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Decision Support System for Performance Assessment of Honorary Personnel Applying TOPSIS, SMART, and MAUT Methods with a Combination of ROC Weighting

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A B S T R A C T

This research explores the assessment of honorary personnel performance through the application of the TOPSIS, SMART, and MAUT methods, along with ROC weighting. In today's competitive landscape, effective decision-making is vital for organizational success, and the role of Decision Support Systems (DSS) is emphasized. Unfair assessments can impact motivation and productivity, necessitating comprehensive criteria such as Work Discipline, Cooperation, and Education. The study employs TOPSIS, SMART, and MAUT, supported by ROC weighting, to holistically evaluate honorary personnel. The literature review provides insights into DSS and the methodologies used. The qualitative methodology involves literature review, problem identification, data collection, and method application. The findings highlight the dominance of certain alternatives in each method. The conclusion emphasizes the importance of method selection for accurate evaluation. Further study suggestions include exploring external validity, longitudinal impact, and qualitative research for a comprehensive understanding. This research aims to enhance organizational decision-making and improve the assessment of honorary personnel performance

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INTRODUCTION

In today's dynamic and competitive era, decision making is at the core of an organization's success. For government institutions or private institutions, the performance of honorary personnel plays an important role in supporting smooth operations and achieving goals. Meanwhile, the Decision Support System (DSS) has become a critical element in assisting in appropriate and efficient decision making (Syafiatun Ihsani Luthfiyah & Candra Noor Santi, 2022).

Assessing the performance of honorary personnels is a vital step in planning human resource development, training, and effective utilization in line with their tasks and functions. However, unfair assessments can have negative impacts on the motivation and productivity of honorary personnels. In this context, it is important to ensure that performance evaluations encompass a number of relevant criteria, such as Work Discipline, Cooperation, Commitment, Service Orientation, Education, and Etiquette.

The increasing complexity of business complexity and demands for operational efficiency place the need to have a system that can provide a holistic view of the performance of honorary personnel. In this context, the application of the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), SMART (Simple Multi-Attribute Rating Technique), and MAUT (Multi-Attribute Utility Theory) methods emerged as strategic solutions to compile and evaluate relevant criteria in making decisions on the assessment of honorary personnel.

These methods have proven effective in addressing performance evaluation issues by considering various aspects or criteria simultaneously. Additionally, the use of a combination of Rank Order Centroid (ROC) weighting can provide flexibility in adapting to decision-maker preferences.

Considering the complexity and importance of assessing honorary personnel performance, this research aims to provide an overview of a Decision Support System that applies the TOPSIS, SMART, and MAUT methods with ROC weighting combination. Through this research, it is hoped that an approach can be identified to assist organizations in assessing honorary personnel performance more effectively and efficiently, while reducing the level of subjectivity that may arise in the evaluation process.

LITERATURE REVIEW

In this theoretical review, the focus is on explaining Decision Support Systems (DSS) and their significance in addressing problems using data and models. Furthermore, the review examines various multi-criteria decision-making methods such as TOPSIS, SMART, MAUT, and ROC weighting, elucidating their fundamental principles and their roles in enhancing decision-making processes.

Decision Support System (DSS)

According to (Aldo et al., 2019), Decision Support System (DSS) is a computer-based system that can assist in decision-making to solve specific problems by utilizing certain data and models.

According to (Seran et al., 2020), Decision Support System (DSS) is a computer-based system that is part of an information system, including knowledge-based or knowledge management systems, used to support decision-making in an organization or company.

Based on the explanation above, it can be concluded that a Decision Support System (DSS) is a computer-based system that can assist in decision-making to solve specific problems by utilizing certain data and models.

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)

According to (Trise Putra et al., 2020), TOPSIS is a multi-criteria decision-making method based on the alternative that is closest to the positive ideal solution and farthest from the negative ideal solution. However, the alternative that has the smallest distance from the positive ideal solution does not necessarily have the largest distance from the negative ideal solution.

According to (Hertyana et al., 2020), TOPSIS is one of the multi-criteria decision-making methods that operates on the principle that the selected alternative should have the closest distance to the positive ideal solution and the farthest distance from the negative ideal solution.

Based on the explanation above, it can be concluded that TOPSIS is a multi-criteria decision-making method. It is based on the criterion that the chosen alternative should exhibit the closest proximity to the positive ideal solution while maintaining the farthest distance from the negative ideal solution

SMART (Simple Multi-Attribute Rating Technique)

According to (Sibyan, 2020), SMART is a decision-making method that addresses multi-criteria issues based on the values associated with each alternative for each criterion, which has been assigned a weight.

According to (Kurniadi & Prehanto, 2021), SMART method essentially is a decision-making approach that involves normalizing the weights of criteria, resulting in an evaluation score. This numerical evaluation facilitates decision-makers in the decision-making process.

Based on the explanation above, it can be concluded that the SMART method is a decision-making approach that involves normalizing the weights of criteria, resulting in an evaluation score, which facilitates decision-makers in the decision-making process.

MAUT (Multi-Attribute Utility Theory)

According to (Sari & Hayati, 2019), MAUT is a method in which the weighted sum of values is sought for the same utilities in each attribute. This method can also process data from all attributes with different utilities.

According to (Murti et al., 2023), MAUT is a quantitative comparison method that typically combines measurements of different cost, risk, and benefit considerations. Each criterion involved has several alternatives capable of providing solutions.

