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Promethee Algorithm in Assessing Lecturer Performance

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Abstract— In this study, the focus is on the Implementation of Lecturer Performance Assessment, Higher Education is an educational institution that plays a role in producing quality human resources. The roles, duties and responsibilities of lecturers are very important in educating the nation's life and national goals. There are many problems that cause the performance of lecturers at universities in Indonesia. Meanwhile, lecturers are required to give good performance. In this case, the researcher is interested in evaluating the performance of lecturers using the promethee method. The promethee method is able to produce decisions based on comparisons between alternatives according to the preference function and the different weights of each criterion. The criteria used in the assessment of lecturer performance are 10 criteria with 7 alternative lecturers. The Promethee method produces recommendations for lecturers with the best performance, namely Lecturer E who has a net flow value of 0.12153. While the lecturer with the lowest performance assessment is Lecturer B with a net flow value of -0.19167. The results of the decisions given by the promethee method can help provide an assessment of the lecturer's performance from the several alternatives given. So as to be able to produce an objective recommendation decision.

Keywords : Promethe Method, Performance Appraisal, Lecturer.

I. INTRODUCTION

Performance appraisal activities are activities that are commonly carried out in educational institutions. Higher Education is an educational institution with the aim of producing quality human resources and being able to face increasingly fierce job competition [1]. In this case, the lecturer plays an important role in achieving this goal.

The roles, duties, and responsibilities of lecturers are very meaningful in realizing the goals of national education. Lecturers have not been able to focus one hundred percent on their work due to various factors[2], [3]. As a result, the role of service to students and the community has not shown professional standards in accordance with functional positions [1]. This is because there are still many lecturers who work from one place to another with limited time and a lot of workload [4]. Meanwhile, lecturers are required to be able to show good performance.

STMIK Bina Patria is a private university that always strives to continuously improve internal quality so that it can compete with other universities [4]. Higher education institutions are obliged to provide education, research and community service. Therefore, a performance assessment is needed to obtain an overview and analysis of the state and performance of the Educators/Lecturers in the STMIK Bina Patria environment based on empirical data. Performance appraisal is expected to be able to improve the quality of lecturers and the implementation of the Tri Dharma of Higher Education for the better [5]. Lecturer performance appraisal is very important, but not easy [6]. Because of course every lecturer has quite a lot of assessment criteria and has many assessment criteria that must be evaluated, so using manual assessment will be quite difficult and it will take quite a long time [7].

The purpose of this research is to design an Application for Lecturer Performance Assessment. Based on the problems above, there is a desire to evaluate the performance of lecturers. There are many methods that can be used in assessing the performance of lecturers. One of them is using the Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE) method. Promethee as a decision model in Multi Criteria Decision Making (MCDM) can be used to give preference to support decision making [8], [9]. This method is considered as an efficient and simple method in dealing with multi-criteria problems [10].

II. RESEARCH METHODS

In this study, several methods were used in data collection and promethee methods in the process of assessing lecturers' performance.

2.1Data Collection Method

This research was conducted at STMIK Bina Patria. The data collection methods used to obtain the data are as follows:

1) Survey
   In collecting data, in this research is to conduct a survey to some students by distributing questionnaires to generate data. This data is used as

material for assessing lecturers in the learning process.

2) Interview
In this case, the researcher conducted interviews with students, lecturers, education staff and study programs at each lecture sampled in obtaining the required data.

3) Observation
Researchers make direct observations and take notes in obtaining the required data.

4) Library Research
In this study, the researcher uses reference books and journals as a theoretical basis in making this research.

