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Decision Support System Using the Multi-Objective Optimization Based on Ratio Analysis (MOORA) Method to Determine the World of Work Partners Competency Test at SMK Karnas Sindangwangi

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ABSTRACT

Vocational High Schools (SMK) are designed to prepare students to enter the world of work or business with a focus on specific skills. The Skills Competency Test (UKK) is an effort by the government to ensure the quality of education in SMK. SMK Karya Nasional Sindangwangi organizes UKK Mandiri using standardized instruments from the government and involving workplace partners. Currently, the selection of workforce partners in this school still needs to be done conventionally, making it challenging to determine relevant partners. This research aims to build a Decision Support System (DSS) to determine the optimal workplace partners for implementing UKK at SMK using the Multi-Objective Optimization based on Ratio Analysis (MOORA) method. This method calculates the final value converted into a matrix to obtain a value index (Yi) used for partner ranking. The alternative with the highest value from the benefit and cost criteria calculation is considered the best. The results showed PT Telkom Indonesia (Persero) as the best partner with a weight value of 0.3235, followed by PT Len Industri (Persero) with a value of 0.2656, PT Akur Pratama (Yogya Group) 0.2240, PT Arta Flash Sintesa Nusantara 0.1844, PT Seong Sin Tech 0.1553, and PT Indosat Ooredoo Tbk 0.1365. This research provides recommendations for optimal workforce partners for vocational schools.

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1. INTRODUCTION

In this era of increasingly competitive globalization, the quality of education is the main factor in determining the progress of a nation. Vocational education, especially in Vocational High Schools (SMK), plays an important role in preparing graduates who are ready for work and able to compete in the labor market [1], [2]. One of the efforts to improve

the quality of vocational school graduates is to hold a Competency Test in collaboration with the industrial world as a partner [3]. However, determining the right workforce partners for the Skill Competency Test at SMK is often challenging because it involves various criteria that must be considered holistically [4].

SMK Karnas Sindangwangi, one of the leading vocational education institutions in Majalengka, has realized the importance of collaboration with the industry in developing students' skills and competencies. For this reason, a decision support system (DSS) is needed to help provide optimal recommendations for selecting partners in the world of work. Decision Support Systems (DSS) play an essential role in complex decision-making by considering various criteria and alternatives [5]. DSS helps decision-makers by providing analysis tools and models to process large and diverse information [6]. DSS is very relevant when selecting work partners for competency tests at vocational schools because it integrates data from various sources and presents comprehensive analysis results [7]. By combining the MOORA method as part of DSS, the decision-making process can be carried out more systematically, accurately, and efficiently, thus supporting the achievement of the objectives of this research.

MOORA is one of the effective and efficient multi-criteria decision-making methods (MCDM). This method was developed by Brauers and Zavadskas in 2006 and has been used in a variety of applications, including site selection, performance evaluation, and strategic decision-making [8]. MOORA's main advantage lies in its ability to handle multiple objectives simultaneously and simplify the decision-making process through ratio analysis [9]. In addition, MOORA is relatively easy to apply and does not require complex parameters, so it is suitable for use in selecting UKK Partners as faced by SMK Karnas Sindangwangi.

This study will apply the MOORA method to determine the most suitable partner for SMK Karnas Sindangwangi to conduct competency tests. The determination of this partner involves various criteria that include the length of the company's establishment (partner), teacher internship, *prakerin* (*Praktek Kerja Industri*, industrial work practice), fees that must be paid for UKK, the distance between the school and the exam site. By using MOORA, an optimal solution that considers all these aspects in a balanced manner can be obtained. In this context, MOORA provides recommendations based on objective quantitative analysis and helps reduce subjectivity in decision-making [10], [11]. This is very important, considering that the decisions taken will directly impact the quality of education and the students' work readiness. In addition, implementing this method can be a model for other vocational schools to determine their partners in the world of work so that it can improve the quality of vocational education in general.

An overview of the system flow applied in this study can be seen in Figure 1

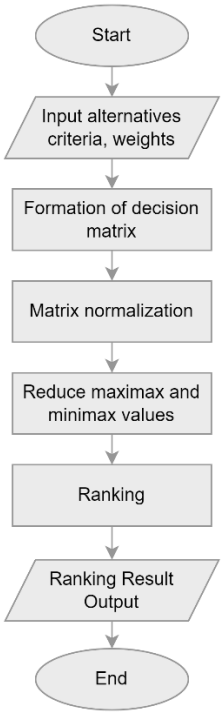

Figure 1. System flow applied in this study.

This research also aims to enrich the literature on the application of MOORA in education, especially in the context of vocational education. Although MOORA has been widely applied in various fields, using this method in selecting work partners for competency tests at vocational schools is still relatively rare [12]. Therefore, this study is expected to contribute significantly to developing decision-making methods in education.