Based on the explanation above, it can be concluded that MAUT is a method that seeks the weighted sum of values for the same utilities in each attribute. Additionally, MAUT is a quantitative comparison method that integrates measurements of various cost, risk, and benefit considerations. Each criterion in this method involves multiple alternatives capable of providing solutions.

ROC (Rank Order Centroid)

According to (Ndruru, 2020), ROC is a method used to provide the necessary weightings for ranking in decision support systems. ROC operates by emphasizing that the first criterion is more important than the second criterion, the second criterion is more important than the third criterion, and so forth.

According to (Mahdi et al., 2023), ROC is a straightforward approach that refers to the level of importance or priority of a criterion in generating weights. In this case, the Rank Order Centroid (ROC) method is utilized to assign weights to each criterion.

Based on the explanation above, it can be concluded that ROC is a method used to provide the necessary weightings for ranking in decision support systems. ROC operates by emphasizing the priority of criteria, with the first criterion considered more important than the second, and so on. Additionally, ROC is described as a straightforward approach that determines the level of importance or priority of a criterion in generating weights.

METHODOLOGY

This research uses a quantitative method that begins with a literature study stage, where the author collects relevant references on the performance assessment of honorary employees and the TOPSIS, SMART, and MAUT methods. This step provides a solid theoretical foundation for further research. After that, the problem identification stage is carried out, where the researcher carefully understands and recognizes the problems that arise, and determines the problems to be solved.

The next process is data collection, where the researcher collects information based on research results related to the previously identified problems. The collected data is analyzed according to the research objectives, especially in the context of assessing the performance of honorary employees. Furthermore, this research involves the analysis and application of the TOPSIS, SMART, and MAUT methods. These methods are chosen with careful consideration, given their crucial role in conducting research. The use of ROC weighting is one of the approaches adopted in the application of these methods.

The research results are then presented in the next stage, where the best performance assessment of honorary employees is selected based on the established criteria. Drawing conclusions becomes an important closing stage, where the researcher summarizes the ranking of the selected performance assessment of honorary employees based on the criteria used. These conclusions provide a final overview of the research, answering the previously identified problems, and may provide suggestions for further research development. Thus, this research forms a logical and systematic series of stages to answer the research questions posed.

RESULTS

In this study, researchers used the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), SMART (Simple Multi-Attribute Rating Technique) and MAUT (Multi-Attribute Utility Theory) methods in the process of assessing the performance of honorary personnel. The TOPSIS, SMART and MAUT methods require preference criteria and weights to determine the best alternative.

Determination of Criteria, Weights and Alternatives

Producing the best alternative requires how many attributes or criteria are used as internal requirements problem solving, as well as the weight of each conflicting criteria.

Table 1. Criteria

Criteria	Description	Type
C1	Work Discipline	Benefit
C2	Teamwork	Benefit
C3	Commitment	Benefit
C4	Service orientation	Benefit
C5	Education	Benefit
C6	Politeness	Cost

From the results of the above table, there are 6 criteria that can be explained as follows:

1. Work Discipline
   Work discipline is an attitude of mutual respect, obedience, compliance, and appreciation for both written and unwritten rules, as well as the ability to adhere to them.
2. Teamwork
   Teamwork is an activity carried out within an organization involving several individuals with the aim of achieving a specific goal.
3. Commitment
   Commitment is a form of dedication or obligation that binds individuals in relation to specific matters or actions.
4. Service Orientation
   Service orientation is the willingness or desire to serve or assist others in meeting their needs.
5. Education
   Education is the academic level someone attains through learning in schools or higher education institutions.
6. Politeness
   Politeness is the demeanor of an individual related to ethics, speech, and friendly behavior displayed in front of others with the intention of respecting them to foster harmony in social interactions.

Furthermore, the data for each alternative obtained can be found in Table 2.

Table 2. Alternative

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	Good	Good	Good	Good	Diploma III	Very Good
Gisel (A2)	Quite Good	Good	Quite Good	Good	High School	Very Good
Loli (A3)	Quite Good	Quite Good	Good	Quite Good	High School	Good
Karin (A4)	Very Good	Very Good	Very Good	Good	Bachelor's Degree	Good
Maya (A5)	Good	Good	Quite Good	Very Good	Bachelor's Degree	Very Good
Cinta (A6)	Very Good	Good	Good	Good	Diploma III	Quite Good

In Table 2 above, a significant portion of the data is linguistic in nature, such as Very Good, Good, and Quite Good. This data needs to be weighted so that values for alternatives can be calculated using the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), SMART (Simple Multi-Attribute Rating Technique) and MAUT (Multi-Attribute Utility Theory) methods applying ROC weighting. The weighting can be seen in the following Table 3:

Table 3. Weight of Criteria Values

Criteria	Description	Value
C1	Very Good	3
	Good	2
	Quite Good	1
C5	Bachelor's Degree	3
	Diploma III	2
	High School	1

After the weighting of criteria values is completed, the next step is to create a compatibility rating, which can be observed in the following Table 4.