2.2Preference Ranking Organization Methods for Enrichment Evaluation (PROMETHEE)

Preference Ranking Organization Method for Enrichment Evaluation (Promethee) is a method of determining the order (priority) in multi-criteria analysis[11][12]. The main problem is simplicity, clarity, stability[13]. The presumption and dominance of the criteria used in Promethee is the use of the value of the relationship between outranking[14]. In Promethee, six forms of criterion preference function are presented [15]. The six preference criteria are as follows[16]:

1) Usual Criteria
In this preference, there is no difference between a and b if and only if f(a) = f(b), if the criterion value for each alternative has a different value, the decision maker makes an absolute preference for the alternative that has a better value.

$$H(d) = \begin{cases} 0 \ jika \ d \leq 0 \\ 1 \ jika \ d > 0 \end{cases} \quad \text{.....(1)}$$

2) Quasi Criteria
Two alternatives have an equally important preference as long as the difference or H(d) value of each alternative for certain criteria does not exceed the value of q, and if the difference in the evaluation results for each alternative exceeds the value of q, an absolute preference occurs. If the decision maker uses quasi-criteria, then it must determine the value of q, where this value can explain the significant effect of a criterion.

$$H(d) = \begin{cases} 0 \ jika \ d \leq q \\ 1 \ jika \ d > q \end{cases} \quad \text{.....(2)}$$

3) Criteria with Linear Preference
In the linear preference criteria, it can be seen that as long as the difference value has a lower value than p, the preference of the decision maker increases linearly with the d value, if the d value is greater than the p value, then there is an absolute preference. When the decision maker identifies several criteria for this type, the value of the upward trend (p value) must be determined.

$$H(d) = \begin{cases} 0 \ jika \ d \leq 0 \\ \frac{d}{p} \ jika \ 0 \leq d \leq p \\ 1 \ jika \ d > p \end{cases} \quad \text{.....(3)}$$

4) level Criteria
Under these conditions, the trend does not differ q and the preference trend p is determined simultaneously. If d is between the values of q and p, this means a weak preference situation (H (d)=0.5).

$$H(d) = \begin{cases} 0 \ jika \ d \leq q \\ \frac{1}{2} \ jika \ 0 \leq d \leq p \\ 1 \ jika \ d > p \end{cases} \quad \text{.....(4)}$$

5) Criteria with undifferentiated linear and area preferences
The decision maker considers the increase in preference linearly not different to absolute preference in the area between the two tendencies q and p.

$$H(d) = \begin{cases} 0 \ jika \ d \leq q \\ \frac{d-q}{p-q} \ jika \ q < d \leq p \\ 1 \ jika \ d > p \end{cases} \quad \text{.....(5)}$$

6) Gaussian Criteria

$$H(d) = \begin{cases} 0 \ jika \ d \leq 0 \\ 1 - e - \frac{d^2}{2a^2} \ jika \ d > 0 \end{cases} \quad \text{.....(6)}$$

Information:
H(d) = function difference criteria between alternatives
d = difference in criteria value {d = f(a) – f(b)}
p = value of upward trend
q = must be a fixed value

While the settlement algorithm of this promethee method is as follows [17]:
1) Determine criteria and weights.
2) Calculate the value of the sub-criteria and the value of the criteria for each alternative.
3) Calculating preference values between alternatives.
4) Calculating the value of the multi-criteria preference index
The multi-criteria preference index is determined based on the average weight of the preference function Pi.

$$\varphi(a,b) = \sum_{i=1}^{n} \pi_i \, P_i \ (a,b) \colon \forall a,b \in A \quad \text{.....(7)}$$

Where $\varphi(a,b)$ is the intensity of the decision maker's preference which states that alternative a is better than alternative b with simultaneous consideration of all criteria.

5) Calculating Leaving flow and Entering flow
Used to determine the order of priority in the Promethee process that uses a partial order of Leaving flow

$$\varphi^{+}(a) = \frac{1}{n-1} \sum x \in A\ \varphi(a,x) \quad \text{.....(8)}$$

Entering flow

$$\varphi^{-}(a) = \frac{1}{n-1} \sum x \in A\ \varphi(a,x) \quad \text{.....(9)}$$

6) Calculating Net Flow
Net flow, is used to produce the final decision in determining the sequence in solving the problem so as to produce a complete sequence.

$$\varphi(a) = \varphi^{+}(a) - \varphi^{-}(a) \quad \text{.....(10)}$$

III. RESULT AND ANALYSIS

In the results of the analysis of this research contains can be described in this discussion. The results and analysis explain the relationship between the criteria data and alternative data used. Where based on these data, it will be analyzed using the promethee method to determine the results of the lecturer's performance appraisal ranking.