Overall, this study has several primary objectives. First, identify and formulate relevant criteria in selecting partners in the world of work for competency tests at SMK Karnas Sindangwangi, and second, apply the MOORA method to analyze and evaluate partner alternatives based on predetermined criteria. Third, providing recommendations for optimal partners in the world of work based on the results of MOORA's analysis. Fourth, to examine the effectiveness and reliability of the MOORA method in the context of selecting partners in the world of work at vocational schools [13].

This research will be carried out in several stages [14]. First, a literature study will be carried out to identify the relevant criteria and methods used in selecting work partners. Second, data will be collected from various sources, including secondary data from literature and primary data through surveys and interviews with related parties at SMK Karnas Sindangwangi and prospective partners in the world of work. Third, the collected data will be analyzed using the MOORA method to evaluate and determine the most suitable partners in the world of work. Fourth, the results of the analysis will be assessed and concluded to provide appropriate recommendations [15].

This research is expected to significantly improve the quality of vocational education at SMK Karnas Sindangwangi through effective collaboration with partners in the world of work. With the MOORA method, it is hoped that the decisions taken will be more objective,

transparent, and accountable to support the achievement of better educational goals and relevant to the needs of the industry [16]. Thus, this research focuses on developing effective decision-making methods that improve the quality of education and job readiness of vocational school graduates [17]. Through better collaboration with the industrial world, it is hoped that graduates of SMK Karnas Sindangwangi can be more competitive and ready to face challenges in the increasingly complex and dynamic world of work.

Some of the previous relevant research includes Fadli and Imtihan [18], titled Implementation of MOORA Method in Evaluating Work Performance of Honorary Teachers. The criteria used in this assessment of teachers' work performance are based on pedagogic, personality, social, and professional competence, with sub-criteria. This study focuses on determining the performance of the best honorary teachers [19], while this study focuses on the selection of work partners for UKK. This provides added value because using MOORA in vocational education is still rare and can significantly contribute to developing decision-making methods in this field.

2. METODE

The Multi-Objective Optimization based on Ratio Analysis (MOORA) method is an effective and efficient approach to multi-criteria decision-making. MOORA was developed to address multiple objectives simultaneously and simplify the decision-making process through ratio analysis. Here are the steps in the MOORA method [20], [21]:

1. Identify Criteria and Alternatives:
   The first step is to determine the criteria used in the decision-making process. This criterion can be favorable (benefit) or unfavorable (cost). Furthermore, alternatives will be identified and evaluated based on predetermined criteria [22].
2. Decision Matrix Normalization:
   Create a decision matrix containing each alternative's values against each criterion.

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1i} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots & \iddots & \vdots \\ x_{j1} & \cdots & x_{ij} & \cdots & x_{jn} \\ \vdots & \iddots & \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mi} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

   The normalization of the decision matrix is carried out to avoid scale differences between criteria. This normalization can be done with the formula:

$$x_{ij}^{*} = \frac{xij}{\sqrt{\left[\sum_{j=1}^{m} x_{ij}^{2}\right]}} \quad (2)$$

   i = 1,2,3 is a criterion with *maximized* status
   where x_{ij} is the ith alternative value in the j-th criterion, and X^{*}_{ij} is the normalized value.
3. Weighting Criteria:
   Determine the weights for each criterion according to their level of importance. This weight is usually obtained from experts or through other methods such as AHP (Analytic Hierarchy Process).

4. Calculation of Ratio Value:
   Calculate the ratio value for each alternative by paying attention to the benefit and cost criteria. The formula calculates the ratio value:
   $$y_i = \sum_{j \in B} w_j x_{ij}^1 - \sum_{j \in C} w_j x_{ij}^1 \quad (3)$$
   Where y_i is the ratio value for the i-th alternative, Wj is the weight of the j-th criterion, B is the set of benefit criteria, and C is the cost criteria.
5. Alternative Ranking:
   Each alternative is ranked from highest to lowest based on the calculated ratio value. The alternative with the highest ratio value is considered the best alternative because it is closest to the ideal solution.
6. Analysis and Interpretation of Results:
   Analyze the ranking results to provide recommendations. The results of this ranking provide clear guidance in selecting the best alternative based on predetermined criteria.
7. Result Validation:
   Results can be validated by other methods or through discussions with experts to ensure they match expectations and realities in the field [23].

3. RESULTS AND DISCUSSION

The selection of partners in the world of work at SMK Karnas Sindangwangi using the MOORA Method requires criteria and weights when calculating to get the best alternative.