Table 4. Compatibility Rating for Each Criteria

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	2	2	2	2	2	3
Gisel (A2)	1	2	1	2	1	3
Loli (A3)	1	1	2	1	1	2
Karin (A4)	3	3	3	2	3	2
Maya (A5)	2	2	1	3	3	3
Cinta (A6)	3	2	2	2	2	1

After the compatibility ratings are determined in the above Table 4, the next step involves calculations using the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), SMART (Simple Multi-Attribute Rating Technique) and MAUT (Multi-Attribute Utility Theory) method applying ROC weighting.

The following are the weights obtained using the Rank Order Centroid (ROC) method as shown below:

$$W_1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.41$$

$$W_2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.24$$

$$W_3 = \frac{0+0+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.16$$

$$W_4 = \frac{0+0+0+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.10$$

$$W_5 = \frac{0+0+0+0+\frac{1}{5}+\frac{1}{6}}{6} = 0.06$$

$$W_6 = \frac{0+0+0+0+0+\frac{1}{6}}{6} = 0.03$$

After applying ROC weighting, the next step involves calculations using the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), SMART (Simple Multi-Attribute Rating Technique) and MAUT (Multi-Attribute Utility Theory) method.

DISCUSSIONS

TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) Method Calculation.

1. **Create a Decision Matrix**

$$\begin{pmatrix} 2 & 2 & 2 & 2 & 2 & 3 \\ 1 & 2 & 1 & 2 & 1 & 3 \\ 1 & 1 & 2 & 1 & 1 & 2 \\ 3 & 3 & 3 & 2 & 3 & 2 \\ 2 & 2 & 1 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 & 2 & 1 \end{pmatrix}$$

2. **Normalize the Decision matrix**

Criterion C1

$$x_1 = \sqrt{2^2 + 2^2 + 2^2 + 2^2 + 2^2 + 3^2 =}\ 5.38$$

$$R_{11} = \frac{X_{11}}{X_1} = \frac{2}{5.38} = 0.37$$

$$R_{21} = \frac{X_{21}}{X_1} = \frac{2}{5.38} = 0.37$$

$$R_{31} = \frac{X_{31}}{X_1} = \frac{2}{5.38} = 0.37$$

$$R_{41} = \frac{X_{41}}{X_1} = \frac{2}{5.38} = 0.37$$

$$R_{51} = \frac{X_{51}}{X_1} = \frac{2}{5.38} = 0.37$$

$$R_{61} = \frac{X_{61}}{X_1} = \frac{3}{5.38} = 0.55$$

Criterion C2

$$x_2 = \sqrt{1^2 + 2^2 + 1^2 + 2^2 + 1^2 + 3^2 =}\ 4.47$$

$$R_{12} = \frac{X_{12}}{X_2} = \frac{1}{4.47} = 0.22$$

$$R_{22} = \frac{X_{22}}{X_2} = \frac{2}{4.47} = 0.44$$

$$R_{32} = \frac{X_{32}}{X_2} = \frac{1}{4.47} = 0.22$$

$$R_{42} = \frac{X_{42}}{X_2} = \frac{2}{4.47} = 0.44$$

$$R_{52} = \frac{X_{52}}{X_2} = \frac{1}{4.47} = 0.22$$

$$R_{62} = \frac{X_{62}}{X_2} = \frac{3}{4.47} = 0.67$$

Criterion C3

$$x_3 = \sqrt{1^2 + 1^2 + 2^2 + 1^2 + 1^2 + 2^2 = } 3.46$$
$$R_{13} = \frac{X_{13}}{X_3} = \frac{1}{3.46} = 0.28$$
$$R_{23} = \frac{X_{23}}{X_3} = \frac{1}{3.46} = 0.28$$
$$R_{33} = \frac{X_{33}}{X_3} = \frac{2}{3.46} = 0.57$$
$$R_{43} = \frac{X_{43}}{X_3} = \frac{1}{3.46} = 0.28$$
$$R_{53} = \frac{X_{53}}{X_3} = \frac{1}{3.46} = 0.28$$
$$R_{63} = \frac{X_{63}}{X_3} = \frac{2}{3.46} = 0.57$$

Criterion C4

$$x_4 = \sqrt{3^2 + 3^2 + 3^2 + 2^2 + 3^2 + 2^2 = } 6.63$$
$$R_{14} = \frac{X_{14}}{X_4} = \frac{3}{6.63} = 0.45$$
$$R_{24} = \frac{X_{24}}{X_4} = \frac{3}{6.63} = 0.45$$
$$R_{34} = \frac{X_{34}}{X_4} = \frac{3}{6.63} = 0.45$$
$$R_{44} = \frac{X_{44}}{X_4} = \frac{2}{6.63} = 0.30$$
$$R_{54} = \frac{X_{54}}{X_4} = \frac{3}{6.63} = 0.45$$
$$R_{64} = \frac{X_{64}}{X_4} = \frac{2}{6.63} = 0.30$$

