level. This decision is crucial, as it will influence their academic and professional careers in the future. However, many of them are still not mature enough in this decision-making process [1][2]. often leading to regrets later, commonly referred to as "wrong Department"[2]. This includes the selection of Departments in the Faculty of Science and Technology, which is a critical step in a student's academic journey [3].]. If a mistake is made in this decision, it will not only affect the student's career development but also their contribution to societal and global progress [4][5][6]. Therefore, a systematic and measurable approach is needed to assist prospective students in choosing a Department that aligns with their interests, talents, and career prospects [3].

Decision Support Systems (DSS) are important tools in complex decision-making processes. This study aims to develop a DSS that can assist prospective students in selecting a Department in the Faculty of Science and Technology, and one of the approaches frequently used in DSS is the Analytic Hierarchy Process (AHP) method [7][8][9]. AHP is chosen as the decision-making model in this study due to its several advantages that are relevant to the problem of Department selection. AHP enables the breakdown of complex problems by structuring decisions into a hierarchy of factors influencing the decision, allowing for a structured assessment of these criteria and providing accurate recommendations based on relevant criteria using a combination of AHP and Fuzzy Logic[10].]. However, in some situations, the factors being evaluated do not always have definite or quantifiable values [11][12]. This is where Fuzzy Logic comes into play [13]. Fuzzy Logic allows us to address uncertainty in data or information by modeling it as a variable that is not only true or false but

also has a degree of membership in a set [14][10]. The combination of AHP and Fuzzy Logic has great potential to solve decision-making challenges in situations that are not always certain, thus the primary goal of this research is to provide a solution that can reduce the risk of making the wrong Department choice, thereby increasing the academic and professional success of prospective students. The success of this research will be measured based on the accuracy and user satisfaction with the recommendations provided by the system [15][16].

Previous research demonstrates various applications of the Analytic Hierarchy Process (AHP) method in decision-making across different fields. B. Laia and B. Sinaga (2021) utilized AHP to develop a Decision Support System (DSS) for employee performance evaluation, helping companies make more structured decisions based on performance priorities [12]. Y. Istianto and B. Sugiantoro (2018) applied Fuzzy AHP in selecting beach tourism destinations in GunungKidul, organizing a hierarchy of determining factors to provide recommendations aligned with tourist preferences [13]. R. Hruška, M. Kmetík, and J. Chocholáč (2021) implemented AHP to select the best transport mode in motor fuel logistics distribution, focusing on criteria like cost, time, and environmental impact [14]. L. Randazzo et al. (2018) employed AHP in a GIS environment to determine the optimal landfill site for solid waste in Sicily, Italy, considering geographic, environmental, and social factors[15].

In this introduction, we will further explain the importance of Department selection in the Faculty of Science and Technology and the key role of the AHP method in assisting this decision-making process [14]. We will also detail the objectives of implementing the AHP method in this decision support system, as well as the benefits expected to be gained by prospective students, faculty, and the educational institution as a whole[12][17][18].

2. MATERIAL AND METHOD

In this research, the initial stage carried out was data collection through observation, literature study, and questionnaire distribution. After the data is collected, criteria are determined in accordance with the research objectives. After the criteria are determined, the next stage is to conduct pairwise comparisons followed by the calculation of eigenvalues using the Analytic Hierarchy Process (AHP) method, then followed by an analysis of the results obtained. The flow of this research can be seen in figure 1.

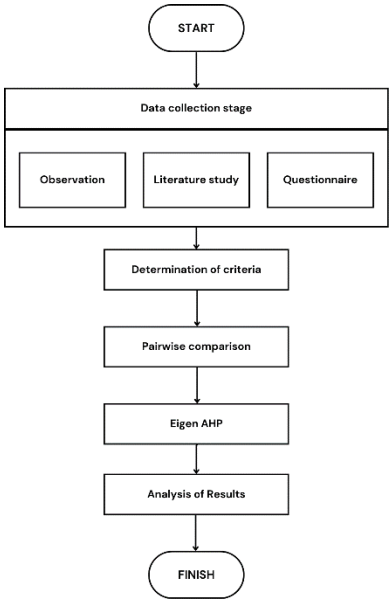

Figure 1. Research Methodology

2.1. Decision Support System (DSS)

Decision Support System is an interactive information system that presents information, performs data modeling, and allows data manipulation [19][20]. This system is used to support the decision-making process in various contexts, including situations that have a partial structure and situations that do not have a clear structure, where there is no certainty about the best way to make decisions [10][21].