3.1. Identify Criteria and Alternatives

By using this method, there are criteria needed to determine partners in the world of work. The requirements set by the school are as follows:

Table 1. Criterion

No	Criterion Name	Description
1	C_1	Long Establishment of the Company
2	C_2	Teacher Internship
3	C_3	Prakerin (Industrial Work Practice)
4	C_4	Cost
5	C_5	Distance

In Table 1, the first criterion (C1) is the length of the company's establishment, the second criterion (C2) is teacher internship, the third criterion (C3) is prakerin, the fourth criterion (C4) is the cost, and the fifth criterion (C5) is distance. Based on these five criteria will be taken into account to determine partners in the world of work who are more prioritized for students of SMK Karnas Sindangwangi who are relevant and according to their abilities, talents, and interests [24].

3.2. Determining the Weight of Criteria

From the criteria that have been set previously, the weight value will be determined according to what the school gives, namely:

Table 2. Weight of each criterion

No	Criterion Name	Weight value	Description
1	C_1	5	*Benefit*
2	C_2	3	*Benefit*
3	C_3	4	*Benefit*
4	C_4	2	*Cost*
5	C_5	1	*Cost*

In Table 2 above, we first improve the weight value, simplifying the calculation process to produce a decision matrix in the form of fractional numbers using the formula.

$$W_j = \frac{w_j}{\sum w_j} \quad (4)$$

So that the total $\sum W_j = 1$, W_j is the j-th W index [25]. The level of importance of the previous criterion W was 5, 3, 4, 2, 1. Here is the calculation of the weight repair:

$$W_1 = \frac{5}{5+3+4+2+1} = 0{,}33$$
$$W_2 = \frac{3}{5+3+4+2+1} = 0{,}20$$
$$W_3 = \frac{4}{5+3+4+2+1} = 0{,}27$$
$$W_4 = \frac{2}{5+3+4+2+1} = 0{,}13$$
$$W_5 = \frac{1}{5+3+4+2+1} = 0{,}07$$

The results of the recalculation of the weight value correction above produce the following preference values:

Table 3. Criterion weight improvements

No	Criterion Name	Weight Value	Description
1	C_1	0,33	*Benefit*
2	C_2	0,20	*Benefit*
3	C_3	0,27	*Benefit*
4	C_4	0,13	*Cost*
5	C_5	0,07	*Cost*

Table 3 is the result of the weight improvement for the old criteria of the establishment of the company, which has a weight value of 0.33, the teacher internship criterion has a weight value of 0.20, the prakerin criterion has a weight value of 0.27, the cost criterion has a weight value of 0.13, and the cost criterion has a weight value of 0.07.

3.3. Determining the level of importance of each criterion

3.3.1. Length of Company Established

Table 4. Criteria parameters based on the length of time the company has been established (C_1)

No	Length of Company Established (C_1)	Value
1	≤ 10 years	1
2	≤ 25 years	2
3	≤ 35 years	3
4	≤ 50 years	4
5	> 50 years	5

Table 4 is the criterion parameter for the length of the company's establishment; the company's age is grouped in the range of 5 years. The older the company, the higher its value. Score 1 for the youngest company (≤ 10 years) and a score of 5 for the oldest company (> 50 years).

3.3.2. Teacher Internship

Table 5. Parameter of criteria based on teacher internship (C_2)

No	Teacher Internship (C_2)	Value
1	≤ 2 weeks	1
2	≤ 1 month	3
3	> 1 month	5

In Table 5 are the criteria parameters for teacher internships: companies that carry out teacher internships for ≤ 2 weeks are given a value of 1, companies that carry out teacher internships for ≤ 1 month are given a value of 3, and companies that carry out teacher internships for > 1 month are given a score of 5.

3.3.3. Prakerin

Tabel 6. Criteria parameters based on prakerin (C_3)

No	Prakerin (C_3)	Value
1	≤ 15 Students	1
2	≤ 30 Students	2
3	≤ 45 Students	3
4	≤ 60 Students	4
5	≥ 75 Students	5

Table 6 is the criterion parameter for prakerin, and the company accepts students who carry out prakerin. The company received a prakerin as many as ≤ 15 students were given a score of 1, the company received a prakerin as many as ≤ 30 students were given a score of 2, the company received a prakerin as many as ≤ 45 students were given a score of 3, the company received a prakerin as many as ≤ 60 students were given a score of 4 and the company received a prakerin as many as ≥ 75 students were given a score of 5.

3.3.4. Cost

Table 7. Criteria parameters by cost (C_4)

No	cost (C_4)	Value
1	> Rp. 10.000.000	1
2	≤ Rp. 10.000.000	2
3	≤ Rp. 7.500.000	3
4	≤ Rp. 5.000.000	4
5	≤ Rp. 2.500.000	5

Table 7 is the criterion parameter for cost. A > fee of IDR 10,000,000 is given a value of 1, a ≤ fee of IDR 10,000,000 is given a value of 2, a ≤ fee of IDR 7,500,000 is given a value of 3, a ≤ fee of IDR 5,000,000 is given a value of 4 and a ≤ fee of IDR 2,500,000 is given a value of 5.