Criterion C5

$$x_5 = \sqrt{2^2 + 2^2 + 1^2 + 3^2 + 3^2 + 3^2 = } 6$$
$$R_{15} = \frac{X_{15}}{X_5} = \frac{2}{6} = 0.33$$
$$R_{25} = \frac{X_{25}}{X_5} = \frac{2}{6} = 0.33$$
$$R_{35} = \frac{X_{35}}{X_5} = \frac{1}{6} = 0.16$$
$$R_{45} = \frac{X_{45}}{X_5} = \frac{3}{6} = 0.5$$
$$R_{55} = \frac{X_{55}}{X_5} = \frac{3}{6} = 0.5$$

$$R_{65} = \frac{X_{65}}{X_5} = \frac{3}{6} = 0.5$$

Criterion C6

$$x_6 = \sqrt{3^2 + 2^2 + 2^2 + 2^2 + 2^2 + 1^2 = } \; 5.09$$
$$R_{16} = \frac{X_{16}}{X_6} = \frac{3}{5.09} = 0.58$$
$$R_{26} = \frac{X_{26}}{X_6} = \frac{2}{5.09} = 0.39$$
$$R_{36} = \frac{X_{36}}{X_6} = \frac{2}{5.09} = 0.39$$
$$R_{46} = \frac{X_{46}}{X_6} = \frac{2}{5.09} = 0.39$$
$$R_{56} = \frac{X_{56}}{X_6} = \frac{2}{5.09} = 0.39$$

$$R_{66} = \frac{X_{66}}{X_6} = \frac{1}{5.09} = 0.19$$

From the results of the calculations above, an R matrix is created as follows:

$$R = \begin{pmatrix} 0.37 & 0.22 & 0.28 & 0.45 & 0.33 & 0.58 \\ 0.37 & 0.44 & 0.28 & 0.45 & 0.33 & 0.39 \\ 0.37 & 0.22 & 0.57 & 0.45 & 0.16 & 0.39 \\ 0.37 & 0.44 & 0.28 & 0.30 & 0.5 & 0.39 \\ 0.37 & 0.22 & 0.28 & 0.45 & 0.5 & 0.39 \\ 0.55 & 0.67 & 0.57 & 0.30 & 0.5 & 0.19 \end{pmatrix}$$

3. Create a Y-Weighted Normalized Matrix

Calculate the value for the weighted normalized matrix Y by multiplying the weighted value obtained from calculations using the ROC method with the R matrix

Criterion C1

$$Y_{11} = w_1 * R_{11} = 0.41 * 0.37 = 0.15$$
$$Y_{21} = w_1 * R_{21} = 0.41 * 0.37 = 0.15$$
$$Y_{31} = w_1 * R_{31} = 0.41 * 0.37 = 0.15$$
$$Y_{41} = w_1 * R_{41} = 0.41 * 0.37 = 0.15$$
$$Y_{51} = w_1 * R_{51} = 0.41 * 0.37 = 0.15$$
$$Y_{61} = w_1 * R_{61} = 0.41 * 0.55 = 0.22$$

Criterion C2

$$Y_{12} = w_2 * R_{12} = 0.24 * 0.22 = 0.05$$
$$Y_{22} = w_2 * R_{22} = 0.24 * 0.44 = 0.10$$
$$Y_{32} = w_2 * R_{32} = 0.24 * 0.22 = 0.05$$
$$Y_{42} = w_2 * R_{42} = 0.24 * 0.44 = 0.10$$
$$Y_{52} = w_2 * R_{52} = 0.24 * 0.22 = 0.05$$
$$Y_{62} = w_2 * R_{62} = 0.24 * 0.67 = 0.16$$

Criterion C3

$Y_{13} = w_3 * R_{13} = 0.16 * 0.28 = 0.04$
$Y_{23} = w_3 * R_{23} = 0.16 * 0.28 = 0.04$
$Y_{33} = w_3 * R_{33} = 0.16 * 0.57 = 0.09$
$Y_{43} = w_3 * R_{43} = 0.16 * 0.28 = 0.04$
$Y_{53} = w_3 * R_{53} = 0.16 * 0.28 = 0.04$
$Y_{63} = w_3 * R_{63} = 0.16 * 0.57 = 0.09$

Criterion C4

$Y_{14} = w_4 * R_{14} = 0.10 * 0.45 = 0.04$
$Y_{24} = w_4 * R_{24} = 0.10 * 0.45 = 0.04$
$Y_{34} = w_4 * R_{34} = 0.10 * 0.45 = 0.04$
$Y_{44} = w_4 * R_{44} = 0.10 * 0.30 = 0.03$
$Y_{54} = w_4 * R_{54} = 0.10 * 0.45 = 0.04$
$Y_{64} = w_4 * R_{64} = 0.10 * 0.30 = 0.03$

Criterion C5

$Y_{15} = w_5 * R_{15} = 0.06 * 0.33 = 0.01$
$Y_{25} = w_5 * R_{25} = 0.06 * 0.33 = 0.01$
$Y_{35} = w_5 * R_{35} = 0.06 * 0.16 = 0.00$
$Y_{45} = w_5 * R_{45} = 0.06 * 0.5 = 0.03$
$Y_{55} = w_5 * R_{55} = 0.06 * 0.5 = 0.03$
$Y_{65} = w_5 * R_{65} = 0.06 * 0.5 = 0.03$

Criterion C6

$Y_{16} = w_6 * R_{16} = 0.03 * 0.58 = 0.01$
$Y_{26} = w_6 * R_{26} = 0.03 * 0.39 = 0.01$
$Y_{36} = w_6 * R_{36} = 0.03 * 0.39 = 0.01$
$Y_{46} = w_6 * R_{46} = 0.03 * 0.39 = 0.01$
$Y_{56} = w_6 * R_{56} = 0.03 * 0.39 = 0.01$
$Y_{66} = w_6 * R_{66} = 0.03 * 0.19 = 0.00$