Decision Support Systems (DSS) are generally designed with the purpose of supporting the search for solutions to specific problems or evaluating opportunities. DSS applications, which are a type of such DSS[22], are used in the decision-making process[14][23]. DSS applications utilize data, provide intuitive user interfaces, and enable the incorporation of thoughts from decision makers[23].

2.2. Analytical Hierarchy Process (AHP)

According to Pamuji and friends. AHP (Analytic Hierarchy Process) is a decision support model developed by Thomas L. Saaty. This model is used to describe problems involving many factors or criteria into a hierarchical structure [24]. According to Thomas L. Saaty (1993), a hierarchy is a representation of a complex problem, with the initial level being a goal [7], followed by levels of factors, criteria, sub-criteria, and so on until reaching alternatives at the lowest level. The following are the steps in the AHP method[25][26]:

1. Create a Hierarchy of problems
2. Determine the Weight
3. Choosing Priority
4. Determining the Logical Consistency Value
5. Calculating Consistency Index (CI)

$$CI = \frac{(\lambda max - n)}{(n-1)} \quad (1)$$

6. Calculating the Consistency Ratio (CR)

$$CR = \frac{CI}{IR} \quad (2)$$

2.3. Data collection model of research population and sample

1. Observation
   Collecting information through direct observation of student data related to the object of research, by recording observations [27].

2. Literature study
   Reading and studying various documents such as literature, journals, books, and other sources relevant to the research topic to obtain theories, concepts, or generalizations that can become the theoretical basis and framework of thought. The goal is to find a suitable methodology and compare theory with field reality.

3. Questionnaire
   Collecting information using a questionnaire given to prospective students of the Faculty of Science and Technology at UIN Suska Riau. In this study, 10 respondents will be taken as data collection.

2.4. Data analysis model

To achieve the objectives of this research, a quantitative analysis method is used that compares criteria and alternatives to choose the Department of prospective students. The use of the AHP method is used in the decision-making process. In the AHP method [28], the first step is to compile a hierarchy by determining the criteria to be used . The criteria chosen for this decision making are as follows[2][28]:

1. Interest and Talent
   This criterion has a natural condition or tendency that a person has towards a certain field or activity, often followed by natural ability or talent in it .

2. Career opportunities
   In this criterion to see the prospects or possibilities for obtaining employment or opportunities in a particular career after completing studies or education in the chosen field [6][29].

3. Review facilities and infrastructure
   In this criterion to evaluate the physical conditions and equipment available in the teaching and learning environment, including buildings, equipment, technology, and other facilities that support the educational process[14][30].

4. Reputation of the teacher
   In this criterion to assess the expertise, competence, experience, and success of teachers or lecturers in guiding [2].

5. Evaluation of resource availability (scholarships)
   In this criterion to measure the willingness or availability of financial support, such as scholarships or other funding assistance, which can help students in completing their studies[2][31].

6. History of academic achievement
   In this criterion to see records or track records of previous academic achievements, such as grades, awards, or other achievements that have been achieved by students in the past[32].

7. Graduate Relations
   In this criterion, connections or relationships that exist between graduates of an educational institution that can provide benefits in terms of career development, information exchange, or social support for students when or after completing their education [10].