3.3.5. Distance

Table 8. Criteria parameters by distance (C_5)

No	distance (C_5)	Value
1	> 100 Km	1
2	≤ 100 Km	2
3	≤ 50 Km	3
4	≤ 25 Km	4
5	≤ 5 Km	5

Table 8 is the criterion parameter for distance. Companies with a distance of > 100 km are given a score of 1, companies with a distance of ≤ 100 km are given a value of 2, companies with a distance of ≤ 50 km are given a value of 3, companies with a distance of ≤ 25 km are given a score of 4 and companies with a distance of ≤ 5 km are given a score of 5.

3.4. Determining Alternative Data

Table 9. Alternative data

No	Name	Criteria				
		C_1	C_2	C_3	C_4	C_5
1	PT. Indosat Ooredoo Tbk	56 Year	≤ 2 weeks	15 students	Rp. 4.620.000	19 km
2	PT. Telkom Indonesia (Persero)	58 Year	> 1 months	45 students	Rp. 6.600.000	3 km
3	PT. Arta Flash Sintesa Nusantara	4 Year	≤ 1 months	60 students	Rp. 9.240.000	25 km
4	PT. Akur Pratama (Yogya Group)	41 Year	≤ 2 weeks	75 students	Rp. 3.300.000	19 km
5	PT. Len Industri (Persero)	58 Year	≤ 1 months	12 students	Rp. 13.200.000	106 km
6	PT. Seong Sin Tech	13 Year	≤ 2 weeks	90 students	Rp. 2.250.000	93 km

3.5. Alternative Match Rating on Criteria

Table 10. Alternate match ratings

No	Nama	Kode	Criteria				
			C_1	C_2	C_3	C_4	C_5
1	PT. Indosat Ooredoo Tbk	A_1	5	1	1	4	4
2	PT. Telkom Indonesia (Persero)	A_2	5	5	3	3	5
3	PT. Arta Flash Sintesa Nusantara	A_3	1	3	4	2	4
4	PT. Akur Pratama (Yogya Group)	A_4	4	1	5	4	4
5	PT. Len Industri (Persero)	A_5	5	3	1	1	1
6	PT. Seong Sin Tech	A_6	2	1	5	5	2

In Table 10, the alternative data has been converted based on the predetermined value weights.

3.6. Decision Matrix

This matrix is formed from a table of 10 values x each alternative on each predetermined criterion.

$$X = \begin{Bmatrix} 5 & 1 & 1 & 4 & 4 \\ 5 & 5 & 3 & 3 & 5 \\ 1 & 3 & 4 & 2 & 4 \\ 4 & 1 & 5 & 4 & 4 \\ 5 & 3 & 1 & 1 & 1 \\ 2 & 1 & 5 & 5 & 2 \end{Bmatrix}$$

3.7. Normalization of the Matrix

$$x_{ij}^{*} = \frac{xij}{\sqrt{\left[\sum_{j=1}^{m} x_{ij}^{2}\right]}}$$

3.7.1. Normalization of Column 1 Matrix (Column of Criteria for the Establishment of the Company)

$$C_1 = \sqrt{5^2 + 5^2 + 1^2 + 4^2 + 5^2 + 2^2}$$

$$C_1 = \sqrt{96}$$

$$C_1 = 9{,}80$$

$$x_{1,1} = \frac{5}{9{,}80} = 0{,}5103$$

$$x_{2,1} = \frac{5}{9{,}80} = 0{,}5103$$

$$x_{3,1} = \frac{1}{9{,}80} = 0{,}1021$$

$$x_{4,1} = \frac{4}{9{,}80} = 0{,}4082$$

$$x_{5,1} = \frac{5}{9{,}80} = 0{,}5103$$

$$x_{6,1} = \frac{2}{9{,}80} = 0{,}2041$$

3.7.2. Normalization of Column 2 Matrix (Teacher Internship Criteria Column)

$$C_2 = \sqrt{1^2 + 5^2 + 3^2 + 1^2 + 3^2 + 1^2}$$
$$C_2 = \sqrt{46}$$
$$C_2 = 6{,}78$$

$$x_{1,2} = \frac{1}{6{,}78} = 0{,}1474$$
$$x_{2,2} = \frac{5}{6{,}78} = 0{,}7372$$
$$x_{3,2} = \frac{3}{6{,}78} = 0{,}4423$$
$$x_{4,2} = \frac{1}{6{,}78} = 0{,}1474$$
$$x_{5,2} = \frac{3}{6{,}78} = 0{,}4423$$
$$x_{6,2} = \frac{1}{6{,}78} = 0{,}1474$$