Then create a Y matrix as follows:

$$Y = \begin{pmatrix} 0.15 & 0.05 & 0.04 & 0.04 & 0.01 & 0.01 \\ 0.15 & 0.10 & 0.04 & 0.04 & 0.01 & 0.01 \\ 0.15 & 0.05 & 0.09 & 0.04 & 0.00 & 0.01 \\ 0.15 & 0.10 & 0.04 & 0.03 & 0.03 & 0.01 \\ 0.15 & 0.05 & 0.04 & 0.04 & 0.03 & 0.01 \\ 0.22 & 0.16 & 0.09 & 0.03 & 0.03 & 0.00 \end{pmatrix}$$

4. **Determine the Positive Ideal Solution Matrix (A+) and the Negative Solution Matrix (A-)**

Selection of the positive ideal solution (A+) by selecting the maximum value for each criterion and for the negative ideal value (A-) by selecting the minimum value for each criterion based on the Y-weighted normalization value.

Table 5. Determine the Positive Ideal Solution matrix (A+) and the Negative Solution Matrix (A-)

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	0.15	0.05	0.04	0.04	0.01	0.01
Gisel (A2)	0.15	0.10	0.04	0.04	0.01	0.01
Loli (A3)	0.15	0.05	0.09	0.04	0.00	0.01
Karin (A4)	0.15	0.10	0.04	0.03	0.03	0.01
Maya (A5)	0.15	0.05	0.04	0.04	0.03	0.01
Cinta (A6)	0.22	0.16	0.09	0.03	0.03	0.00
A+	0.22	0.16	0.09	0.04	0.03	0.01
A-	0.15	0.05	0.04	0.03	0.00	0.00

5. **Calculate the Distance Between the Weighted Values of each Alternative**

$$D_1^+ = \sqrt{\begin{matrix}(0.15-0.22)^2+(0.05-0.16)^2+(0.04-0.09)^2\\+(0.04-0.04)^2+(0.01-0.03)^2+(0.01-0.01)^2\end{matrix}} = 0.14$$

$$D_2^+ = \sqrt{\begin{matrix}(0.15-0.22)^2+(0.10-0.16)^2+(0.04-0.09)^2\\+(0.04-0.04)^2+(0.01-0.03)^2+(0.01-0.01)^2\end{matrix}} = 0.10$$

$$D_3^+ = \sqrt{\begin{matrix}(0.15-0.22)^2+(0.05-0.16)^2+(0.09-0.09)^2\\+(0.04-0.04)^2+(0.00-0.03)^2+(0.01-0.01)^2\end{matrix}} = 0.13$$

$$D_4^+ = \sqrt{\begin{matrix}(0.15-0.22)^2+(0.10-0.16)^2+(0.04-0.09)^2\\+(0.03-0.04)^2+(0.03-0.03)^2+(0.01-0.01)^2\end{matrix}} = 0.10$$

$$D_5^+ = \sqrt{\begin{matrix}(0.15-0.22)^2+(0.05-0.16)^2+(0.04-0.09)^2\\+(0.04-0.04)^2+(0.03-0.03)^2+(0.01-0.01)^2\end{matrix}} = 0.13$$

$$D_6^+ = \sqrt{\begin{matrix}(0.22-0.22)^2+(0.16-0.16)^2+(0.09-0.09)^2\\+(0.03-0.04)^2+(0.03-0.03)^2+(0.00-0.01)^2\end{matrix}} = 0.01$$

The distance between the weighted value of each alternative to the negative ideal solution (D-)

$$D_1^- = \sqrt{\begin{matrix}(0.15-0.15)^2+(0.05-0.05)^2+(0.04-0.04)^2\\+(0.04-0.03)^2+(0.1-0.00)^2+(0.01-0.00)^2\end{matrix}} = 0.01$$

$$D_2^- = \sqrt{\begin{matrix}(0.15-0.15)^2+(0.10-0.05)^2+(0.04-0.04)^2\\+(0.04-0.03)^2+(0.01-0.00)^2+(0.01-0.00)^2\end{matrix}} = 0.05$$

$$D_3^- = \sqrt{\begin{matrix}(0.15-0.15)^2+(0.05-0.05)^2+(0.09-0.04)^2\\+(0.04-0.03)^2+(0.00-0.00)^2+(0.01-0.00)^2\end{matrix}} = 0.05$$

$$D_4^- = \sqrt{\begin{matrix}(0.15-0.15)^2+(0.10-0.05)^2+(0.04-0.04)^2\\+(0.03-0.03)^2+(0.03-0.00)^2+(0.01-0.00)^2\end{matrix}} = 0.05$$

$$D_5^- = \sqrt{\begin{matrix}(0.15-0.15)^2+(0.05-0.05)^2+(0.04-0.04)^2\\+(0.04-0.03)^2+(0.03-0.00)^2+(0.01-0.00)^2\end{matrix}} = 0.03$$

$$D_6^- = \sqrt{\begin{matrix}(0.22-0.15)^2+(0.16-0.05)^2+(0.09-0.04)^2\\+(0.03-0.03)^2+(0.03-0.00)^2+(0.00-0.00)^2\end{matrix}} = 0.14$$

Based on the calculation process above. the calculation results can be seen in the following table

