

Decision Support System for Selecting Outstanding Students University using the Method Multi Attribute Utility Theory (MAUT)

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Abstract—The Selection of Outstanding Students describes the activities that have been carried out by the Higher Education since 2004. These activities include sorting and distributing awards to students who have achieved great achievements, both curricular and extracurricular achievements. Therefore, in each academy it is necessary to identify students who are able to do both and be given awards as outstanding students, namely by conducting mawapres selection at the high academic level. In the higher academies there is a program where students want to be selected and are also entitled to become outstanding students and are also given awards each year. In the process of achieving students at Budi Darma University, Medan, it is still being tried manually. This allows errors in the evaluation and processing of student data information. For this reason, it is necessary to make a decision support system that can help determine achievements and can take into account all the criteria. the predicate of outstanding students are cases that require an assessment process. So that in solving something that is needed a multi-process decision support system. The trick used in this research is the MAUT procedure. Determine the determination of students to overcome problems that require part of the evaluation process. So that the solution requires a multi-process decision support system. The procedure used in this research is the MAUT method. The MAUT method is to obtain a decision support information system for companies with a large level of data accuracy, so that by using this procedure it is expected to determine student achievement and process information more effectively. With this MAUT method creates the most preference as the best alternative results in the initial ranking which lies in the alternative A_4 with the highest preference level of 0.5419 on behalf of Khamsah Anugrah.

Keywords: Decision Support System; Student Achievement; MAUT Method

1. INTRODUCTION

Higher education is a unit of great learning organizers as an advanced level of secondary education on the path of formal education. Budi Darma University is a private university located in the Medan area. Every year, Budi Darma University holds one of the programs where students want to be selected and have the right to be made as outstanding students and given awards as outstanding students. Where outstanding students are a selection that is carried out in stages starting from the level of study programs/departments/sections, faculties, universities and levels National [1],[2].

The selection of Outstanding Students is an organized activity carried out every year by DIKTI since 2004. This activity is an activity to sort and distribute awards to students who have successfully achieved high achievements, both curricular and extracurricular achievements. With this activity, students are expected not only to pursue knowledge in their fields, but also to engage in activities to improve their soft skills. Because in the time of free competition, graduates are needed who have a strong skill and soft skills that are balanced. Therefore, in each higher academy, it is necessary to identify students who can carry out both and be given awards as outstanding students, namely by carrying out the selection of outstanding students at the university level [3].

The selection process for outstanding students that has been tried so far still has some weaknesses that give rise to several problems, including the process of processing election information that takes a long time, allowing the formation of human error in the process of processing the data used in the election process, so that a solution in the form of a Decision Support System is needed to determine the selection of outstanding students at Budi Darma University. For this reason, it is necessary to evaluate several criteria, namely academic scores or Cumulative Achievement Index (GPA), competition achievements, activeness in organizations, foreign language skills, scientific papers, parental income, and the number of parental dependents.

A decision support system is an interactive information system that provides information, modeling and data manipulation that is used to support decision-making in a semi-structured and unstructured environment [4]. Some of the components in the Decision Support System consist of Management information, Management Models, Communication, and Knowledge Management. In its application, there are methods in SPK that are often used, such as SAW, WP, WASPAS, MOORA, TOPSIS, PROMETHEE, ELECTRE, MAUT and others. The method used in this research is the MAUT Method. The MAUT method is a decision support information system for companies with a high level of information accuracy [5],[6]. By using this MAUT method, it is hoped that it can ensure outstanding students and a more efficient information processing process.

Based on research conducted by Pristiwati Fitriani in 2020 regarding the purchase of an android smartphone with the Multi Attribute Utility Theory (MAUT) method, the best ranking is A_2 with a value of 0.657368088 to support the right decision. The research that has been conducted in 2021 by Abdul Karim, et al applied the Operational Competitiveness Rating Analysis (OCRA) Method and the Multi Attribute Utility Theory (MAUT)

Method to the Selection of Prospective Permanent Employees obtained the best preference value of 0.456 in the alternative A_5 .