3.1 Criteria Data

The data criteria used are the criteria for assessing the performance of lecturers. Where for each criterion has a weight percentage value. The criteria data are shown in Table 1.

Table 1. Assessment Criteria Data

No	Criteria	Code
1	The average value of student assessment of lecturers	K1
2	SAP/GBPP compatibility	K2
3	Discipline in attendance	K3
4	Discipline in collecting question files and grades	K4
5	Conducting Research	K5
6	Carrying out Community Service	K6
7	Have scientific publications	K7
8	Have structured modules	K8
9	Have a book that has been published by a publisher	K9
10	Be a speaker in a seminar	K10

Each criterion has sub-criteria and weight values as follows:

1) The average value of student assessment (K1)
The criteria for the average value of student assessments have the following sub-criteria and weight values:
a) The average rating of 86-100 has a weight value of 4
b) The average rating of 76-85 has a weight value of 3
c) The average rating of 66-75 has a weight value of 2
d) The average rating of 50-65 has a weight value of 1
e) Average assessment <50 has a weight value of 0

2) SAP/GBPP compliance (K2)
The SAP/GBPP suitability criteria if appropriate have a weight value of 4 and those that are not appropriate have a weight value of 1.

3) Discipline in attendance (K3)
Disciplinary criteria have sub-criteria and weight values with average values as follows:
a) Average 86-100 has a weight value of 4
b) Average 76-85 has a weight value of 3
c) Average 66-75 has a weight value of 2
d) Average 50-65 has a weight value of 1
e) Average <50 has a weight value of 0

4) Discipline in collecting question and grade files (K4)
Discipline criteria in file collection if discipline has a weight value of 4 and undisciplined has a weight value of 1.

5) Conducting Research (K5)
Sub-criteria data for international research has a weight value of 4, research at the national level 3 and no research has a weight value of 1.

6) Carry out Community Service (K6)
On the criteria of Community Service in the form of the number of services carried out by lecturers.

7) Have scientific paper publications (K7)
In the publication criteria, the resulting scientific work has the following sub-criteria and weights:
a) Published in the form of a reputable international journal has a weight value of 4.
b) Published in the form of an international journal indexed to an international database with a weight value of 3.
c) Published in the form of an accredited national journal Kemenristekdikti has a weight value of 2.
d) Published in the form of a national journal in Indonesian language with a weight value of 1.
e) No publication of scientific work has a weight value of 0.

8) Have structured modules (K8)
This criterion is in the form of the number of modules compiled by the lecturer.

9) Have a book that has been published by a publisher (K9)
In this criterion, if a book published by an international publisher has a weight value of 4, national has a weight

value of 3 and no book publication has a weight value of 1.

10) Being a speaker in a seminar (K10)
The sub-criteria data as an international speaker has a weight value of 4, a national speaker has a weight value of 3 and not being a seminar speaker has a weight value of 1.

3.2 Alternative Data

The alternative data used is in the form of permanent lecturer data of foundations that already have NIDN. The data of the lecturers who became the sample were 7 lecturers represented by A, C, D, E, F and G. The data was obtained using random sampling method. Assessment data on lecturer performance is shown in Table 1.