Table 6. Distance between the weighted values of each alternative

D	D+	D-
D1	0.14	0.01
D2	0.10	0.05
D3	0.13	0.05
D4	0.10	0.05
D5	0.13	0.03
D6	0.01	0.14
D1	0.14	0.01
D2	0.10	0.05

6. Determine the Preference Value

$$V_1 = \frac{0.01}{0.01 + 0.14} = 0.06$$

$$V_2 = \frac{0.05}{0.05 + 0.10} = 0.3$$

$$V_3 = \frac{0.05}{0.05 + 0.13} = 0.27$$

$$V_4 = \frac{0.05}{0.05 + 0.10} = 0.3$$

$$V_5 = \frac{0.03}{0.03 + 0.13} = 0.18$$

$$V_6 = \frac{0.14}{0.14 + 0.01} = 0.93$$

From the calculation of the preference values above, the results are:

Table 7. Result

Code	Name	Result	Rank
V1	Sinta A1	0.06	4
V2	Gisel A2	0.3	5
V3	Loli A3	0.27	2
V4	Karin A4	0.3	5
V5	Maya A5	0.18	3
V6	Cinta A6	0.93	1

Based on calculations using the TOPSIS method, first place is Cinta with a score of 0.93, second place is Loli with a score of 0.27, third place is Maya with a score of 0.18, fourth place is Sinta with a score of 0.06, and for sixth place there are two candidates. namely Gisel and Karin with a score of 0.3.

SMART (Simple Multi-Attribute Rating Technique) Method Calculation.

First step: Assigning parameter values to each alternative

Table 8. Criterion Score for each Alternative

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	2	2	2	2	2	3
Gisel (A2)	1	2	1	2	1	3
Loli (A3)	1	1	2	1	1	2
Karin (A4)	3	3	3	2	3	2
Maya (A5)	2	2	1	3	3	3
Cinta (A6)	3	2	2	2	2	1

Second step: Weight calculation results

$$W1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.41$$

$$W2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.24$$

$$W3 = \frac{0+0+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.16$$

$$W4 = \frac{0+0+0+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0.10$$

$$W5 = \frac{0+0+0+0+\frac{1}{5}+\frac{1}{6}}{6} = 0.06$$

$$W6 = \frac{0+0+0+0+0+\frac{1}{6}}{6} = 0.03$$

For criteria with benefit categories calculated using equation (2) as follows

$u_i(a_i) = \frac{(Cmax-Cout)}{(Cmax-Cmin)}$.............................. (2)

criteria with cost categories (cost) are calculated using equation (3)

as follows

$u_i(a_i) = \frac{(Cmax-Cout)}{(Cmax-Cmin)}$.............................. (3)

Information:

$u_i(a_i)$: Utility score of the i criterion

$Cout$: Score i criterion

$Cmax$: Maximum criterion score

$Cmin$: Minimum criterion score

Maks (C1) = 3 Min (C1) = 1
A1(C1) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A2(C1) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A3(C1) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A4(C1) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A5(C1) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A6(C1) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$

Maks (C2) = 3 Min (C2) = 1
A1(C2) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A2(C2) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A3(C2) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A4(C2) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A5(C2) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A6(C2) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$

Maks (C3) = 3 Min (C3) = 1
A1(C3) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A2(C3) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A3(C3) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A4(C3) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A5(C3) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A6(C3) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$

Maks (C4) = 3 Min (C4) = 1
A1(C4) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A2(C4) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A3(C4) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A4(C4) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A5(C4) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A6(C4) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$

Maks (C5) = 3 Min (C5) = 1
A1(C5) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$
A2(C5) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A3(C5) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$
A4(C5) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A5(C5) = $(\frac{3-1}{3-1})\ x\ 100\% = 1$
A6(C5) = $(\frac{2-1}{3-1})\ x\ 100\% = 0.5$

Maks (C6) = 3 Min (C6) = 1
A1(C6) = $(\frac{1-3}{3-1})\ x\ 100\% = -1$
A2(C6) = $(\frac{1-3}{3-1})\ x\ 100\% = -1$
A3(C6) = $\left(\frac{1-2}{3-1}\right) x\ 100\% = -0.5$
A4(C6) = $\left(\frac{1-2}{3-1}\right) x\ 100\% = -0.5$
A5(C6) = $\left(\frac{1-3}{3-1}\right) x\ 100\% = -1$
A6(C6) = $(\frac{1-1}{3-1})\ x\ 100\% = 0$

Third step: Calculating utility value

Table 9. Utility Scores

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	0.5	0.5	0.5	0.5	0.5	-1
Gisel (A2)	0	0.5	0	0.5	0	-1
Loli (A3)	0	0	0.5	0	0	-0.5
Karin (A4)	1	1	1	0.5	1	-0.5
Maya (A5)	0.5	0.5	0	1	1	-1
Cinta (A6)	1	0.5	0.5	0.5	0.5	0

$u(\text{ai}) \sum_{j=1}^{m} Wj * uj\ (ai\ )$…………………….. (4)

Information:

$u(a_i)$: Alternative final value

Wj : Results of normalization of criteria weighting

$u_i(a_i)$: The resulting value of utility

Fourth step : Final Grade Calculation

A1 = (0.41 x 0.5) + (0.24 x 0.5) + (0.16 x 0.5) + (0.10 x 0.5) + (0.06 x 0.5) + (0.03 x -1)
= **0.455**