Based on related research conducted by RW Dari, S Sapriadi, NA Rahmi, and PAW Purnama (2023) discusses the development of a decision support system for the selection of used cars using the Multi Attribute Utility Theory (MAUT) method. This research aims to assist potential buyers in determining the best used cars based on various criteria, such as price, vehicle condition, year of production, and other specifications. The MAUT method is used to calculate the utility value of each alternative so that the ranking of used cars that best suits the needs of users is obtained. The results of the study show that the implementation of MAUT is able to provide objective, systematic, and easy-to-understand decision recommendations, so that it can improve the quality of decision-making in used car sales transactions [7].

Furthermore, research by W Saputra and SA Wardana (2024) examined the application of the combination of MAUT and Rank Sum methods in the decision support system for selecting the best students. This study assesses student achievement based on academic and non-academic criteria, such as report card scores, competition achievements, and attitudes. The Rank Sum method is used to determine the weight of the criteria, while MAUT is used to calculate the utility value of each student's alternative. The results of the study show that the combination of the two methods is able to produce the best student rankings more accurately and fairly, and can be used as a decision-making tool for schools in determining outstanding students [8].

In this regard, the author conducted a study on the decision support system using the MAUT method to get the highest final utility value and ensure that students excel. The author made this study to ensure a decision on the value of weight and the best alternative in the selection of outstanding students at Budi Darma University. So that the campus does not want to have trouble sorting out these students through some alternatives and criteria. The implementation of the MAUT method is expected to share the benefits to obtain the best alternative to the maximum source of the criteria that have been set to proceed to the ranking stage.

2. RESEARCH METHODOLOGY

2.1 Decision Support System

Decision support system (SPK) is a computer-based system to produce an alternative decision and support management in deciding various problems. Decision support systems aim to provide a variety of data, guide and share predictions and centralize data users so that they can practice decision-making [9],[10],[11].

2.2 Outstanding Students

Students are people who are studying at the university level, either public or private universities or institutions that are at the same level as universities [12],[13],[14]. Outstanding students is a selection that is carried out in stages starting from the level of study programs/departments/sections, faculties, universities and the national level. Students who have achieved success in achieving great achievements both curricular, co-curricular, and extracurricular in accordance with the set criteria [15],[16],[17].

2.3 MAUT Method

The Multi Attribute Utility Theory (MAUT) method is a scheme in which the final assessment, $v(x)$, of an object x is defined as a weight summed by a value that is relevant to its dimensional value [18],[19],[20]. The expression that is commonly used to refer to it is a utility value. The following are the steps in the MAUT method:

a. Preparing the Decision Matrix (X_{ij})

$$X_{ij} = \begin{bmatrix} r_{11} & \cdots & r_{ij} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ r_{i1} & \cdots & r_{ij} & \cdots & r_{in} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mj} & \cdots & r_{mn} \end{bmatrix} ; i = 1, \dots, m, j = 1, \dots, n \quad (1)$$

b. Calculating Normalization (r_{ij}^*)

For the Benefit criteria

$$r_{ij}^* = \frac{r_{ij} - \min(r_{ij})}{\max(r_{ij}) - \min(r_{ij})} \quad (2)$$

For the Cost criterion

$$r_{ij}^* = 1 + \left(\frac{\min(r_{ij}) - r_{ij}}{\max(r_{ij}) - \min(r_{ij})} \right) \quad (3)$$

c. Calculating Marginal Utilities (U_{ij})

$$u_{ij} = \frac{\exp(r_{ij}^*)^2 - 1}{1.71} \quad (4)$$

d. Calculating Final Utility (u_i)

$$u_i = \sum_{j=1}^n u_{ij} * w_{ij} \quad (5)$$

2.4 Research Stages

In making this research, there are several stages carried out by the author. The following is an explanation of some of the stages of the research:

a. Problem Analysis

Analyze data in conducting a study before designing or calculating.

b. Data Collection

Carry out an observation that is used to master the stages of selecting outstanding students.

c. Literature Studies

It serves to make the author understand SPK and the MAUT method by reading journals and other references that are related to the research.

d. Application of MAUT Method

This stage is a very meaningful stage in a research. There is also a method applied in this study, namely the MAUT (Multi Attribute Utility Theory) method

e. Research Report

The preparation of a research report as a written result in the form of the essence of this research.