Table 1. Lecturer Performance Assessment Data

No	Kriteria	Alternatif						
		A	B	C	D	E	F	G
1	K1	3	3	4	3	2	3	2
2	K2	4	4	4	4	1	4	1
3	K3	2	3	1	1	1	1	1
4	K4	4	1	1	1	4	1	4
5	K5	4	1	1	3	3	4	3
6	K6	2	3	2	1	2	4	2
7	K7	2	1	1	1	4	4	4
8	K8	3	2	3	3	2	2	2
9	K9	1	1	2	1	3	3	3
10	K10	1	1	3	1	3	3	3

3.3 Analysis with the Promethee Method

Based on the alternative data obtained, then an assessment is carried out using the promethee method based on the criteria for each alternative as follows:

1) Calculating Preference Values Between Alternatives

At this stage, a comparison is made between one alternative and another. To get the difference in the value of the criteria {d = f(a) – f(b)}. Furthermore, the preference value is calculated according to the type of preference used.

The preference value for criteria for each alternative is obtained from the difference in the criteria for each alternative using Equation 2. The preference value for criteria K1 is shown in Table 2.

Table 2. Preference Value Criteria K1

Alternatif	a	b	d	|d|	P
E,D	2	3	-1	1	1
E,G	2	2	0	0	0
E,B	2	3	-1	1	1
E,A	2	3	-1	1	1
E,C	2	4	-2	2	1
E,F	2	3	-1	1	1
D,E	3	2	1	1	1
D,G	3	2	1	1	1
D,B	3	3	0	0	0
D,A	3	3	0	0	0
D,C	3	4	-1	1	1
D,F	3	3	0	0	0
G,E	2	2	0	0	0
G,D	2	3	-1	1	1
G,B	2	3	-1	1	1
G,A	2	3	-1	1	1
G,C	2	4	-2	2	1
G,F	2	3	-1	1	1
B,E	3	2	1	1	1
B,D	3	3	0	0	0
B,G	3	2	1	1	1
B,A	3	3	0	0	0
B,C	3	4	-1	1	1
B,F	3	3	0	0	0
A,E	3	2	1	1	1
A,D	3	3	0	0	0
A,G	3	2	1	1	1
A,B	3	3	0	0	0
A,C	3	4	-1	1	1
A,F	3	3	0	0	0
C,E	4	2	2	2	1
C,D	4	3	1	1	1
C,G	4	2	2	2	1
C,B	4	3	1	1	1
C,A	4	3	1	1	1
C,F	4	3	1	1	1
F,E	3	2	1	1	1
F,D	3	3	0	0	0
F,D	3	2	1	1	1
F,B	3	3	0	0	0
F,A	3	3	0	0	0
F,C	3	4	-1	1	1

The preference value for K2 criteria is shown in Table 3.

Table 3. Preference Value Criteria K2

Alternatif	a	b	d	|d|	P
E,D	1	4	-3	3	1
E,G	1	1	0	0	0
E,B	1	4	-3	3	1
E,A	1	4	-3	3	1
E,C	1	4	-3	3	1
E,F	1	4	-3	3	1
D,E	4	1	3	3	1
D,G	4	1	3	3	1

D,B	4	4	0	0	0
D,A	4	4	0	0	0
D,C	4	4	0	0	0
D,F	4	4	0	0	0
G,E	1	1	0	0	0
G,D	1	4	-3	3	1
G,B	1	4	-3	3	1
G,A	1	4	-3	3	1
G,C	1	4	-3	3	1
G,F	1	4	-3	3	1
B,E	4	1	3	3	1
B,D	4	4	0	0	0
B,G	4	1	3	3	1
B,A	4	4	0	0	0
B,C	4	4	0	0	0
B,F	4	4	0	0	0
A,E	4	1	3	3	1
A,D	4	4	0	0	0
A,G	4	1	3	3	1
A,B	4	4	0	0	0
A,C	4	4	0	0	0
A,F	4	4	0	0	0
C,E	4	1	3	3	1
C,D	4	4	0	0	0
C,G	4	1	3	3	1
C,B	4	4	0	0	0
C,A	4	4	0	0	0
C,F	4	4	0	0	0
F,E	4	1	3	3	1
F,D	4	4	0	0	0
F,D	4	1	3	3	1
F,B	4	4	0	0	0
F,A	4	4	0	0	0
F,C	4	4	0	0	0

The preference value for K3 criteria is shown in Table 4.