3.7.3. Normalization of Matrix Column 3 (Column of Industrial Work Practice Criteria)

$$C_3 = \sqrt{1^2 + 3^2 + 4^2 + 5^2 + 1^2 + 5^2}$$
$$C_3 = \sqrt{77}$$
$$C_3 = 8{,}77$$

$$x_{1,3} = \frac{1}{8{,}77} = 0{,}1140$$
$$x_{2,3} = \frac{3}{8{,}77} = 0{,}3419$$
$$x_{3,3} = \frac{4}{8{,}77} = 0{,}4558$$
$$x_{4,3} = \frac{5}{8{,}77} = 0{,}5698$$
$$x_{5,3} = \frac{1}{8{,}77} = 0{,}1140$$
$$x_{6,3} = \frac{5}{8{,}77} = 0{,}5698$$

3.7.4. Normalization of Column 4 Matrix (Cost Criteria Column)

$$C_4 = \sqrt{4^2 + 3^2 + 2^2 + 4^2 + 1^2 + 5^2}$$
$$C_4 = \sqrt{71}$$
$$C_4 = 8{,}43$$

$$x_{1,4} = \frac{4}{8{,}43} = 0{,}4747$$
$$x_{2,4} = \frac{3}{8{,}43} = 0{,}3560$$
$$x_{3,4} = \frac{2}{8{,}43} = 0{,}2374$$
$$x_{4,4} = \frac{4}{8{,}43} = 0{,}4747$$
$$x_{5,4} = \frac{1}{8{,}43} = 0{,}1187$$
$$x_{6,4} = \frac{5}{8{,}43} = 0{,}5934$$

3.7.5. Normalization of Column 5 Matrix (Distance Criterion Column)

$$C_5 = \sqrt{4^2 + 5^2 + 4^2 + 4^2 + 1^2 + 2^2}$$
$$C_5 = \sqrt{78}$$
$$C_5 = 8{,}83$$

$x1{,}5=48{,}83x_{1,5} = \frac{4}{8{,}83} = 0{,}4529$

$$x_{2,5} = \frac{5}{8{,}83} = 0{,}5661$$
$$x_{3,5} = \frac{4}{8{,}83} = 0{,}4529$$
$$x_{4,5} = \frac{4}{8{,}83} = 0{,}4529$$
$$x_{5,5} = \frac{1}{8{,}83} = 0{,}1132$$
$$x_{6,5} = \frac{2}{8{,}83} = 0{,}2265$$

From the results of the normalization calculation above, the normalization value of the matrix is obtained (x^*_{ij}) as follows:

$$x^*_{ij} = \begin{Bmatrix} 0{,}5103 & 0{,}1474 & 0{,}1140 & 0{,}4747 & 0{,}4529 \\ 0{,}5103 & 0{,}7372 & 0{,}3419 & 0{,}3560 & 0{,}5661 \\ 0{,}1021 & 0{,}4423 & 0{,}4558 & 0{,}2374 & 0{,}4529 \\ 0{,}4082 & 0{,}1474 & 0{,}5698 & 0{,}4747 & 0{,}4529 \\ 0{,}5103 & 0{,}4423 & 0{,}1140 & 0{,}1187 & 0{,}1132 \\ 0{,}2041 & 0{,}1474 & 0{,}5698 & 0{,}5934 & 0{,}2265 \end{Bmatrix}$$

3.8. Calculating the Optimization Value

a. Calculate the Optimization Value on Alternative 1 (y*1)

$y^*_1 = (x_{1.1(max)}.w_1 + x_{1.2(max)}.w_2 + x_{1.3(max)}.w_3) - (x_{1.4(min)}.w_4) - (x_{1.5(min)}.w_5)$

$y^*_1 = ((0{,}5103 \times 0{,}33) + (0{,}1474 \times 0{,}20) + (0{,}1140 \times 0{,}27)) - ((0{,}4747 \times 0{,}13) + (0{,}4529 \times 0{,}07))$

$y^*_1 = 0{,}2300 - 0{,}0935$

$y^*_1 = 0{,}1365$

b. Calculate the Optimization Value on Alternative 2 (y*2)

$y^*_2 = (x_{2.1(max).}w_1 + x_{2.2(max)}.w_2 + x_{2.3(max)}.w_3) - (x_{2.4(min)}.w_4) - (x_{2.5(min)}.w_5)$

$y^*_2 = ((0{,}5103 \times 0{,}33) + (0{,}7372 \times 0{,}20) + (0{,}3419 \times 0{,}27)) - ((0{,}3560 \times 0{,}13) + (0{,}5661 \times 0{,}07))$

$y^*_2 = 0{,}4087 - 0{,}0852$

$y^*_2 = 0{,}3235$

c. Calculate the Optimization Value on Alternative 3 (y*3)

$y^*_3 = (x_{3.1(max)}.w_1 + x_{3.2(max)}.w_2 + x_{3.3(max)}.w_3) - (x_{3.4(min)}.w_4) - (x_{3.5(min)}.w_5)$

