Independent Campus Internship Scholarship Selection System with TOPSIS Method

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Abstract

Currently, the Ministry of Education, Culture, Research and Technology provides many internship schemes for students from various universities. However, to get there, universities usually conduct internal selections to screen students who are entitled to take part in the internship selection at independent campuses to match their competencies, abilities and talents. There are many ways that can be done, one of which is to determine certain decisions using the TOPSIS method. TOPSIS is ideally used to help solve problems that offer various alternative criteria. TOPSIS helps in the decision-making process. The results showed that the most ideal criterion was a high cumulative achievement index. The results of the research can be used as a reference model in the decision-making process.

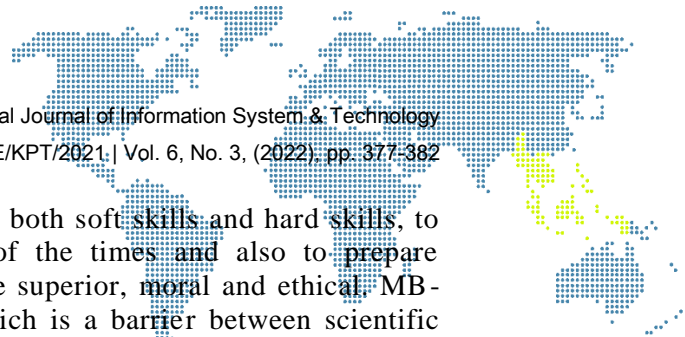**Keywords:** *TOPSIS, Decision support system, scholarship, independent campus*

1. Introduction

The Independent Campus is one of the programs issued by the Ministry of Education, Culture, Research and Technology which aims to channel talents, interests and encourage students to prepare competencies as a provision to enter the world of work. Through the independent campus, students get the opportunity to study in companies or institutions that have collaborated to learn and engage directly from practitioners. The learning carried out is equivalent to 20 credits each semester if studying in college. Independent campus is one part of the flagship program for independent learning issued by the Ministry of Education, Culture, Research and Technology. In addition to gaining knowledge, students also get many other benefits, including tuition assistance and living expenses. However, not all students can pass the selection of the independent campus program. There are many conditions that must be met. To enter this stage, the campus should prepare students who have advantages and high potential to qualify for various independent campus schemes.

The government issued a new program, namely the independent campus. This program aims to prepare the future of students by directing them to the industry so that they are in sync between skills and current industry needs [1].

Merdeka Campus is a policy of the Minister of Education and Culture which aims to encourage students to master various sciences that are useful for entering the world of work. Merdeka Campus provides an opportunity for students to choose the courses they will take. The concept of independent learning certainly aims to provide flexibility for students to study outside campus. This program is expected to be able to improve the competence of graduates, both soft skills and hard skills, to be more prepared and relevant to the needs of the times and also to prepare graduates as future leaders of the nation who are superior, moral and ethical [2].

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be able to improve the competence of graduates, both soft skills and hard skills, to be more prepared and relevant to the needs of the times and also to prepare graduates as future leaders of the nation who are superior, moral and ethical. MB-KM wants to abolish the linearity paradigm which is a barrier between scientific fields. Considering that today's increasingly complex life emphasizes aspects of broader and more comprehensive insight, to prepare it, of course, it requires various scientific collaborations, both multidisciplinary and interdisciplinary [3].

On that basis, this research was made to assist universities in selecting students in order to determine the conditions for receiving scholarships that will qualify for the independent campus program. Decision support systems can use the TOPSIS method. However, special research needs to be done so that the scholarship recipients of the independent campus can be right on target

Atas dasar itulah penelitian ini dibuat untuk membantu perguruan tinggi dalam menyeleksi mahasiswa agar dapat menetukan syarat penerimaan beasiswa yang akan lolos dalam program kampus merdeka. System pendukung keputusan dapat menggunakan metode TOPSIS. Namun perlu dilakukan penelitian khusus agar penerima beasiswa kampus merdeka dapat tepat sasaran.

The number of criteria in considering students who are eligible and worthy of receiving scholarships is one of the difficulties in determining prospective scholarship recipients [4]. Therefore, a decision support system is needed to assist the decision-making process so that it is right on target..

Decision Support System (DSS) as a set of model-based procedures for processing and assessing data to help managers make decisions [5].

This study uses TOPSIS because this method has an uncomplicated calculation. Comparison of the two methods is carried out to find out the best method in scholarship selection [6].