From these criteria and alternatives, a hierarchical model of department selection at the Faculty of Science and Technology UIN Suska Riau is obtained as follows:

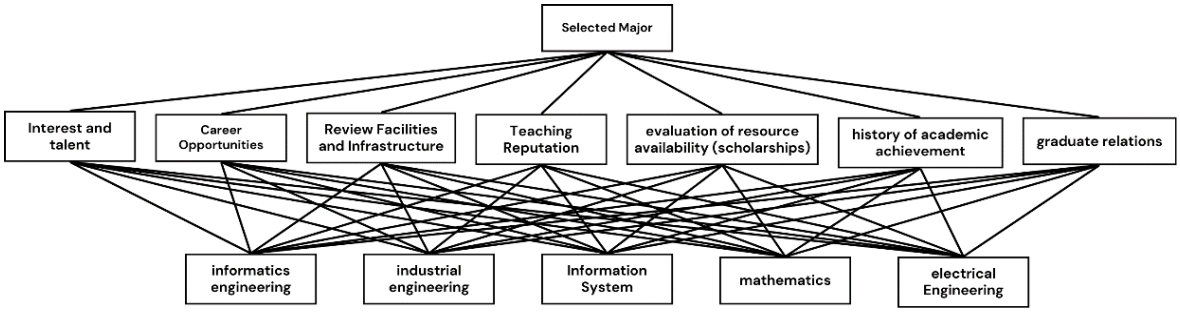

Figure 2. Hierarchy Model

The picture above explains that at the Goal level is the Department chosen by the student. At the criteria level, there are 7 criteria that become the acua for choosing a Department based on talent interests, career opportunities, review facilities and infrastructure, teacher reputation, evaluation of resource availability (scholarships), history of academic achievement, alumni network. Then, at the alternative level there are choices of Departments at the Faculty of Science and Technology consisting of Informatics Engineering, Industrial Engineering, Information Systems, Mathematics, and Electrical Engineering [7].

3. RESULTS AND DISCUSSION

The results of the analysis show that the criteria that have the most influence on the selection of Departments are the criteria of interest and talent, followed by career opportunities, review of facilities and infrastructure, teaching reputation, evaluation of resource availability, history of academic achievement, and alumni network. Then the comparison matrix of the reference results above is:

Table 1. Pairwise Comparison Matrix Table

criteria	MDB	PK	TFI	RM	EKS	SPA	JA
MDB	1	MDB/PK	MDB/TFI	MDB/RM	MDB/EKS	MDB/SPA	MDB/JA
PK	PK/MDB	1	PK/TFI	PK/RM	PK/EKS	PK/SPA	PK/JA
TFI	TFI/MDB	TFI/PK	1	TFI/RM	TFI/EKS	TFI/SPA	TFI/JA
RM	RM/MDB	RM/PK	RM/TFI	1	RM/EKS	RM/SPA	RM/JA
EKS	EKS/MDB	EKS/PK	EKS/TFI	EKS/RM	1	EKS/SPA	EKS/JA
SPA	SPA/MDB	SPA/PK	SPA/TFI	SPA/RM	SPA/EKS	1	SPA/JA
JA	JA/MDB	JA/PK	JA/TFI	JA/RM	JA/EKS	JA/SPA	1

Table 2. Hierarchical weighting factor matrix for all criteria

Criteria	MDB	PK	TFI	RM	EKS	SPA	JA
MDB	1.00	1.00	3.00	2.00	2.00	3.00	4.00
PK	1.00	1.00	1.00	3.00	2.00	3.00	3.00
TFI	0.33	1.00	1.00	3.00	1.00	2.00	2.00
RM	0.50	0.33	0.33	1.00	3.00	2.00	2.00
EKS	0.50	0.50	1.00	0.33	1.00	3.00	3.00
SPA	0.33	0.33	0.50	0.50	0.33	1.00	3.00
JA	0.25	0.33	0.50	0.50	0.33	0.33	1.00

Table 2 is an overview of the hierarchical weighting factor matrix for all criteria. The criteria that become a reference are career opportunities, review facilities and infrastructure, faculty reputation, evaluate the availability of resources (scholarships), history of academic achievement, alumni network.