$y^*_3 = ((0{,}1021 \times 0{,}33) + (0{,}4423 \times 0{,}20) + (0{,}4558 \times 0{,}27)) - ((0{,}2374 \times 0{,}13) + (0{,}4529 \times 0{,}07))$

$y^*_3 = 0{,}2440 - 0{,}0618$

$y^*_3 = 0{,}1822$

d. Calculate the Optimization Value on Alternatives 4()

$y^*_4 = (x_{4.1(max)}.w_1 + x_{4.2(max)}.w_2 + x_{4.3(max)}.w_3) - (x_{4.4(min)}.w_4) - (x_{4.5(min)}.w_5)$

$y^*_4 = ((0{,}4082 \times 0{,}33) + (0{,}1474 \times 0{,}20) + (0{,}5698 \times 0{,}27)) - ((0{,}4747 \times 0{,}13) + (0{,}4529 \times 0{,}07))$

$y^*_4 = 0{,}3175 - 0{,}0935$

$y^*_4 = 0{,}2240$

e. Calculate the Optimization Value on Alternatives 5 ()

$y^*_5 = (x_{5.1(max)}.w_1 + x_{5.2(max)}.w_2 + x_{5.3(max)}.w_3) - (x_{5.4(min)}.w_4) - (x_{5.5(min)}.w_5)$

$y^*_5 = ((0{,}5103 \times 0{,}33) + (0{,}1474 \times 0{,}20) + (0{,}1140 \times 0{,}27)) - ((0{,}1187 \times 0{,}13) + (0{,}1132 \times 0{,}07))$

$y^*_5 = 0{,}2890 - 0{,}0234$

$y^*_5 = 0{,}2656$

f. Calculate the Optimization Value on Alternatives 6 ()

$y^*_6 = (x_{6.1(max)}.w_1 + x_{6.2(max)}.w_2 + x_{6.3(max)}.w_3) - (x_{6.4(min)}.w_4) - (x_{6.5(min)}.w_5)$

$y^*_6 = ((0{,}2041 \times 0{,}33) + (0{,}1474 \times 0{,}20) + (0{,}5698 \times 0{,}27)) - ((0{,}5934 \times 0{,}13) + (0{,}2265 \times 0{,}07))$

$y^*_6 = 0{,}2495 - 0{,}0942$

$y^*_6 = 0{,}1553$

3.9. Determining the Ranking

From the results of the previous calculation, we get results that we can sort from the largest value to the smallest value [25]. The alternative with the largest optimization value is the selected alternative, as seen in Table 11.

Table 11. Ranking table

No	Alternative	Value	Rank
1	PT. Telkom Indonesia (Persero)	0,3235	1
2	PT. Len Industri (Persero)	0,2656	2
3	PT. Akur Pratama (Yogya Group)	0,2240	3
4	PT. Arta Flash Sintesa Nusantara	0,1822	4
5	PT. Seong Sin Tech	0,1553	5
6	PT. Indosat Ooredoo Tbk	0,1365	6

From the results of the previous calculation, we get results that we can sort from the largest value to the smallest value [12], where the alternative that has the largest optimization value is the selected alternative, which can be seen in Table 11.

3.10. System Implementation

The implementation of the Decision Support System (DSS) that has been built using the MOORA method will be shown here; the first thing that the user must do is the Login System, where the user will be asked to enter a Username and password to log in, as shown in Figure 2 below.

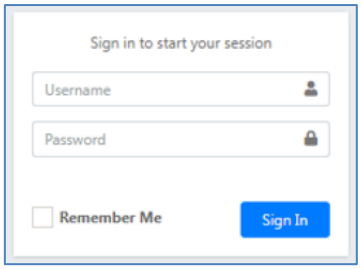

Figure 2. Login DSS MOORA

After successfully logging in, the admin will be redirected to the main page or dashboard. The dashboard page can be seen in the following figure 3:

Figure 3. Dashboard DSS MOORA

To view the criteria data, select the master data menu and then choose the criteria. This page contains a criteria data input form, a table containing data input into the database, and actions to change and delete the criteria data. The following is the display of the criteria data page, which can be seen in Figure 4.