From the results of the research stage, Figure 1 was obtained as follows:

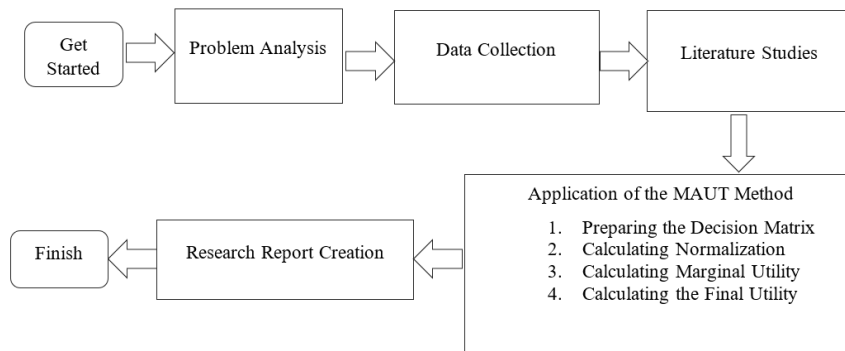


Figure 1. Research Stages

3. RESULTS AND DISCUSSION

In this discussion, the process of determining the performance measurement of student activity units by applying the MAUT (Multi Attribute Utility Theory) method. The first step that must be taken to start the calculation is to determine the assessment criteria.

3.1 Determination of Criteria and Alternatives

The determination of alternatives in the selection of outstanding students is clearly described in Table 1 below:

Table 1. Alternative Data

Code Alternatives	Student Name
A1	Boy Eduardo
A2	Khoirunnas
A3	Muhammad Karel
A4	Khamsah Anugrah
A5	Dimas Hadityo
A6	Perwira
A7	Dini Fadillah

In the selection of outstanding students, there are the criteria needed according to the following Table 2:

Table 2. Criteria Data

Criteria	Remarks	Type	Weight
C1	Cumulative Grade Point Average (GPA)	Benefit	0.37

Criteria	Remarks	Type	Weight
C2	Competition Achievements	Benefit	0.23
C3	Activeness in the organization	Benefit	0.16
C4	Foreign Language Skills	Benefit	0.11
C5	Scientific Papers	Benefit	0.07
C6	Parental Income	Cost	0.04
C7	Number of Dependents of Parents	Cost	0.02

Description of the criteria in Table 2:

- Cumulative Grade Point Average (GPA) is the average grade of courses that are passed in accordance with the provisions of each higher academy
- The achievement of the competition is the expertise that is excelled by each outstanding student in the form of activities that receive awards
- Activeness in the organization is activities in exploring activities carried out by the organization that are positive in accordance with the goals that have been set
- Foreign language skills are the ability to express opinions, thoughts and feelings to interact with others about English
- Scientific papers are papers that are made from writings or essays and based on various research results, which are compiled using scientific procedures
- Parental income is the income obtained by parents by carrying out economic activities
- The number of parental dependents is how many family members according to the Family Card without a job or income.

Criterion data is a benchmark in the selection of outstanding students, so the next table determines the Assessment Criteria for each Alternative, found in Table 3.