After getting an overview of the hierarchical seeding factor matrix for all criteria, next determine the Eigen value:

1. Square the pairwise comparison matrix

1.00	1.00	3.00	2.00	2.00	3.00	4.00		1.00	1.00	3.00	2.00	2.00	3.00	4.00
1.00	1.00	1.00	3.00	2.00	3.00	3.00		1.00	1.00	1.00	3.00	2.00	3.00	3.00
0.33	1.00	1.00	3.00	1.00	2.00	2.00		0.33	1.00	1.00	3.00	1.00	2.00	2.00
0.50	0.33	0.33	1.00	3.00	2.00	2.00	x	0.50	0.33	0.33	1.00	3.00	2.00	2.00
0.50	0.50	1.00	0.33	1.00	3.00	3.00		0.50	0.50	1.00	0.33	1.00	3.00	3.00
0.33	0.33	0.50	0.50	0.33	1.00	3.00		0.33	0.33	0.50	0.50	0.33	1.00	3.00
0.25	0.33	0.50	0.50	0.33	0.33	1.00		0.25	0.33	0.50	0.50	0.33	0.33	1.00

2. Sum of pairwise comparison squared matrices

10.25	12.00	15.67	22.67	20.33	29.33		110.25	0.280
6.58	7.00	11.00	14.67	18.00	24.00		81.25	0.206
4.83	5.17	7.00	12.00	15.00	17.67	=	61.67	0.157
4.11	4.33	7.50	7.00	9.33	16.83		49.11	0.125
3.75	4.61	7.11	9.17	7.00	12.67		44.31	0.113
2.33	2.83	4.33	5.78	5.00	7.00		27.28	0.069
1.53	1.86	2.75	4.28	3.94	5.42		19.78	0.050
							393.64	1.000

3. The process is stopped after processing the eigenvalue
   a. Interest and Talent (MDB) : 0.408
   b. Career Opportunities (PK) : 0.295
   c. Review Facilities & Infrastructure (TFI) : 0.115
   d. Reputation of Teaching (RM) : 0.072
   e. Evaluate Resource Availability (EKS) : 0.045
   f. History of Academic Achievement (SPA) : 0.030
   g. Alumni Network (JA) : 0.035

4. Pairwise comparison of matrix alternatives on criteria
   a. Interests and Talents (MDB)

	TIF	TI	SI	MT	TE
TIF	1.00	5.00	3.00	7.00	7.00
TI	0.20	1.00	5.00	4.00	6.00
SI	0.33	0.20	1.00	3.00	4.00
MT	0.14	0.25	0.33	1.00	3.00
TE	0.14	0.17	0.25	0.33	1.00

   b. Career Opportunities (PK)

	TIF	TI	SI	MT	TE
TIF	1.00	3.00	7.00	5.00	5.00
TI	0.33	1.00	6.00	4.00	3.00
SI	0.14	0.17	1.00	2.00	7.00
MT	0.20	0.25	0.50	1.00	8.00
TE	0.20	0.33	0.14	0.13	1.00

   c. Review Facilities and Infrastructure (TFI)

	TIF	TI	SI	MT	TE
TIF	1.00	6.00	4.00	3.00	8.00
TI	0.17	1.00	2.00	7.00	5.00
SI	0.25	0.50	1.00	5.00	4.00
MT	0.33	0.14	0.20	1.00	6.00
TE	0.13	0.20	0.25	0.17	1.00

d. Reputation for Teaching (RM)

	TIF	TI	SI	MT	TE
TIF	1.00	2.00	7.00	5.00	4.00
TI	0.50	1.00	5.00	3.00	4.00
SI	0.14	0.20	1.00	7.00	5.00
MT	0.20	0.33	0.14	1.00	7.00
TE	0.25	0.25	0.20	0.14	1.00

e. Evaluation of Resource Availability (EKS)

	TIF	TI	SI	MT	TE
TIF	1.00	5.00	3.00	2.00	5.00
TI	0.20	1.00	4.00	5.00	3.00
SI	0.33	0.25	1.00	6.00	7.00
MT	0.50	0.20	0.17	1.00	4.00
TE	0.20	0.33	0.14	0.25	1.00

f. History of Academic Achievement (SPA)

	TIF	TI	SI	MT	TE
TIF	1.00	4.00	5.00	4.00	5.00
TI	0.25	1.00	6.00	5.00	3.00
SI	0.20	0.17	1.00	3.00	2.00
MT	0.25	0.20	0.33	1.00	4.00
TE	0.20	0.33	0.50	0.25	1.00

g. Alumni Network (JA)

	TIF	TI	SI	MT	TE
TIF	1.00	4.00	3.00	4.00	5.00
TI	0.25	1.00	6.00	5.00	8.00
SI	0.33	0.17	1.00	7.00	2.00
MT	0.25	0.20	0.14	1.00	3.00
TE	0.20	0.13	0.50	0.33	1.00

5. Total Pairwise Comparison of Eigen Alternatives on Criteria
The results of calculating the eigenvalue of alternatives for each criterion based on pairwise comparisons made by decision makers as a whole, can be seen in table 3.