Topsis is a decision support system (DSS) method that is used to choose the best rank with the highest weight value on the assessed alternative. In the selection of who is entitled to a scholarship with the existing criteria. The assessment is carried out with a team of assessors who will judge based on the weight of the value of the criteria and alternatives [7].

TOPSIS is a multiple criteria method for identifying solutions from a limited set of alternatives. The TOPSIS method is a technique for ordering preferences by similarity to an ideal solution [8]. The TOPSIS method has several advantages, namely the concept is easy to understand and simple. The research, entitled the decision-making system for scholarship recipients at STMIK Pringsewu, is designed to help schools determine scholarship recipients quickly, precisely, time-efficiently, objectively so that they can quickly produce a decision in the selection of scholarship recipients. [9]. This study aims to assist universities in determining students to get scholarships for the independent campus program. This research is expected to be a reference in the decision-making process..

2. Research Methodology

The materials and methods used in this study were sourced from respondents and questionnaires. The selection of respondents using this method is a purposive sampling technique with the consideration that respondents are actors, both individuals or institutions who are considered to understand the problems that occur and are part of what the decision makers for this assessment are [7].

TOPSIS is used to solve criteria problems so that they can calculate the ideal solution and the best alternative [10]. The stages of research carried out in this study using the TOPSIS method are as follows:

a) Create a normalized decision matrix;
b) Create a weighted normalized decision matrix;

c) Determine the positive ideal solution matrix & negative ideal solution matrix;
d) Determine the distance between the value of each alternative with the positive ideal solution matrix & the negative ideal solution matrix; and
e) Determine the preference value for each alternative.

3. Result And Disscussion

Before performing calculations using the TOPSIS method, you must first determine the weight of the criteria as follows:

Table 1. Weight Criteria

Answer	Score
Very Good	5
Good	4
Enough	3
Bad	2
Very Bad	1

There are many independent campus program schemes, but only three were used in this study. In this study the criteria used are as follows:

Table 2. Research Criteria

Criteria	Value
C1	Kampus Mengajar
C2	Magang
C3	Membangun Desa

In this study the alternatives used are as follows:

Table 3. Alternative Criteria

Criteria	Value
A1	Minimum GPA 3.0
A2	National Insight Ability
A3	Organizational experience

Then the value of the weight of the criteria used for each criterion is 5 for A1 which is a minimum GPA of 3.0. Then the value of 4 for the A2 criteria, namely the ability of national insight. And the last 3 for the A3 criteria, namely organizational experience.

The following are the stages of completion using the TOPSIS method, namely:
1) Create a normalized decision matrix

The next step after knowing the criteria weights is to calculate the normalization decision matrix based on the previously known criteria weights. The following is the normalization decision matrix table below.

Table 4. Normalized Decision Matrix

Criteria	C1	C2	C3
A1	5	5	4
A2	5	4	3
A3	4	4	3

Then do the calculation of the normalization value based on the matrix above. The easy way to calculate it is to calculate the root of the total number of criteria offered. The results are in the table below, namely:

Table 5. Normalized Value

Criteria	C1	C2	C3
A1	5	5	4
A2	5	4	3
A3	5	4	3
Result	66	57	34
Score	8.12	7.54	5.83

2) Create a weighted normalized decision matrix

Another important step is to determine the normalization value for each alternative criteria C1, C2 and C3. The following is the normalization table, namely:

Table 6. Normalized Value

Criteria	C1	C2	C3
A1	5	5	4
A2	5	4	3
A3	4	4	3
Result	66	57	34
Score	8.12	7.54	5.83

The following are the normalization matrix values for the C1 criteria, which are as follows:

Table 7. Normalized Matrix C1

Criteria	C1	Result	Score
A1	5	8.12	0.61
A2	5	8.12	0.61
A3	4	8.12	0.49

The following are the normalization matrix values for the C2 criteria, which are as follows:

Table 8. Normalized Matrix C2

Criteria	C2	Result	Score
A1	5	7.54	0.66
A2	4	7.54	0.53
A3	4	7.54	0.53

The following are the normalization matrix values for the C3 criteria, which are as follows:

Table 9. Normalized Matrix C3

Criteria	C3	Result	Score
A1	4	5.83	0.68
A2	3	5.83	0.51
A3	3	5.83	0.51

Furthermore, after being calculated based on the criteria C1, C2 and C3 then the value is obtained with the following numbers:

Table 10. Data Normalization

Criteria	C1	C2	C3
A1	0.61	0.66	0.68
A2	0.61	0.53	0.51
A3	0.49	0.53	0.51

3) Determine the positive ideal solution matrix & negative ideal solution matrix
The most important step in the TOPSIS method is to calculate the positive ideal solution matrix and the negative ideal solution matrix. Here is the table:
Table 11. Weighted Normalization Matrix

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Criteria	C1	C2	C3
A1	3.05	2.64	2.04
A2	3.05	2.12	1.53
A3	1.96	2.12	1.53

Based on the results of the weighted normalization matrix, the minimum and maximum values in each criterion are known. For criteria C1 the maximum value is 3.05 and the minimum is 1.96 and for criteria C2 the minimum is 2.12 and the maximum is 2.64. then for C3 the minimum is 1.53 and the maximum is 2.04.

4) Determine the distance between the value of each alternative with a positive ideal solution matrix & a negative ideal solution matrix;
The next step is to calculate the maximum and minimum values. The following is how to calculate it based on the weighted normalization matrix from the previous table, which is as follows:

Maximum value: **3.05, 2.64, 2.04**

$\text{SQRT}((3.05 - \textbf{3.05})^2 + ((2.64 - \textbf{2.64})^2) + ((2.04 - \textbf{2.04})^2)) = 0$
$\text{SQRT}((3.05 - \textbf{3.05})^2 + ((2.12 - \textbf{2.64})^2) + ((1.53 - \textbf{2.04})^2)) = 0.53$
$\text{SQRT}((1.96 - \textbf{3.05})^2 + ((2.12 - \textbf{2.64})^2) + ((1.53 - \textbf{2.04})^2)) = 1.62$

Minimum value
$\text{SQRT}((3.05 - \textbf{1.96})^2 + ((2.64 - \textbf{2.12})^2) + ((2.04 - \textbf{1.53})^2)) = 1.62$
$\text{SQRT}((3.05 - \textbf{1.96})^2 + ((2.12 - \textbf{2.12})^2) + ((1.53 - \textbf{1.53})^2)) = 1.09$
$\text{SQRT}((1.96 - \textbf{1.96})^2 + ((2.12 - \textbf{2.12})^2) + ((1.53 - \textbf{1.53})^2)) = 0$

5) Determine the preference value for each alternative
Based on the value of the previous calculation, it is necessary to calculate alternative criteria for each criterion as follows:
For C1 criteria, namely $(1.62)/(1.62+0) = 1$
For criteria C2, namely $(1.09)/(1.09+0.53) = 0.67$
For C3 criteria, namely $(0)/(0 +1.62) = 0$
Based on these results, the value of C1 with the number 1 means that the most appropriate scholarship is based on a minimum GPA of 3.0 as a solution for selecting scholarships in the independent campus program.

4. Conclusion

The Ministry of Education, Culture, Research and Technology has a flagship program, namely the independent campus. The independent campus has the goal of making students ready and able to adapt to the industry through apprenticeship schemes or other learning in order to prepare themselves for the world of work. There are many independent campus schemes available, but the three schemes discussed in this study are campus teaching C1, internship C2 and building village C3.

The independent campus program aims to prepare superior and highly competitive and competent human resources. Therefore, more in-depth research is
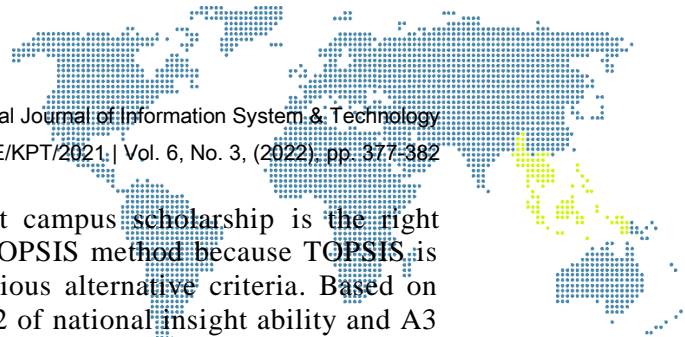
needed so that the recipient of the independent campus scholarship is the right person. The research was conducted using the TOPSIS method because TOPSIS is the most suitable method for problems with various alternative criteria. Based on alternative A1 for a minimum GPA of 3.0 and A2 of national insight ability and A3 of organizational experience, this study resulted in a score of 1 for a minimum GPA of 3.0 as the main requirement in determining the recipient of an independent campus scholarship. The research is expected to be a reference for universities before deciding which students are eligible for scholarships.

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