Table 3. Alternative Match Rating Data and Criteria

Alternative s	C_1 Cumulative Grade Point Average (GPA)	C_2 Competition Achievements	C_3 Activeness in the organization	C_4 Foreign Language Skills	C_5 Scientific Papers	C_6 Parental Income	C_7 Number of Dependents of Parents
A_1	3.55	3 Performance	Quite Active	Can't	1 Article	10.000.000	5
A_2	3.22	4 Performance	Active	Pretty Good	3 Articles	9.000.000	4
A_3	3.66	3 Performance	Highly Active	Can't	2 Articles	6.000.000	2
A_4	3.11	5 Performance	Highly Active	Very Good	3 Articles	7.000.000	1
A_5	3.44	3 Performance	Active	Very Good	4 Articles	7.000.000	2
A_6	3.33	3 Performance	Inactive	Good	4 Articles	5.000.000	3
A_7	3.77	1 Performance	Inactive	Pretty Good	5 Articles	6.000.000	4

In the table above, it can be seen that there is still linguistic data so that it requires weighting to produce numerical values as seen in Table 4 and table 5 as follows:

Table 4. The Value of Activeness in the Organization (C_3)

Remarks	Weight
Highly Active	4
Active	3
Quite Active	2
Inactive	1

Furthermore, it can be seen in Table 5 is the Weighted Value of Foreign Language Ability (C_4).

Table 5. Weighted Value of Foreign Language Proficiency (C_4)

Remarks	Weight
Very Good	4

Remarks	Weight
Good	3
Pretty Good	2
Can't	1

The criteria that have been weighted can be clearly seen in table 6 below:

Table.6 Match rating data of each alternative

Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	3.55	3	2	1	1	10000000	5
A_2	3.22	4	3	2	3	9000000	4
A_3	3.66	3	4	1	2	6000000	2
A_4	3.11	5	4	4	3	7000000	1
A_5	3.44	3	3	4	4	7000000	2
A_6	3.33	3	1	3	4	5000000	3
A_7	3.77	1	1	2	5	6000000	4

3.2 Application of the MAUT Method

The Stages of the Calculation Process Applying the MAUT method are explained in detail in the process below:

a. Preparing the Decision Matrix

$$X_{ij} = \begin{bmatrix} 3.55 & 3 & 2 & 1 & 1 & 10000000 & 5 \\ 3.22 & 4 & 3 & 2 & 3 & 9000000 & 4 \\ 3.66 & 3 & 4 & 1 & 2 & 6000000 & 2 \\ 3.11 & 5 & 4 & 4 & 3 & 7000000 & 1 \\ 3.44 & 3 & 3 & 4 & 4 & 7000000 & 2 \\ 3.33 & 3 & 1 & 3 & 4 & 5000000 & 3 \\ 3.77 & 1 & 1 & 2 & 5 & 6000000 & 4 \end{bmatrix}$$