Table 3. Pairwise Comparison of Eigen Alternatives on Criteria

Criteria/ Alternatives	MDB	PK	TFI	RM	EKS	SPA	JA
Informatics Engineering (TIF)	0.478	0.419	0.448	0.391	0.374	0.441	0.395
Industrial Engineering (TI)	0.274	0.275	0.245	0.263	0.275	0.284	0.345
Information System (SI)	0.133	0.142	0.170	0.203	0.217	0.115	0.144
Mathematics (MT)	0.076	0.127	0.104	0.107	0.093	0.103	0.071
Electrical Engineering (TE)	0.040	0.036	0.033	0.036	0.041	0.057	0.045

6. Determine the global priority weight

$$W_{global} = W_{alternatif} . W_{kriteria} \text{ or } W_{global} = W_{AK} . W_{Ci} \quad (3)$$

W_{global} : Global priority weight
$W_{alternatif} = W_{AK}$: WAK: Alternative weights or alternative aigenes on each criterion
$W_{kriteria} = W_{Ci}$: WCi: Weight of criteria or eigen criteria
W : Weight or eigen Vector

Thus obtaining the weight for each alternative, can show table 4.

Table 4. Selected alternative

Department	Eigen Global	Rank/ Priority
Informatics Engineering (TIF)	0.442	1
Industrial Engineering (TI)	0.273	2
Information System (SI)	0.149	3

Department	Eigen Global	Rank/ Priority
Mathematics (MT)	0.098	4
Electrical Engineering (TE)	0.038	5

7. Calculating the Consistency Ratio
   a. Determining Weighted Sum Vector (WSV)
   WSV is obtained by multiplying the pairwise comparison matrix by the eigenvalue, according to equation 1.

$$\begin{vmatrix} 1.00 & 1.00 & 3.00 & 2.00 & 2.00 & 3.00 & 4.00 \\ 1.00 & 1.00 & 1.00 & 3.00 & 2.00 & 3.00 & 3.00 \\ 0.33 & 1.00 & 1.00 & 3.00 & 1.00 & 2.00 & 2.00 \\ 0.50 & 0.33 & 0.33 & 1.00 & 3.00 & 2.00 & 2.00 \\ 0.50 & 0.50 & 1.00 & 0.33 & 1.00 & 3.00 & 3.00 \\ 0.33 & 0.33 & 0.50 & 0.50 & 0.33 & 1.00 & 3.00 \\ 0.25 & 0.33 & 0.50 & 0.50 & 0.33 & 0.33 & 1.00 \end{vmatrix} \times \begin{vmatrix} 0.280 \\ 0.206 \\ 0.157 \\ 0.125 \\ 0.113 \\ 0.069 \\ 0.050 \end{vmatrix} = \begin{vmatrix} 1.840 \\ 1.601 \\ 1.182 \\ 0.963 \\ 0.913 \\ 0.560 \\ 0.390 \end{vmatrix}$$

   b. Calculating Consistence Vector (CV)
   CV is the result of the comparison between WSV and eigenvalues, according to equation 2

$$CV = \begin{vmatrix} 1.840 \\ 1.601 \\ 1.182 \\ 0.963 \\ 0.913 \\ 0.560 \\ 0.390 \end{vmatrix} / \begin{vmatrix} 0.280 \\ 0.206 \\ 0.157 \\ 0.125 \\ 0.113 \\ 0.069 \\ 0.050 \end{vmatrix} = \begin{vmatrix} 6.569 \\ 7.757 \\ 7.547 \\ 7.715 \\ 8.109 \\ 8.087 \\ 7.770 \end{vmatrix}$$