Table 4. K3 Criteria Preference Value

Alternatif	a	b	d	|d|	P
E,D	1	1	0	0	0
E,G	1	1	0	0	0
E,B	1	3	-2	2	1
E,A	1	2	-1	1	1
E,C	1	1	0	0	0
E,F	1	1	0	0	0
D,E	1	1	0	0	0
D,G	1	1	0	0	0
D,B	1	3	-2	2	1
D,A	1	2	-1	1	1
D,C	1	1	0	0	0
D,F	1	1	0	0	0
G,E	1	1	0	0	0
G,D	1	1	0	0	0
G,B	1	3	-2	2	1
G,A	1	2	-1	1	1
G,C	1	1	0	0	0
G,F	1	1	0	0	0
B,E	3	1	2	2	1
B,D	3	1	2	2	1
B,G	3	1	2	2	1
B,A	3	2	1	1	1
B,C	3	1	2	2	1
B,F	3	1	2	2	1
A,E	2	1	1	1	1
A,D	2	1	1	1	1
A,G	2	1	1	1	1
A,B	2	3	-1	1	1
A,C	2	1	1	1	1
A,F	2	1	1	1	1
C,E	1	1	0	0	0
C,D	1	1	0	0	0
C,G	1	1	0	0	0
C,B	1	3	-2	2	1
C,A	1	2	-1	1	1
C,F	1	1	0	0	0
F,E	1	1	0	0	0
F,D	1	1	0	0	0
F,D	1	1	0	0	0
F,B	1	3	-2	2	1
F,A	1	2	-1	1	1
F,C	1	1	0	0	0

The preference value for K4 criteria is shown in Table 5.

Table 5. Preference Value Criteria K4

Alternatif	a	b	d	|d|	P
E,D	4	1	3	3	1
E,G	4	4	0	0	0
E,B	4	1	3	3	1

E,A	4	4	0	0	0
E,C	4	1	3	3	1
E,F	4	1	3	3	1
D,E	1	4	-3	3	0
D,G	1	4	-3	3	0
D,B	1	1	0	0	0
D,A	1	4	-3	3	0
D,C	1	1	0	0	0
D,F	1	1	0	0	0
G,E	4	4	0	0	0
G,D	4	1	3	3	1
G,B	4	1	3	3	1
G,A	4	4	0	0	0
G,C	4	1	3	3	1
G,F	4	1	3	3	1
B,E	1	4	-3	3	0
B,D	1	1	0	0	0
B,G	1	4	-3	3	0
B,A	1	4	-3	3	0
B,C	1	1	0	0	0
B,F	1	1	0	0	0
A,E	4	4	0	0	0
A,D	4	1	3	3	1
A,G	4	4	0	0	0
A,B	4	1	3	3	1
A,C	4	1	3	3	1
A,F	4	1	3	3	1
C,E	1	4	-3	3	0
C,D	1	1	0	0	0
C,G	1	4	-3	3	0
C,B	1	1	0	0	0
C,A	1	4	-3	3	0
C,F	1	1	0	0	0
F,E	1	4	-3	3	0
F,D	1	1	0	0	0
F,D	1	4	-3	3	0
F,B	1	1	0	0	0
F,A	1	4	-3	3	0
F,C	1	1	0	0	0

The preference value of K5 criteria is shown in Table 6.