A2 = (041 x 0) + (0.24 x 0.5) + (0.16 x 0) + (0.10 x 0.5) + (0.06 x 0) + (0.03 x -1)
= **0.14**

A3 = (0.41 x 0) + (0.24 x 0) + (0.16 x 0.5) + (0.10 x 0) + (0.06 x 0) + (0.03 x – 0.5)
= **0.065**

A4 = (0.41 x 1) + (0.24 x 1) + (0.16 x 1) + (0.10 x 0.5) + (0.06 x 1) + (0.03 x – 0.5)
= **0.585**

A5 = (0.41 x 0.5) + (0.24 x 0.5) + (0.16 x 0) + (0.10 x 1) + (0.06 x 1) + (0.03 x -1)
= **0.455**

A6 = (0.41 x 1) + (0.24 x 0.5) + (0.16 x 0.5) + (0.10 x 0.5) + (0.06 x 0.5) + (0.03 x 0)
= **0.69**

Fifth step: Ranking

Table 10. Alternative Ranking

Alternative	Nilai Akhir	Ranking
Sinta (A1)	0.455	4
Gisel (A2)	0.14	6
Loli (A3)	0.65	2
Karin (A4)	0.585	3
Maya (A5)	0.455	5
Cinta (A6)	0.69	1

Sixth step: Create a table for Alternative Ranking Results.

Table 11. Result

Code	Name	Result	Rank
A6	Cinta	0.69	1
A3	Loli	0.65	2
A4	karin	0.585	3
A1	Sinta	0.455	4
A5	Maya	0.455	5
A2	Gisel	0.14	6

From the results of the SMART Method calculations above, a ranking is obtained in the assessment. The best performance of the honorary personnel was alternative A6 in the name "Cinta" with a final value = 0.69

a. MAUT (Multi-Attribute Utility Theory) Method Calculation.

First step: Creating a decision matrix.

$$X = \begin{pmatrix} 2 & 2 & 2 & 2 & 2 & 3 \\ 1 & 2 & 1 & 2 & 1 & 3 \\ 1 & 1 & 2 & 1 & 1 & 2 \\ 3 & 3 & 3 & 2 & 3 & 2 \\ 2 & 2 & 1 & 3 & 3 & 3 \end{pmatrix}$$

Second step: Normalization of the matrix.

For the benefits = $U_{(X)} \frac{X - Xi^{-}}{Xi^{+} - Xi^{-}}$ …………………….. (5)

For the Cost = $U_{(X)} \frac{X^{+} - X}{Xi^{+} - Xi^{-}}$ ………………………… (6)

Description:

U(x) = Normalization of Weight Matrix.

X = Alternative Weights.

X^{-} = Minimum weight from criteria to X.

X^+ = Maximum weight from criteria to X.

Third step: Calculations for alternatives

a. Sinta (A1)

$A_{11} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{12} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{13} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{14} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{15} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{16} = \frac{3-3}{3-1} = \frac{0}{2} = 0$

b. Gisel A2

$A_{21} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{22} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{23} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{24} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{25} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{26} = \frac{3-3}{3-1} = \frac{0}{2} = 0$

c. Loli A3

$A_{31} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{32} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{33} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{34} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{35} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{36} = \frac{3-2}{3-1} = \frac{1}{2} = 0.5$

d. Karin A4

$A_{41} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{42} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{43} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{44} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{45} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{46} = \frac{3-2}{3-1} = \frac{1}{2} = 0.5$

e. Maya A5

$A_{51} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{52} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{53} = \frac{1-1}{3-1} = \frac{0}{2} = 0$

$A_{54} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{55} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{56} = \frac{3-3}{3-1} = \frac{0}{2} = 0$

f. Cinta A6

$A_{61} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

$A_{62} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{63} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{64} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{65} = \frac{2-1}{3-1} = \frac{1}{2} = 0.5$

$A_{66} = \frac{3-1}{3-1} = \frac{2}{2} = 1$

Fourth step: Create a table of normalized matrix results.

Table 12. Normalized Matrix Results

Alternative	C1	C2	C3	C4	C5	C6
Sinta (A1)	0.5	0.5	0.5	0.5	0.5	0
Gisel (A2)	0	0.5	0	0.5	0	0
Loli (A3)	0	0	0.5	0	0	0.5
Karin (A4)	1	1	1	0.5	1	0.5
Maya (A5)	0.5	0.5	0	1	1	0
Cinta (A6)	1	0.5	0.5	0.5	0.5	1

Fifth step: Perform multiplication of normalized matrix.

$V(x)\sum_{i=1}^{n} Wj.Xij$ …………………….. (7)

A1 = (0.41 x 0.5) + (0.24 x 0.5) + (0.16 x 0.5) + (0.10 x 0.5) + (0.06 x 0.5) + (0.03 x 0)
= **0.485**

A2 = (0.41 x 0) + (0.24 x 0.5) + (0.16 x 0) + (0.10 x 0.5) + (0.06 x 0) + (0.03 x 0)
= **0.17**

A3 = (0.41 x 0) + (0.24 x 0) + (0.16 x 0.5) + (0.10 x 0) + (0.06 x 0) + (0.03 x 0.5)
= **0.095**

A4 = (0.41 x 1) + (0.24 x 1) + (0.16 x 1) + (0.10 x 0.5) + (0.06 x 1) + (0.03 x 0.5)
= **0.935**

A5 = (0.41 x 0.5) + (0.24 x 0.5) + (0.16 x 0) + (0.10 x 1) + (0.06 x 1) + (0.03 x 0)
= **0.485**

A6 = (0.41 x 1) + (0.24 x 0.5) + (0.16 x 0.5) + (0.10 x 0.5) + (0.06 x 0.5) + (0.03 x 1)
= **0.72**

Sixth step: Create a table for Alternative Ranking Results.