   c. Calculating Lambda (λ)
   The lambda value is obtained using Equation

$$\begin{vmatrix} 7.020 \\ 7.683 \\ 7.771 \\ 9.528 \\ 11.396 \\ 11.361 \\ 8.636 \end{vmatrix} / 7 = 9.056$$

   d. Calculating Consistence Index (CI)

$$CI = \frac{9,056 - 7}{6} = 0.343$$

   e. Calculating Consistence Ratio (CR)
   Based on the formula, CR is the result of the division between CI and IR with the IR provisions that have been applied based on the size of the random index table. In this case the number of criteria or n = 7, the IR value is 1.32.

$$CR = \frac{0.343}{1.32} = 0.260$$

The implementation of the Analytic Hierarchy Process (AHP) method in the Decision Support System (DSS) at the Faculty of Science and Technology, Sultan Syarif Kasim State Islamic University of Riau, aims to assist prospective students in systematically selecting the right Department. AHP helps evaluate seven main criteria: interest and talent, career opportunities, facilities and infrastructure, teacher reputation, availability of scholarships, academic achievements, and alumni networks, with the results showing that interest and talent are the most influential criteria (0.408). Informatics Engineering emerged as the top Department choice with the highest weight (0.442). This method is relevant in the campus context as it helps students make more informed decisions and prevents cases of choosing the wrong Department, which can negatively impact their career development and academic satisfaction.

4. CONCLUSION

Based on the results of pairwise comparisons conducted by one of the students using the Analytical Hierarchy Process (AHP) method to determine the criteria that have the most influence on the selection of Departments, it is concluded that the Interest and Talent criteria are the criteria that have the highest priority with an eigenvalue of 0.280, followed by Career Opportunities with an eigen value of 0.206, Review Facilities & Infrastructure with an eigen value of 0.157, Teaching Reputation with an eigen value of 0.125, Evaluation of Resource Availability with an eigen value of 0.113, History of Academic Achievement with an eigen value of 0.069, and Alumni Network with an eigen value of 0.050.

REFERENCES

[1] V. D. Iswari, F. Y. Arini, and M. A. Muslim, "Decision Support System for the Selection of Outstanding Students Using the AHP-TOPSIS Combination Method," *Lontar Komput. J. Ilm. Teknol. Inf.*, vol. 10, no. 1, p. 40, 2019, doi: 10.24843/lkjiti.2019.v10.i01.p05.

[2] S. D. Yulianti, R. Nuraini, M. I. Shalahudin, and M. H. Prayitno, "Decision support system for selection of exemplary students using the analytical hierarchy process (AHP) method," *J. Tek. Inform. C.I.T Medicom*, vol. 15, no. 2, pp. 96–107, 2023, doi: 10.35335/cit.vol15.2023.461.pp96-107.

[3] Winarno, A. Prasetyo, and A. Wijayanto, "Decision Support System for Indonesia Smart Card (KIP) Scholarship Selection Using The AHP And VIKOR Method Integrated with EKTP," *E3S Web Conf.*, vol. 448, p. 02035, 2023, doi: 10.1051/e3sconf/202344802035.

[4] B. D. H. Putranto, D. Kurniadi, and A. Widiharini, "Selection Of The Best Employees Using Analytical Hierarchy Process at PT. Gotrans Logsitics International Semarang Branch," *J. Appl. Sci. Technol.*, vol. 1, no. 02, p. 30, 2021, doi: 10.30659/jast.1.02.30-37.

[5] T. D. Puspitasari, E. O. Sari, P. Destarianto, and H. Y. Riskiawan, "Decision Support System for Determining Scholarship Selection using an Analytical Hierarchy Process," *J. Phys. Conf. Ser.*, vol. 953, no. 1, 2018, doi: 10.1088/1742-6596/953/1/012119.

[6] Soleman, "Decision support system for employee candidate selection using AHP and PM methods," *Int. J. Adv. Comput. Sci. Appl.*, vol. 10, no. 11, pp. 220–231, 2019, doi: 10.14569/IJACSA.2019.0101130.