Table 6. Preference Value Criteria K5

Alternatif	a	b	d	|d|	P
E,D	3	3	0	0	0
E,G	3	3	0	0	0
E,B	3	1	2	2	1
E,A	3	4	-1	1	0
E,C	3	1	2	2	1
E,F	3	4	-1	1	0
D,E	3	3	0	0	0
D,G	3	3	0	0	0
D,B	3	1	2	2	1
D,A	3	4	-1	1	0
D,C	3	1	2	2	1
D,F	3	4	-1	1	0
G,E	3	3	0	0	0
G,D	3	3	0	0	0
G,B	3	1	2	2	1
G,A	3	4	-1	1	0
G,C	3	1	2	2	1
G,F	3	4	-1	1	0
B,E	1	3	-2	2	0
B,D	1	3	-2	2	0
B,G	1	3	-2	2	0
B,A	1	4	-3	3	0
B,C	1	1	0	0	0
B,F	1	4	-3	3	0
A,E	4	3	1	1	0
A,D	4	3	1	1	0
A,G	4	3	1	1	0
A,B	4	1	3	3	1
A,C	4	1	3	3	1
A,F	4	4	0	0	0
C,E	1	3	-2	2	0
C,D	1	3	-2	2	0
C,G	1	3	-2	2	0
C,B	1	1	0	0	0
C,A	1	4	-3	3	0
C,F	1	4	-3	3	0
F,E	4	3	1	1	0
F,D	4	3	1	1	0
F,D	4	3	1	1	0
F,B	4	1	3	3	1
F,A	4	4	0	0	0
F,C	4	1	3	3	1

The preference value of K6 criteria is shown in Table 7.

Table 7. Preference Value Criteria K6

Alternatif	a	b	d	|d|	P
E,D	2	1	1	1	1,0
E,G	2	2	0	0	1,0
E,B	2	3	-1	1	1,0
E,A	2	2	0	0	1,0
E,C	2	2	0	0	1,0
E,F	2	4	-2	2	1,0
D,E	1	2	-1	1	1,0
D,G	1	2	-1	1	1,0
D,B	1	3	-2	2	1,0
D,A	1	2	-1	1	1,0
D,C	1	2	-1	1	1,0
D,F	1	4	-3	3	1,0
G,E	2	2	0	0	1,0
G,D	2	1	1	1	1,0
G,B	2	3	-1	1	1,0
G,A	2	2	0	0	1,0
G,C	2	2	0	0	1,0
G,F	2	4	-2	2	1,0
B,E	3	2	1	1	1,0
B,D	3	1	2	2	0,5
B,G	3	2	1	1	1,0
B,A	3	2	1	1	1,0
B,C	3	2	1	1	1,0
B,F	3	4	-1	1	1,0
A,E	2	2	0	0	1,0
A,D	2	1	1	1	1,0
A,G	2	2	0	0	1,0
A,B	2	3	-1	1	1,0
A,C	2	2	0	0	1,0
A,F	2	4	-2	2	1,0
C,E	2	2	0	0	1,0
C,D	2	1	1	1	1,0
C,G	2	2	0	0	1,0
C,B	2	3	-1	1	1,0
C,A	2	2	0	0	1,0
C,F	2	4	-2	2	1,0
F,E	4	2	2	2	0,5
F,D	4	1	3	3	0,5
F,D	4	2	2	2	0,5
F,B	4	3	1	1	1,0
F,A	4	2	2	2	0,5
F,C	4	2	2	2	0,5

The preference value of K7 criteria is shown in Table 8.

Table 8. Preference Value Criteria K7

Alternatif	a	b	d	|d|	P
E,D	4	1	3	3	1
E,G	4	4	0	0	0
E,B	4	1	3	3	1
E,A	4	2	2	2	1
E,C	4	1	3	3	1
E,F	4	4	0	0	0
D,E	1	4	-3	3	1
D,G	1	4	-3	3	1
D,B	1	1	0	0	0
D,A	1	2	-1	1	1
D,C	1	1	0	0	0
D,F	1	4	-3	3	1
G,E	4	4	0	0	0
G,D	4	1	3	3	1
G,B	4	1	3	3	1
G,A	4	2	2	2	1
G,C	4	1	3	3	1
G,F	4	4	0	0	0
B,E	1	4	-3	3	1
B,D	1	1	0	0	0
B,G	1	4	-3	3	1
B,A	1	2	-1	1	1
B,C	1	1	0	0	0
B,F	1	4	-3	3	1
A,E	2	4	-2	2	1
A,D	2	1	1	1	1
A,G	2	4	-2	2	1
A,B	2	1	1	1	1
A,C	2	1	1	1	1
A,F	2	4	-2	2	1
C,E	1	4	-3	3	1
C,D	1	1	0	0	0
C,G	1	4	-3	3	1
C,B	1	1	0	0	0
C,A	1	2	-1	1	1
C,F	1	4	-3	3	1
F,E	4	4	0	0	0
F,D	4	1	3	3	1
F,D	4	4	0	0	0
F,B	4	1	3	3	1