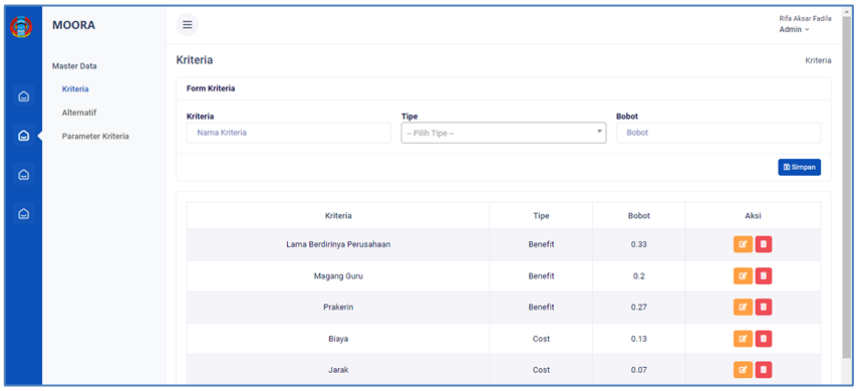

Figure 4. Page Criteria

To view alternative data, select the master data menu and then choose alternatives. This page has an alternative data input form, a table containing data input into the database, and actions to change and delete alternative data. An alternate data page looks like this in Figure 5.

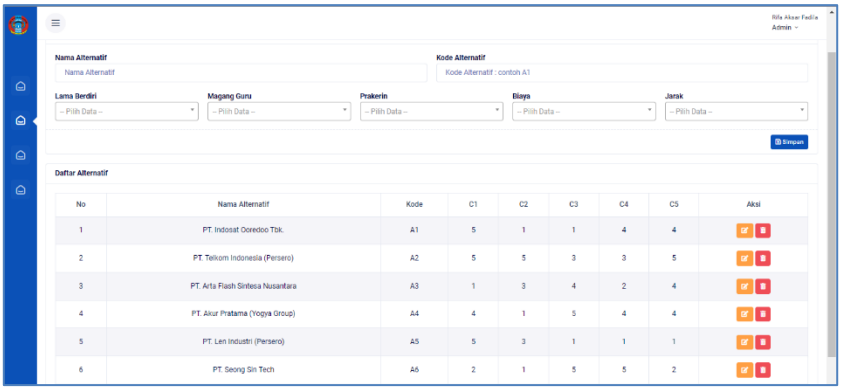

Figure 5. Alternative page

To view the criteria parameter data, select the master data menu and choose the criteria parameters. On this page, there is a table containing the data that has been input into the database and actions to change the criteria parameter data. The criteria parameter data page looks like this in Figure 6.

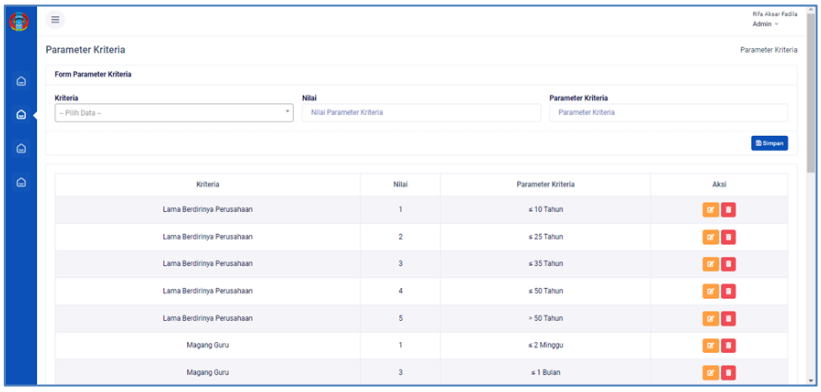

Figure 6. Criteria parameter page

Select the MOORA calculation and matrix menus to view the matrix data. This page contains a table containing the data input into the database and the results of the calculations that are automatically generated. The matrix data page looks like in Figure 7.

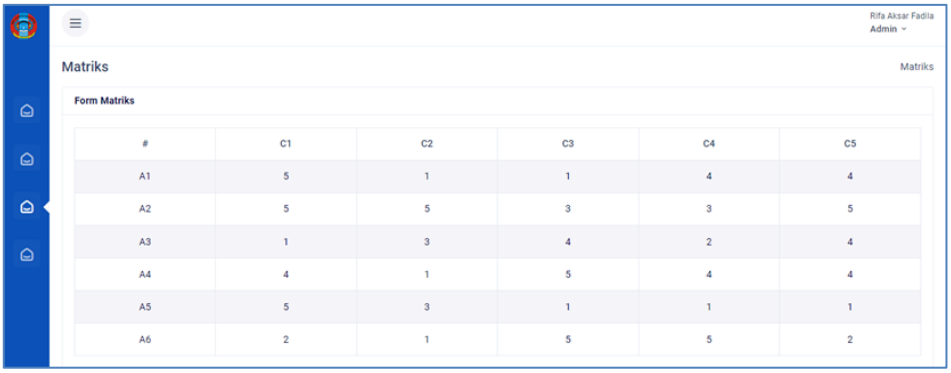

Figure 7. Matrix page

Select the MOORA calculation menu and then the normalization menu to view the normalization data. This page contains a table containing the data input into the database and the results of the calculations that are automatically generated. The normalized data page looks like this in Figure 8.

