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Decision Support System for Selecting the Best Head of Study Program Using the MOORA and MOOSRA Methods

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Abstract−The Head of the Study Program is one of the most important parts of a university. The Head of the Study Program is also the highest leader within the study program structure. The role of the Head of the Study Program is as an organizational unit that is responsible for the administration of the study program they lead. The Head of the Study Program is tasked with coordinating all study program activities, as well as managing lecture schedules, practicum schedules, and lecture evaluation results. The selection of the Head of the Study Program requires precise accuracy to avoid errors in the selection process. The stability of a study program heavily depends on the role and reputation of its lecturers, especially the lecturer responsible for the core courses of that study program. Therefore, the participation of lecturers is highly necessary in the selection of the Head of the Study Program. Since the higher education management is also interested in the selection process, methodological assistance is needed to accommodate the aspirations of the lecturers and the interests of the university management. The reward system is a crucial element for motivation toward a better direction, aiming to further increase performance. This reward system is expected to encourage the performance of the Head of the Study Program to be more productive, so that the vision and mission for achieving the development of a university can be properly attained and implemented.

Keywords: Head of Study Program; Decision Support System (DSS); MOORA; MOOSRA

1. INTRODUCTION

The Head of the Study Program (Kaprodi) is the highest leader in the organizational structure responsible for the administration of the study program they lead. This position is usually filled by a senior lecturer who possesses specialized expertise related to the study program being chaired. The Head of the Study Program is an organizational unit responsible for coordinating all study program activities [1]. As an element of higher education administration, the Head of the Study Program is vital in managing the educational process at the university [2].

The selection process for the Head of the Study Program requires careful scrutiny, necessitating the involvement of other lecturers in the selection [3], [4]. The stability of a study program greatly depends on the reputation of the lecturers, especially those teaching the core courses of the program [5]. The Head of the Study Program is responsible for leading and regulating all academic processes and the administration of other supporting activities [6]. Consequently, it is appropriate for a high-performing Head of the Study Program to receive recognition as the best Head of Study Program. The implementation of a reward system is expected to encourage the Head of the Study Program to achieve more and be more productive , ensuring that the goal of developing the national higher education system can be optimally achieved [7].

The selection process requires criteria that support the performance of a Head of the Study Program, two of which are years of service and the status of an outstanding lecturer [8], [9]. These factors are crucial in determining whether the Head of the Study Program will have good performance. To select the Head of the Study Program, the leadership needs a system to assist the process; this system is known as a Decision Support System (DSS) [10], [11]. To address this problem, a Decision Support System (DSS) must be developed for the selection of the best Head of Study Program to support the determination process.

DSS is an interactive part of an information system that provides information. This system is also aimed at solving problems in semi-structured and unstructured situations. The presence of a DSS for determining the Head of the Study Program using the MOORA and MOOSRA methods can generate data from these criteria , making the assessment more accurate and consistent, and facilitating timely and precise decision-making in the selection process [12], [13]. Several methods are frequently used in decision-making, such as SAW, WP, ROC, WASPAS, AHP, TOPSIS, PSI, and others.

This permanent lecturer selection system is intended to maximize the determination of deserving lecturers to be appointed as permanent lecturers at Universitas Budi Darma Medan. Previous studies related to similar methods serve as a reference for this research. A study conducted by [14] discussed the MOORA method for selecting a fabric supplier. The criteria included Price, Design, Quality, Service, and Delivery. The highest ranking result was obtained for alternative 4 with a value of 0.1599. The research by [15] discussed the SAW method for distributing city government assistance funds in the Kwala Bekala area, Neighborhood XI. The four criteria were a Certificate of Poverty, Mandatory Registration in the Family Card (KK) of Kwala Bekala Neighborhood XI, Employment Status, and Salary <3,200,000 IDR. The highest ranking result was found for alternative 18 with a value of 1. The study by

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[16] discussed the WP method for analyzing the performance of non-permanent employees. The five criteria included Attendance, Work Discipline, Cooperation, Public Service, Experience, and Education. The highest ranking result was obtained for alternative 2 with a value of 0.1158. Research by [17]discussed the ROC and WASPAS methods for vendor partnership selection. The five criteria were Product Quality, Product Price, Delivery Timeliness, Track Record, and Legality. The highest ranking was found for alternative 6 with a value of 0.864321. Research conducted by [18]discussed the Preference Selection Index (PSI) method for determining the best Smartphone brand to support online learning for students during the Covid-19 era. The five criteria were Price, Screen Size, RAM, Battery, and Internal Memory. The highest ranking result was obtained for alternative 2 with a value of 0.327332.