b. Calculating normalizations

For the criteria (Benefit) C_1

$$r_{11}^* = \frac{3.55 - 3.11}{3.77 - 3.11} = 0.6$$

$$r_{21}^* = \frac{3.22 - 3.11}{3.77 - 3.11} = 0.16$$

$$r_{31}^* = \frac{3.66 - 3.11}{3.77 - 3.11} = 0.83$$

$$r_{41}^* = \frac{3.11 - 3.11}{3.77 - 3.11} = 0$$

$$r_{51}^* = \frac{3.44 - 3.11}{3.77 - 3.11} = 0.5$$

$$r_{61}^* = \frac{3.33 - 3.11}{3.77 - 3.11} = 0.3$$

$$r_{71}^* = \frac{3.77 - 3.11}{3.77 - 3.11} = 1$$

For the criteria (Benefit) C_2

$$r_{12}^* = \frac{3 - 1}{5 - 1} = 0.5$$

$$r_{22}^* = \frac{4 - 1}{5 - 1} = 0.75$$

$$r_{32}^* = \frac{3 - 1}{5 - 1} = 0.5$$

$$r_{42}^* = \frac{5 - 1}{5 - 1} = 1$$

$$r_{52}^* = \frac{3 - 1}{5 - 1} = 0.5$$

$$r_{62}^* = \frac{3 - 1}{5 - 1} = 0.5$$

$$r_{72}^* = \frac{1 - 1}{5 - 1} = 0$$

For Criteria (Benefits) C_3

$$r_{13}^* = \frac{2 - 1}{4 - 1} = 0.33$$

$$r_{23}^* = \frac{3-1}{4-1} = 0.66$$

$$r_{33}^* = \frac{4-1}{4-1} = 1$$

$$r_{43}^* = \frac{4-1}{3-1} = 1$$

$$r_{53}^* = \frac{4-1}{1-1} = 0.66$$

$$r_{63}^* = \frac{4-1}{1-1} = 0$$

$$r_{73}^* = \frac{4-1}{4-1} = 0$$

For Criteria (Benefits) C_4

$$r_{14}^* = \frac{1-1}{4-1} = 0$$

$$r_{24}^* = \frac{2-1}{4-1} = 0.33$$

$$r_{34}^* = \frac{1-1}{4-1} = 0$$

$$r_{44}^* = \frac{4-1}{4-1} = 1$$

$$r_{54}^* = \frac{4-1}{3-1} = 1$$

$$r_{64}^* = \frac{4-1}{2-1} = 0.66$$

$$r_{74}^* = \frac{4-1}{4-1} = 0.33$$

For Criteria (Benefits) C_5

$$r_{15}^* = \frac{1-1}{5-1} = 0$$

$$r_{25}^* = \frac{3-1}{5-1} = 0.5$$

$$r_{35}^* = \frac{2-1}{5-1} = 0.25$$

$$r_{45}^* = \frac{5-1}{3-1} = 0.5$$

$$r_{55}^* = \frac{5-1}{4-1} = 0.75$$

$$r_{65}^* = \frac{5-1}{5-1} = 0.75$$

$$r_{75}^* = \frac{5-1}{5-1} = 1$$

For Criteria C_6

$$r_{16}^* = 1 + \left(\frac{5000000-10000000}{10000000-5000000} \right) = 0$$

$$r_{26}^* = 1 + \left(\frac{5000000-9000000}{10000000-5000000} \right) = 0.2$$

$$r_{36}^* = 1 + \left(\frac{5000000-6000000}{10000000-5000000} \right) = 0.8$$

$$r_{46}^* = 1 + \left(\frac{5000000-7000000}{10000000-5000000} \right) = 0.6$$

$$r_{56}^* = 1 + \left(\frac{5000000-7000000}{10000000-5000000} \right) = 0.6$$

$$r_{66}^* = 1 + \left(\frac{5000000-5000000}{10000000-5000000} \right) = 1$$

$$r_{76}^* = 1 + \left(\frac{5000000-6000000}{10000000-5000000} \right) = 0.8$$

For Criteria C_7

$$r_{17}^* = 1 + \left(\frac{1-5}{5-1} \right) = 0$$

$$r_{27}^* = 1 + \left(\frac{1-4}{5-1} \right) = 0.25$$

$$r_{37}^* = 1 + \left(\frac{1-2}{5-1} \right) = 0.75$$

$$r_{47}^* = 1 + \left(\frac{1-1}{5-1} \right) = 1$$

$$r_{57}^* = 1 + \left(\frac{1-2}{5-1} \right) = 0.75$$

$$r_{67}^* = 1 + \left(\frac{1-3}{5-1} \right) = 0.5$$

$$r_{77}^* = 1 + \left(\frac{1-4}{5-1} \right) = 0.25$$

Based on the calculations that have been made, the matrix normalization value is clearly visible in Table 7 below:

Table.7 Normalized Matrix Results

Alternatives	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	0.6	0.5	0.33	0	0	0	0
A_2	0.16	0.75	0.66	0.33	0.5	0.2	0.25
A_3	0.83	0.5	1	0	0.25	0.8	0.75
A_4	0	1	1	1	0.5	0.6	1
A_5	0.5	0.5	0.66	1	0.75	0.6	0.75
A_6	0.3	0.5	0	0.66	0.75	1	0.5
A_7	1	0	0	0.33	1	0.8	0.25

c. Calculating the Marginal Value of the Utility (U_{ij})