[7] A. Abdillah, "Implementation of The Analytical Hierarchy Process (AHP) Method in The Laptop Election Decision Support System for Students and Community in Medan City," *ZERO J. Sains, Mat. dan Terap.*, vol. 5, no. 2, pp. 21–33, 2022, doi: 10.30829/zero.v5i2.11123.

[8] R. Malemnganbi and B. A. Shimray, "An integrated multiple layer perceptron-genetic algorithm decision support system for photovoltaic power plant site selection," *Int. J. Electr. Comput. Eng.*, vol. 12, no. 2, pp. 1965–1972, 2022, doi: 10.11591/ijece.v12i2.pp1965-1972.

[9] M. M. Putra, S. Alim, and D. B. Pangestu, "Decision Support System Selection of The Best Citilink Agent Call Center Using the Fuzzy Ahp Method (analytical Hierarchy Process) (case Study: Pt. Infomedia Surabaya Call Center Citilink)," *JEECS (Journal Electr. Eng. Comput. Sci.*, vol. 6, no. 1, pp. 975–984, 2021, doi: 10.54732/jeecs.v6i1.186.

[10] D. Yuliana, F. Ayu, F. Hidayat, S. Alfadri, and C. Author, "Application Of Decision Support System For Employee ' S," vol. 4, no. 1, pp. 441–450, 2022.

[11] T. Alkan and S. S. Durduran, "Gis-supported mapping of suitable parking areas using ahp method: The case of konya," *Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci. - ISPRS Arch.*, vol. 46, no. 4/W5-2021, pp. 51–56, 2021, doi: 10.5194/isprs-Archives-XLVI-4-W5-2021-51-2021.

[12] B. Laia and B. Sinaga, "Decision Support System for Employee Performance Using AHP Method," *Int. J. Basic Appl. Sci.*, vol. 10, no. 3, pp. 116–125, 2021, doi: 10.35335/ijobas.v10i3.33.

[13] Y. Istianto and B. Sugiantoro, "Design of Decision Support System Selection of Beach Tourism Object in GunungKidul using Fuzzy AHP Method," *IJID (International J. Informatics Dev.*, vol. 6, no. 2, p. 12, 2018, doi: 10.14421/ijid.2017.06203.

[14] R. Hruška, M. Kmetík, and J. Chocholáč, "Selection of the Transport Mode Using the Ahp Method Within Distribution Logistics of Motor Fuels," *Promet - Traffic Transp.*, vol. 33, no. 6, pp. 905–917, 2021, doi: 10.7307/ptt.v33i6.3940.

[15] L. Randazzo *et al.*, "Landfill site selection for municipal solid waste by using AHP method in GIS environment: Waste management decision-support in sicily (Italy)," *Detritus*, vol. 2, no. June, pp. 78–88, 2018, doi: 10.31025/2611-4135/2018.13656.

[16] M. I. Sirojul, A. Bogor, S. H. Sukmana, S. Fauziah, S. Sahara, and E. D. Sikumbang, "JITE (Journal of Informatics and Telecommunication Engineering) Implementation AHP Method in Selection of Outstanding Students at," vol. 5, no. January, pp. 332–341, 2022.

[17] O. DOGUC, "Eleman İşe Alım Süreci İçin AHP Metodu ile Karar Destek Sistemi," *Ekon. İşletme ve Maliye Araştırmaları Derg.*, vol. 4, no. 2, pp. 126–145, 2022, doi: 10.38009/ekimad.1142952.

[18] A. Ishak, A. Y. Bin Ali, S. Budin, and R. Ginting, "Decision Support System for Selection and Assessment of Solid Waste Processing Technology from Oil Palm Industry using Analytical Hierarchy

Process (AHP)," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 1003, no. 1, 2020, doi: 10.1088/1757-899X/1003/1/012150.

[19] R. Zubaedah, S. H. D. Loppies, and F. Xaverius, "Decision Support System for Selecting House using Analythical Hierarchy Process," *Int. J. Multidiscip. Sci. Arts*, vol. 2, no. 1, pp. 100–106, 2023, doi: 10.47709/ijmdsa.v2i1.2490.