F,A	4	2	2	2	1
F,C	4	1	3	3	1

The preference value for K8 criteria is shown in Table 9.

Table 9. Criterion Preference Value K8

Alternatif	a	b	d	|d|	P
E,D	2	3	-1	1	1
E,G	2	2	0	0	0
E,B	2	2	0	0	0
E,A	2	3	-1	1	1
E,C	2	3	-1	1	1
E,F	2	2	0	0	0
D,E	3	2	1	1	1
D,G	3	2	1	1	1
D,B	3	2	1	1	1
D,A	3	3	0	0	0
D,C	3	3	0	0	0
D,F	3	2	1	1	1
G,E	2	2	0	0	0
G,D	2	3	-1	1	1
G,B	2	2	0	0	0
G,A	2	3	-1	1	1
G,C	2	3	-1	1	1
G,F	2	2	0	0	0
B,E	2	2	0	0	0
B,D	2	3	-1	1	1
B,G	2	2	0	0	0
B,A	2	3	-1	1	1
B,C	2	3	-1	1	1
B,F	2	2	0	0	0
A,E	3	2	1	1	1
A,D	3	3	0	0	0
A,G	3	2	1	1	1
A,B	3	2	1	1	1
A,C	3	3	0	0	0
A,F	3	2	1	1	1
C,E	3	2	1	1	1
C,D	3	3	0	0	0
C,G	3	2	1	1	1
C,B	3	2	1	1	1
C,A	3	3	0	0	0
C,F	3	2	1	1	1
F,E	2	2	0	0	0
F,D	2	3	-1	1	1
F,D	2	2	0	0	0
F,B	2	2	0	0	0
F,A	2	3	-1	1	1
F,C	2	3	-1	1	1

The preference value for K9 criteria is shown in Table 10.

Table 10. Preference Value Criteria K9

Alternatif	a	b	d	|d|	P
E,D	3	1	2	2	1
E,G	3	3	0	0	0
E,B	3	1	2	2	1
E,A	3	1	2	2	1
E,C	3	1	2	2	1
E,F	3	3	0	0	0
D,E	1	3	-2	2	0
D,G	1	3	-2	2	0
D,B	1	1	0	0	0
D,A	1	1	0	0	0
D,C	1	1	0	0	0
D,F	1	3	-2	2	0
G,E	3	3	0	0	0
G,D	3	1	2	2	1
G,B	3	1	2	2	1
G,A	3	1	2	2	1
G,C	3	1	2	2	1
G,F	3	3	0	0	0
B,E	1	3	-2	2	0
B,D	1	1	0	0	0
B,G	1	3	-2	2	0
B,A	1	1	0	0	0
B,C	1	1	0	0	0
B,F	1	3	-2	2	0
A,E	1	3	-2	2	0
A,D	1	1	0	0	0
A,G	1	3	-2	2	0
A,B	1	1	0	0	0
A,C	1	1	0	0	0
A,F	1	3	-2	2	0
C,E	1	3	-2	2	0
C,D	1	1	0	0	0
C,G	1	3	-2	2	0
C,B	1	1	0	0	0
C,A	1	1	0	0	0

C,F	1	3	-2	2	0
F,E	3	3	0	0	0
F,D	3	1	2	2	1
F,D	3	3	0	0	0
F,B	3	1	2	2	1
F,A	3	1	2	2	1
F,C	3	1	2	2	1

The preference value of K10 criteria is shown in Table 11.