Based on the related studies discussed, they can serve as references for this research. Consequently, the author is interested in conducting research on a "Decision Support System for the Acceptance of Permanent Lecturers at Universitas Budi Darma Medan Applying the Moora and Moosra Methods". The application of this method can yield the best preference value from a predetermined number of alternatives and criteria, and can perform ranking to achieve the highest value or an accurate result.

2. RESEARCH METHODOLOGY

2.1 Head of Study Program

Kaprodi is an abbreviation for Head of Study Program. The Head of the Study Program is tasked with regulating the implementation of education and bears significant responsibility for the execution of lecture activities.

2.2 Research Stages

The stages of research in the creation of this article are as follows:

a. Problem Identification : In conducting research, we must first analyze the problem to establish the core issue of the study.
b. Data Collection : Data collection is essential in this research stage as it serves as a reference.
c. Literature Study : The author must understand the subject and seek several references, which can be obtained from Google Scholar or the library.
d. Analysis and Method Application : At this stage, we analyze the problem of selecting outstanding students, starting with determining the weight values, criteria, and alternatives using the MOORA and MOOSRA methods.

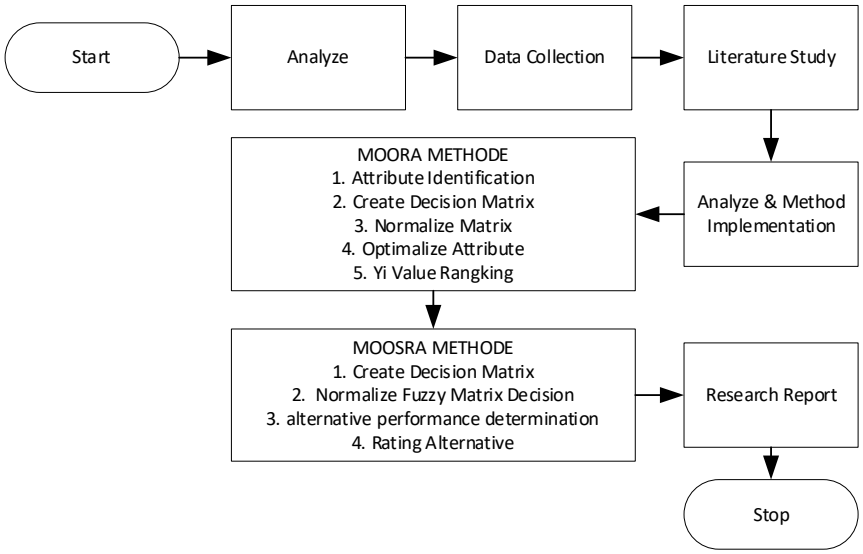

Figure 1. Research Stage

2.3 MOOSRA (Multi-Objective Optimization on the Basis of Simple Analysis)

The MOOSRA method is a technique developed by Das et al., which involves a decision matrix. The MOOSRA method is also one of the methods that lack variation in the criterion values [19]. There are four calculation steps for the MOOSRA method:

Step 1: Forming the Decision Matrix

$$Xij \begin{bmatrix} X11 & X12 & \cdots & X1n \\ X21 & X22 & \vdots\vdots & X2n \\ \cdots & \cdots & & \cdots \\ Xm1 & Xm2 & \cdots & Xmn \end{bmatrix} \quad (1)$$

Step 2: Determining the Normalized Matrix

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$$X^*ij = \frac{X_{ij}}{\sqrt{[\sum_{i=1}^{m} Xij^2]}} \quad (2)$$

Step 3: Determining the Final Value / Preference

$$Y_i = \frac{\sum_{j=1}^{g} X^*ij}{\sum_{j=g+1}^{n} X^*ij} \quad (3)$$

If there is no difference in the importance weights of the criteria, the optimization formula is:

$$Y_i = \frac{\sum_{j=1}^{g} wj\, X^*ij}{\sum_{j=g+1}^{n} W_j X^*ij} \quad (4)$$

Step 4: Determining the Final Result or Ranking

2.3 MOOSRA (Multi-Objective Optimization on the Basis of Simple Analysis)

The MOORA method is an arithmetic-based method that helps solve problems without manipulation. The MOORA method also has two types of stipulations or criteria Cost and Benefit which are conflicting, aiming to obtain accurate and precise results [20]. The steps for the calculation in the MOORA method are as follows:
Stage 1: Preparing the Decision Matrix

$$Xij \begin{bmatrix} X11 & X12 & \cdots & X1n \\ X21 & X22 & \vdots\vdots & X2n \\ \cdots & \cdots & & \cdots \\ Xm1 & Xm2 & \cdots & Xmn \end{bmatrix} \quad (5)$$