[20] H. Setiadi, N. A. M. Suni, and D. W. Wardani, "Decision Support System to Select Elective Courses Using Hybrid AHP-Promethee Method," *Performa Media Ilm. Tek. Ind.*, vol. 21, no. 1, p. 105, 2022, doi: 10.20961/performa.21.1.60307.

[21] M. H. Calp and S. Agarwal, "An AHP-based Decision Support System for Personnel Selection for Manager Position in Businesses," *Proc. Int. Conf. Res. Manag. Technovation*, vol. 28, pp. 1–7, 2022, doi: 10.15439/2021km98.

[22] L. Sabrina, F. Rakhmawati, and I. Husein, "Implementation Of Decision Selection In The Selection Of Transportation Modes Among Workers And Students In Medan City Using Ahp And Electric Methods," *ZERO J. Sains, Mat. dan Terap.*, vol. 6, no. 1, p. 24, 2022, doi: 10.30829/zero.v6i1.12454.

[23] M. Mukharir and R. Wardoyo, "Decision Support System for Laptop Selection Using AHP Method and Profile Matching," *IJCCS (Indonesian J. Comput. Cybern. Syst.*, vol. 15, no. 3, p. 307, 2021, doi: 10.22146/ijccs.67811.

[24] S. A. Chandra, E. Winarko, and S. Priyanta, "Adwords Keyword Set Selection Decision Support System Using AHP and TOPSIS Method," *IJCCS (Indonesian J. Comput. Cybern. Syst.*, vol. 14, no. 2, p. 135, 2020, doi: 10.22146/ijccs.50731.

[25] J. Juliana, J. Jasmir, and P. A. Jusia, "Decision Support System for Supplier Selection using Analytical Hierarchy Process (AHP) Method," *Sci. J. Informatics*, vol. 4, no. 2, pp. 158–168, 2017, doi: 10.15294/sji.v4i2.12015.

[26] Noviana, M. B, and S. Ramadhani, "Decision Support System for Selection of the Superior Mango Seeds Using Web-based Analytical Hierarchy Process (AHP) Hybrid Simple Additive Weighting (SAW) Method," *Tepian*, vol. 3, no. 2, pp. 76–84, 2022, doi: 10.51967/tepian.v3i2.852.

[27] I. H. Batubara and I. P. Sari, "Combination of Analytic Hierarchy Process (AHP) Method and Profile Matching Method with Matrix Decomposition in Determining Olympiad Candidates," *Int. J. Econ. Technol. Soc. Sci.*, vol. 2, no. 2, pp. 470–477, 2021, doi: 10.53695/injects.v2i2.536.

[28] T. G. Soares, M. F. X. Cham, A. Z. Abidin, and T. Wahyuningrum, "a Hybrid Methods Dss for the Best Performing Lecturers Selection," *Int. J. Soft Comput. Artif. Intell. Appl.*, vol. 12, no. 1, pp. 1–13, 2023.

[29] I. K. A. Pirnanda, I. M. A. Pradnyana, and I. M. A. Wirawan, "Decision Support System for Household Labor Services Selection 'Best Helper' Using AHP and TOPSIS Methods," *Sci. J. Informatics*, vol. 6, no. 1, pp. 106–115, 2019, doi: 10.15294/sji.v6i1.18050.

[30] R. Kumar *et al.*, "Into the furniture woods: Analytical hierarchy process method," *Int. J. Recent Technol. Eng.*, vol. 8, no. 2 Special Issue 3, pp. 1562–1567, 2019, doi: 10.35940/ijrte.B1285.0782S319.

[31] D. A. Kristiyanti and G. W. Pangemanan, "Decision Support System in Determining the Best Judo Athlete Using Ahp Method," *J. Pilar Nusa Mandiri*, vol. 16, no. 1, pp. 45–52, 2020, doi: 10.33480/pilar.v16i1.919.

[32] S. Hidayat HR, M. Susanti, and M. Rahmawati, "Selection of the Right Marketplace for Sale of Ornamental Plants Using Analytical Hierarchy Process (Ahp) Method," *J. Techno Nusa Mandiri*, vol. 18, no. 1, pp. 39–48, 2021, doi: 10.33480/techno.v18i1.2054.