For Criteria C_1

$$U_{11} = \frac{e^{(0.6)^2} - 1}{1.71} = 0.25$$

$$U_{21} = \frac{e^{(0.16)^2} - 1}{1.71} = 0.01$$

$$U_{31} = \frac{e^{(0.83)^2} - 1}{1.71} = 0.58$$

$$U_{41} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{51} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{61} = \frac{e^{(0.3)^2} - 1}{1.71} = 0.05$$

$$U_{71} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

For the criteria C_2

$$U_{12} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{22} = \frac{e^{(0.75)^2} - 1}{1.71} = 0.44$$

$$U_{32} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{42} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{52} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{62} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{72} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

For Criteria C_3

$$U_{13} = \frac{e^{(0.33)^2} - 1}{1.71} = 0.07$$

$$U_{23} = \frac{e^{(0.66)^2} - 1}{1.71} = 0.32$$

$$U_{33} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{43} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{53} = \frac{e^{(0.66)^2} - 1}{1.71} = 0.32$$

$$U_{63} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{73} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

For Criteria C_4

$$U_{14} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{24} = \frac{e^{(0.33)^2} - 1}{1.71} = 0.07$$

$$U_{34} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{44} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{54} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{64} = \frac{e^{(0.66)^2} - 1}{1.71} = 0.32$$

$$U_{74} = \frac{e^{(0.33)^2} - 1}{1.71} = 0.07$$

For Criteria C_5

$$U_{15} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{25} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{35} = \frac{e^{(0.25)^2} - 1}{1.71} = 0.04$$

$$U_{45} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.17$$

$$U_{55} = \frac{e^{(0.75)^2} - 1}{1.71} = 0.44$$

$$U_{65} = \frac{e^{(0.75)^2} - 1}{1.71} = 0.44$$

$$U_{75} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

For Criteria C_6

$$U_{16} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{26} = \frac{e^{(0.2)^2} - 1}{1.71} = 0.02$$

$$U_{36} = \frac{e^{(0.8)^2} - 1}{1.71} = 0.52$$

$$U_{46} = \frac{e^{(0.6)^2} - 1}{1.71} = 0.25$$

$$U_{56} = \frac{e^{(0.6)^2} - 1}{1.71} = 0.25$$

$$U_{66} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{76} = \frac{e^{(0.8)^2} - 1}{1.71} = 0.52$$

For Criteria C_7

$$U_{17} = \frac{e^{(0)^2} - 1}{1.71} = 0$$

$$U_{27} = \frac{e^{(0.25)^2} - 1}{1.71} = 0.04$$

$$U_{37} = \frac{e^{(0.75)^2} - 1}{1.71} = 0.44$$

$$U_{47} = \frac{e^{(1)^2} - 1}{1.71} = 1$$

$$U_{57} = \frac{e^{(0.75)^2} - 1}{1.71} = 0.44$$

$$U_{67} = \frac{e^{(0.5)^2} - 1}{1.71} = 0.2$$

$$U_{77} = \frac{e^{(0.25)^2} - 1}{1.71} = 0.04$$

From the calculations that have been made, the marginal value of final use is obtained as seen in the following table 8:

Table 8. Marginal Results of Final Utility

Alternatives	C_1 (0.37)	C_2 (0.23)	C_3 (0.16)	C_4 (0.11)	C_5 (0.07)	C_6 (0.04)	C_7 (0.02)
A1	0.25	0.17	0.07	0	0	0	0
A2	0.01	0.44	0.32	0.07	0.17	0.02	0.04
A3	0.58	0.17	1	0	0.04	0.52	0.44
A4	0	1	1	1	0.17	0.25	1
A5	0.17	0.17	0.32	1	0.44	0.25	0.44
A6	0.05	0.17	0	0.32	0.44	1	0.2
A7	1	0	0	0.07	1	0.52	0.04

d. Calculating the value of the final utility (U_i)