Stage 2: Normalizing the Decision Matrix

$$X^*ij = \frac{X_{ij}}{\sqrt{[\sum_{i=1}^{m} Xij^2]}} \quad (6)$$

Stage 3: Determining the Optimization Value
There are two options for determining the optimization value:
a. Without involving weights:

$$Yi = \sum_{j=1}^{g} X * ij - \sum_{j=g+1}^{n} X * ij \quad (7)$$

b. Involving weights:

$$Yi = \sum_{j=1}^{g} wjX * ij - \sum_{j=g+1}^{n} wjX * ij \quad (8)$$

Stage 4: Final Result in Determining the Ranking

3. RESULT AND DISCUSSION

3.1. Alternative

Alternative data is crucial for the selection of the best Head of Study Program to perform calculations and obtain the final result. Table 1 presents 5 alternatives:

Table 1. Alternative

Alternative	Information
A_1	Berto Nadeak,M.Kom
A_2	Bister Purba,M.Kom
A_3	Melda Pnjaitan,M.Pd
A_4	Murdani,M.Kom
A_5	Imam Saputra,M.Kom

3.2 Criteria and Weights

Criteria and weights are necessary for the calculation in selecting the best Head of Study Program to obtain the final result. Table 2 presents the criteria and weights:

Table 2. Criteria and Weights

Criteria	Information	Weight	Type
C_1	Education	0,37	Benefit
C_2	Communication	0,35	Benefit
C_3	Discipline	0,25	Benefit

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Criteria	Information	Weight	Type
C_4	Devotion	0,03	Benefit

Criterion Descriptions:
a. Education: The level of education achieved by the lecturer.
b. TOEFL Score: The TOEFL score achieved by the lecturer.
c. Discipline: If the lecturer is disciplined, they are responsible for everything.
d. Community Service: The community service performed by the lecturer.

Table 3. Alternative Criterion Data

Alternative	C_1	C_2	C_3	C_4
Berto Nadeak,M.Kom	S2	Good	Pretty Good	Good
Bister Purba,M.Kom	S2	Good	Good	Very Good
Melda Pnjaitan,M.Pd	S2	Pretty Good	Good	Good
Murdani,M.Kom	S2	Good	Very Good	Good
Imam Saputra,M.Kom	S2	Very Good	Very Good	Very Good

Table 4. C_1 Criterion Value

Information	Weight
S1	3
S2	4
S3	5

Table 5. C2, C3, and C4 Criterion Values

Information	Weight
Very Good	4
Goog	3
Pretty Good	2

Table 6. Suitability Rating (Rating)

Alternative	**C_1**	**C_2**	**C_3**	**C_4**
Berto Nadeak,M.Kom	4	3	2	3
Bister Purba,M.Kom	4	3	3	4
Melda Pnjaitan,M.Pd	4	2	3	3
Murdani,M.Kom	4	3	4	3
Imam Saputra,M.Kom	4	4	4	4

3.3 MOORA Method Implementataion

The steps for completing the MOORA calculation are as follows:
Step 1. Prepare the Decision Matrix

$$X = \begin{vmatrix} 4 & 3 & 2 & 3 \\ 4 & 3 & 3 & 4 \\ 4 & 2 & 3 & 3 \\ 4 & 3 & 4 & 3 \\ 4 & 4 & 4 & 4 \end{vmatrix}$$

Step 2. Normalize Decision Matrix
For criterion C_1, namely Education

$$X^*_{1,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2)}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{2,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2)}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{3,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2)}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{4,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2)}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{5,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2)}} = \frac{4}{8.944272} = 0.4472$$