Table 11. Preference Value Criteria K10

Alternatif	a	b	d	|d|	P
E,D	3	1	2	2	1
E,G	3	3	0	0	0
E,B	3	1	2	2	1
E,A	3	1	2	2	1
E,C	3	3	0	0	0
E,F	3	3	0	0	0
D,E	1	3	-2	2	1
D,G	1	3	-2	2	1
D,B	1	1	0	0	0
D,A	1	1	0	0	0
D,C	1	3	-2	2	1
D,F	1	3	-2	2	1
G,E	3	3	0	0	0
G,D	3	1	2	2	1
G,B	3	1	2	2	1
G,A	3	1	2	2	1
G,C	3	3	0	0	0
G,F	3	3	0	0	0
B,E	1	3	-2	2	1
B,D	1	1	0	0	0
B,G	1	3	-2	2	1
B,A	1	1	0	0	0
B,C	1	3	-2	2	1
B,F	1	3	-2	2	1
A,E	1	3	-2	2	1
A,D	1	1	0	0	0
A,G	1	3	-2	2	1
A,B	1	1	0	0	0
A,C	1	3	-2	2	1
A,F	1	3	-2	2	1
C,E	3	3	0	0	0
C,D	3	1	2	2	1
C,G	3	3	0	0	0
C,B	3	1	2	2	1
C,A	3	1	2	2	1
C,F	3	3	0	0	0
F,E	3	3	0	0	0
F,D	3	1	2	2	1
F,D	3	3	0	0	0
F,B	3	1	2	2	1
F,A	3	1	2	2	1
F,C	3	3	0	0	0

2) Calculating Leafing Flow and Entering Flow

Then calculate the leafing flow using Equation 8 and entering flow using Equation 9. So that the resulting ranking of leafing flow and entering flow for each alternative is in Table 12.

Table 11. Preference Value Criteria K10

Alternatif	Leaving Flow	Entering Flow
A	0,58433	0,36528
B	0,29583	0,61767
C	0,41767	0,59267
D	0,41767	0,46767
E	0,41736	0,29583
F	0,40933	0,27847
G	0,41736	0,29583

3) Calculating Net Flow

Calculation of net flow will result in the final decision. In determining the net flow, Equation 10 is used. This results in a ranking of each alternative as shown in Table 12.

Table 12. Ranking Results Based on Net Flow

Alternatif	Leaving Flow	Entering Flow	Net Flow	Rank
A	0,58433	0,36528	0,05833	3
B	0,29583	0,61767	-0,19167	7
C	0,41767	0,59267	-0,17500	6
D	0,41767	0,46767	-0,05000	5
E	0,41736	0,29583	0,12153	1
F	0,40933	0,27847	0,00833	4
G	0,41736	0,29583	0,12153	2

Based on the results of the net flow calculation shown in Table 12, it can be seen that the alternative for Lecturer E has the highest net flow value of 0.12153. Meanwhile, the one with the lowest net flow value is Lecturer B at -0.19167. Lecturer rankings can be determined based on the highest to lowest net flow values in Table 12. In order, Lecturer E, Lecturer G, Lecturer A, Lecturer F, Lecturer D, Lecturer C,

and Lecturer B. In this case, Lecturer E is an alternative lecturer. with the best performance assessment because Lecturer E has better grades than other alternatives.

IV. CONCLUSION

Based on the results and analysis that has been carried out, the researchers draw several conclusions that the promethee method can help in providing an assessment of lecturer performance from several alternatives given.

The final result in this research is an application that can provide an assessment of lecturer performance. The result of the decision given by the promethee method is the result of the comparison of each alternative based on the assessment criteria with different preferences and criteria weights so as to be able to produce an objective decision. The addition of assessment criteria for each alternative can affect the assessment and calculation results of the promethe method.

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