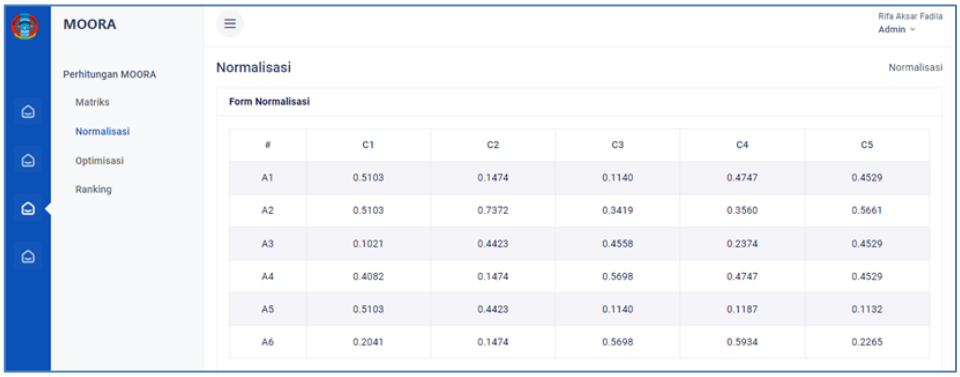

Figure 8. Normalization page

Select the MOORA calculation and optimization menu to view the optimization data. This page contains a table containing the data input into the database and the results of the

calculations that are automatically generated. The optimization data page looks like this in Figure 9.

Figure 9. Optimization page

To view the ranking data, select the MOORA calculation menu, then select the ranking menu. This page contains a table containing the data input into the database and the results of the calculations that are automatically generated. The ranking data page looks like this in Figure 10.

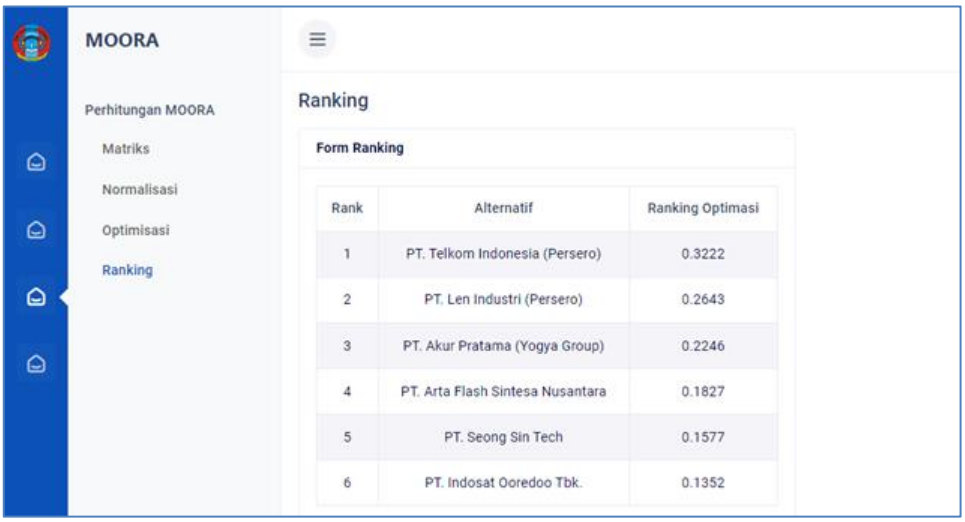

Figure 10. Ranking page

The conclusion of the Method and System Testing that has been made shows the same results, namely the alternative of PT. Telkom Indonesia (Persero) is ranked 1st with a weight value of 0.3235; the second alternative is PT. Len Industri (Persero) has a weight value of 0.2656; the third alternative is PT. Akur Pratama (Yogya Group) has a weight value of 0.2240; the fourth alternative is PT. Arta Flash Sintesa Nusantara has a weight value of 0.1844; the fifth alternative is PT. Seong Sin Tech has a weight value of 0.1553; the sixth alternative is PT. Indosat Ooredoo Tbk, with a weight value of 0.1365.

4. CONCLUSION

Based on the results of this study, it was concluded that the final value calculated was automatically obtained through the assessment process, which was then converted into a matrix form to get the final result. The output of this method includes calculating the value of the MOORA (Yi) index, which is used for ranking employment partners. The ranking of this method is based on the highest MOORA (Yi) index value because the highest MOORA (Yi) index value indicates that the alternative is closest to the ideal solution. The perfect solution in the MOORA method consists of two criterion values, namely the criteria that are beneficial and cost. The alternative with the highest value from calculating the number of criteria with benefit value minus the number of criteria with cost value will be considered the best alternative. So that the system chooses an alternative that considers the criteria as a whole, the alternative is in the form of the most linear partner in the world of work with the implementation of the Competency Test. Ranking using this method provides valuable information in determining recommended work partners for the school.

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