For criterion C_2, namely Communication

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$$X^*_{1,2}=\frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}}=\frac{3}{6.855665}=0.4376$$

$$X^*_{1,2}=\frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}}=\frac{3}{6.855665}=0.4376$$

$$X^*_{1,2}=\frac{2}{\sqrt{(3^2+3^2+2^2+3^2+4^2}}=\frac{2}{6.855665}=0.2917$$

$$X^*_{1,2}=\frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}}=\frac{3}{6.855665}=0.4376$$

$$X^*_{1,2}=\frac{4}{\sqrt{(3^2+3^2+2^2+3^2+4^2}}=\frac{4}{6.855665}=0.5834$$

For criterion C_3, namely Discipline

$$X^*_{1,3}=\frac{2}{\sqrt{(2^2+3^2+3^2+4^2+4^2}}=\frac{2}{7.348469}=0.2722$$

$$X^*_{2,3}=\frac{3}{\sqrt{(2^2+3^2+3^2+4^2+4^2}}=\frac{3}{7.348469}=0.4082$$

$$X^*_{3,3}=\frac{3}{\sqrt{(2^2+3^2+3^2+4^2+4^2}}=\frac{3}{7.348469}=0.4082$$

$$X^*_{4,3}=\frac{4}{\sqrt{(2^2+3^2+3^2+4^2+4^2}}=\frac{4}{7.348469}=0.5443$$

$$X^*_{5,3}=\frac{4}{\sqrt{(2^2+3^2+3^2+4^2+4^2}}=\frac{4}{7.348469}=0.5443$$

For criterion C_4, namely Community Service

$$X^*_{1,4}=\frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}}=\frac{3}{7.681146}=0.3906$$

$$X^*_{2,4}=\frac{4}{\sqrt{(3^2+4^2+3^2+3^2+4^2}}=\frac{4}{7.681146}=0.5207$$

$$X^*_{3,4}=\frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}}=\frac{3}{7.681146}=0.3906$$

$$X^*_{4,4}=\frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}}=\frac{3}{7.681146}=0.3906$$

$$X^*_{5,4}=\frac{4}{\sqrt{(3^2+4^2+3^2+3^2+4^2}}=\frac{4}{7.681146}=0.5207$$

Then it can produce values from the decision matrix, namely:

$$\begin{vmatrix} 0.4472 & 0.4376 & 0.2722 & 0.3906 \\ 0.4472 & 0.4376 & 0.4082 & 0.5207 \\ 0.4472 & 0.2917 & 0.4082 & 0.3906 \\ 0.4472 & 0.4376 & 0.5443 & 0.3906 \\ 0.4472 & 0.5834 & 0.5443 & 0.5207 \end{vmatrix}$$

Step 3. Find the Optimization Value

y^*_1 = (0,37*0.4472) + (0,35*0.4376) + (0,25*0,2722) + (0,03*0,3906) = 0.3984

y^*_1 = (0,37*0.4472) + (0,35*0.4376) + (0,25*0,4082) + (0,03*0,5207) = 0.4363

y^*_1 = (0,37*0.4472) + (0,35*0.2917) + (0,25*0,4082) + (0,03*0,3906) = 0.3813

y^*_1 = (0,37*0.4472) + (0,35*0.4376) + (0,25*0,5443) +(0,03*0,3906) = 0.4664

y^*_1 = (0,37*0.4472) + (0,35*0.5834) + (0,25*0,5443) + (0,03*0,5207) = 0.5213

Table 7. Rangking Result

Alternative	Information	Result	Ranking
A1	Berto Nadeak,M.Kom	0.3984	4
A2	Bister Purba,M.Kom	0.4363	3
A3	Melda Panjaitan,M.Pd	0.3813	5
A4	Murdani,M.Kom	0.4664	2
A5	Imam Saputra,M.Kom	0.5213	1

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3.3 MOOSRA Method Implementataion

Here are several steps in completing the Moora calculation:
Step 1. Prepare the Decision Matrix

$$X = \begin{vmatrix} 4 & 3 & 2 & 3 \\ 4 & 3 & 3 & 4 \\ 4 & 2 & 3 & 3 \\ 4 & 3 & 4 & 3 \\ 4 & 4 & 4 & 4 \end{vmatrix}$$

Step 2. Normalize the Decision Matrix X
For criterion C1, namely Education

$$X^*_{1,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{2,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{3,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{4,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2}} = \frac{4}{8.944272} = 0.4472$$

$$X^*_{5,1} = \frac{4}{\sqrt{(4^2+4^2+4^2+4^2+4^2}} = \frac{4}{8.944272} = 0.4472$$