$$U_1 = (0.37 * 0.25) + (0.23 * 0.17) + (0.16 * 0.07) + (0.11 * 0) + (0.07 * 0) + (0.04 * 0) + (0.02 * 0) = 0.1428$$

$$U_2 = (0.37 * 0.01) + (0.23 * 0.44) + (0.16 * 0.32) + (0.11 * 0.07) + (0.07 * 0.17) + (0.04 * 0.02) + (0.02 * 0.04) = 0.1773$$

$$U_3 = (0.37 * 0.58) + (0.23 * 0.17) + (0.16 * 1) + (0.11 * 0) + (0.07 * 0.04) + (0.04 * 0.52) + (0.02 * 0.44) = 0.4461$$

$$U_4 = (0.37 * 0) + (0.23 * 1) + (0.16 * 1) + (0.11 * 1) + (0.07 * 0.17) + (0.04 * 0.25) + (0.02 * 1) = 0.5419$$

$$U_5 = (0.37 * 0.17) + (0.23 * 0.17) + (0.16 * 0.32) + (0.11 * 1) + (0.07 * 0.44) + (0.04 * 0.25) + (0.02 * 0.44) = 0.3128$$

$$U_6 = (0.37 * 0.05) + (0.23 * 0.17) + (0.16 * 0) + (0.11 * 0.32) + (0.07 * 0.44) + (0.04 * 1) + (0.02 * 0.2) = 0.1676$$

$$U_7 = (0.37 * 1) + (0.23 * 0) + (0.16 * 0) + (0.11 * 0.07) + (0.07 * 1) + (0.04 * 0.52) + (0.02 * 0.04) = 0.4693$$

The final utility value that is ranked can be seen as follows:

Table 9. Alternative Rankings

Alternatives	Student Name	Value U_i	Ratings
A_4	Khamsah Anugrah	0.5419	1
A_7	Dini Fadilah	0.4693	2
A_3	Muhammad Karel	0.4461	3
A_5	Dimas Hadityo	0.3128	4
A_2	Khoirunnas	0.1773	5
A_6	Perwira	0.1676	6
A_1	Boy Eduardo	0.1428	7

According to the calculation using the MAUT method, the appropriate alternative according to the criteria for outstanding students is the alternative A_4 that is the best alternative with a value of 0.5419 in the name of Khamsa Anugrah. The following in Figure 2 shows the results of the ranking based on the final utility value obtained from the application of the decision-making method. This diagram presents a comparison of the final

utility values of each alternative, where higher values indicate a better level of performance. This visualization makes it easy to identify the highest-to-lowest-ranked alternatives.

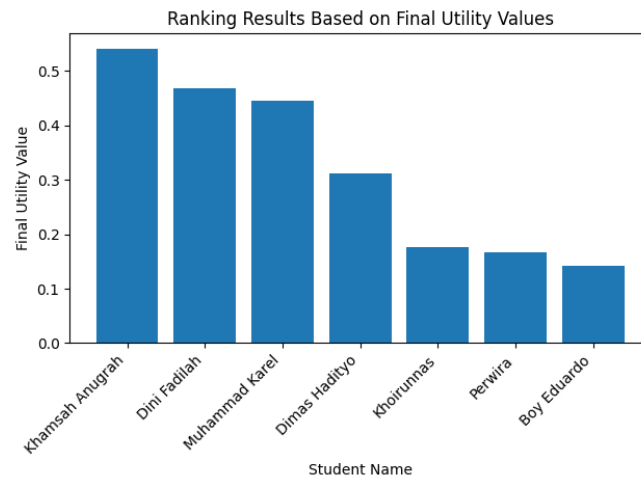


Figure 2. Rangkang result

4. CONCLUSION

From the results of the research, the author concludes that if the use of the MAUT method can be used in the process of selecting outstanding students, the application of the MAUT method is useful to help create more effective testing. In this regard, the aspect greatly influences the acquisition of scores in terms of the MAUT method, which is the value with the most preference procedures as the best alternative result in the initial ranking, which is located in the A₄ alternative with the highest preference value of 0. 5419 in the name of Khamsah Anugrah.

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