For criterion C2, namely Communication

$$X^*_{1,2} = \frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}} = \frac{3}{6.855665} = 0.4376$$

$$X^*_{1,2} = \frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}} = \frac{3}{6.855665} = 0.4376$$

$$X^*_{1,2} = \frac{2}{\sqrt{(3^2+3^2+2^2+3^2+4^2}} = \frac{2}{6.855665} = 0.2917$$

$$X^*_{1,2} = \frac{3}{\sqrt{(3^2+3^2+2^2+3^2+4^2}} = \frac{3}{6.855665} = 0.4376$$

$$X^*_{1,2} = \frac{4}{\sqrt{(3^2+3^2+2^2+3^2+4^2}} = \frac{4}{6.855665} = 0.5834$$

For criterion C3, namely Discipline

$$X^*_{1,3} = \frac{2}{\sqrt{(2^2+3^2+3^2+4^2+4^2}} = \frac{2}{7.348469} = 0.2722$$

$$X^*_{2,3} = \frac{3}{\sqrt{(2^2+3^2+3^2+4^2+4^2}} = \frac{3}{7.348469} = 0.4082$$

$$X^*_{3,3} = \frac{3}{\sqrt{(2^2+3^2+3^2+4^2+4^2}} = \frac{3}{7.348469} = 0.4082$$

$$X^*_{4,3} = \frac{4}{\sqrt{(2^2+3^2+3^2+4^2+4^2}} = \frac{4}{7.348469} = 0.5443$$

$$X^*_{5,3} = \frac{4}{\sqrt{(2^2+3^2+3^2+4^2+4^2}} = \frac{4}{7.348469} = 0.5443$$

For criterion C4, namely Community Service

$$X^*_{1,4} = \frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}} = \frac{3}{7.681146} = 0.3906$$

$$X^*_{2,4} = \frac{4}{\sqrt{(3^2+4^2+3^2+3^2+4^2}} = \frac{4}{7.681146} = 0.5207$$

$$X^*_{3,4} = \frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}} = \frac{3}{7.681146} = 0.3906$$

$$X^*_{4,4} = \frac{3}{\sqrt{(3^2+4^2+3^2+3^2+4^2}} = \frac{3}{7.681146} = 0.3906$$

$$X^*_{5,4} = \frac{4}{\sqrt{(3^2+4^2+3^2+3^2+4^2}} = \frac{4}{7.681146} = 0.5207$$

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$$\begin{vmatrix} 0.4472 & 0.4376 & 0.2722 & 0.3906 \\ 0.4472 & 0.4376 & 0.4082 & 0.5207 \\ 0.4472 & 0.2917 & 0.4082 & 0.3906 \\ 0.4472 & 0.4376 & 0.5443 & 0.3906 \\ 0.4472 & 0.5834 & 0.5443 & 0.5207 \end{vmatrix}$$

Step 3. Finding the Optimization Value

$$y^*_1 = (0{,}37*0.4472) + (0{,}35*0.4376) + (0{,}25*0{,}2722) + (0{,}03*0{,}3906) = 0.3984$$

$$y^*_1 = (0{,}37*0.4472) + (0{,}35*0.4376) + (0{,}25*0{,}4082) + (0{,}03*0{,}5207) = 0.4363$$

$$y^*_1 = (0{,}37*0.4472) + (0{,}35*0.2917) + (0{,}25*0{,}4082) + (0{,}03*0{,}3906) = 0.3813$$

$$y^*_1 = (0{,}37*0.4472) + (0{,}35*0.4376) + (0{,}25*0{,}5443) + (0{,}03*0{,}3906) = 0.4664$$

$$y^*_1 = (0{,}37*0.4472) + (0{,}35*0.5834) + (0{,}25*0{,}5443) + (0{,}03*0{,}5207) = 0.5213$$

Table 8. Rangking Result

Alternatif	Keterangan	Hasil	Ranking
A1	Berto Nadeak,M.Kom	0.3984	4
A2	Bister Purba,M.Kom	0.4363	3
A3	Melda Panjaitan,M.Pd	0.3813	5
A4	Murdani,M.Kom	0.4664	2
A5	Imam Saputra,M.Kom	0.5213	1

The results from the MOORA and MOOSRA methods are the same. The selected Head of Study Program is Alternative A5, on behalf of Imam Saputra, M.Kom.

4. CONCLUSION

Based on the research conducted, it can be concluded that the process of determining the selection of the Head of the Study Program using a system, known as the Decision Support System with the MOORA and MOOSRA methods, allows decision-making to be more objective than manual methods. Both methods have nearly identical steps for completion; only the step for finding the final result differs. Both methods are also very simple and are recognized as accurate alternatives for decision-making.

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