Table 13. Alternative Ranking Results

Code	Name	Result	Rank
A4	Karin	0.935	1
A6	Cinta	0.72	2
A1	Sinta	0.485	3
A5	Maya	0.485	3
A2	Gisel	0.17	5
A3	Loli	0.095	6

Therefore, the alternative that has the highest value, namely alternative A4 in the name "Karin" is an alternative for performance assessment the best honorary personnel with a V_i value = 0.935.

CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis of the results and discussion, it can be concluded that in assessing the performance of honorary personnel using the TOPSIS method, the "Cinta" alternative achieved the highest score of 0.93. In the SMART method, once again the "Cinta" alternative excelled with a score of 0.69. Meanwhile, the MAUT method gave the highest score to the "Karin" alternative with a score of 0.935. Thus, the "Cinta" and "Karin" alternatives stand out as the best choices in performance evaluation, each dominant in the TOPSIS and MAUT methods, respectively. This research highlights the importance of selecting the appropriate method according to the research context to obtain accurate and reliable evaluation results in determining quality honorary personnel.

FURTHER STUDY

While the current research has provided valuable insights into assessing the performance of honorary personnel using the TOPSIS, SMART, and MAUT methods, there are certain limitations that open avenues for further investigation.

Firstly, it is recommended to explore the external validity of the findings by extending the study to a larger and more diverse sample of honorary personnel across different organizational contexts. This could enhance the generalizability of the results and provide a more comprehensive understanding of the effectiveness of the evaluated methods.

Secondly, considering the dynamic nature of work environments, future research could delve into the longitudinal impact of the selected performance evaluation methods. Investigating how the performance of honorary personnel evolves over time and whether the effectiveness of the chosen methods remains consistent would contribute valuable insights for organizations seeking sustained improvement in their workforce.

Lastly, incorporating qualitative research methods, such as interviews or focus group discussions, could provide a richer perspective on the experiences and perceptions of both honorary personnel and evaluators regarding the chosen assessment methods. This qualitative aspect would enhance the quantitative results and provide a more well-rounded assessment of the effectiveness and suitability of the evaluation procedures.

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REFERENCES

Alahmadi, D. H., & Jamjoom, A. A. (2022). Decision support system for handling control decisions and decision-maker related to supply chain. *Journal of Big Data*, *9*(1). https://doi.org/10.1186/s40537-022-00653-9

Aldo, D., Putra, N., & Munir, Z. (2019). SISTEM PENDUKUNG KEPUTUSAN PENILAIAN KINERJA DOSEN DENGAN MENGGUNAKAN METODE MULTI ATTRIBUTE UTILITY THEORY (MAUT). *Jursima*, *7*(2), 76. https://doi.org/10.47024/js.v7i2.180

Aulia, S. (2020). Sistem Pendukung Keputusan Untuk Penerima Bantuan Beras Miskin Menggunakan Metode Topsis. *Djtechno: Jurnal Teknologi Informasi*, *1*(2), 52–57. https://doi.org/10.46576/djtechno.v1i2.973

Cahyani, L., Arif, Mu., & Ningsih, F. (2019). Sistem Pendukung Keputusan Pemilihan Mahasiswa Berprestasi Menggunakan Metode Moora (Studi Kasus Fakultas Ilmu Pendidikan Universitas Trunojoyo Madura. *Jurnal Ilmiah Edutic : Pendidikan Dan Informatika*, *5*(2), 108–114. https://journal.trunojoyo.ac.id/edutic/article/view/5354

Damanik, S., & Utomo, D. P. (2020). Implementasi Metode ROC (Rank Order Centroid) Dan Waspas Dalam Sistem Pendukung Keputusan Pemilihan Kerjasama Vendor. *… Teknologi Informasi Dan …*, *4*, 242–248. https://doi.org/10.30865/komik.v4i1.2690

Fitriani, P. (2020). Sistem Pendukung Keputusan Pembelian Smartphone Android dengan Metode Multi Attribute Utility Theory (MAUT). *Mantik Penusa*, *4*(1), 6–11. http://www.e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/711

Hertyana, H., Rahmawati, E., Studi, P., Informasi, S., Jakarta, N. M., Seroja, J., & Selatan, J. (2020). Sistem Pendukung Keputusan untuk Rekomendasi Pembelian Smartphone Dengan Menggunakan Metode Topsis. *Jurnal Teknik Informatika UNIKA Santo Thomas*, *05*, 80–91. http://ejournal.ust.ac.id/index.php/JTIUST/article/view/714

Jeri, R. W., & Robi, Y. (2020). Sistem Pendukung Keputusan Pendistribusian Zakat Menggunakan Metode Smart. *Jurnal Ilmiah Binary STMIK Bina Nusantara Jaya*, *02*(01), 2657–2117.

Kurniadi, A. D., & Prehanto, D. R. (2021). Rancang Bangun Sistem Pencarian Lokasi Usaha Dengan Metode Smart Bagi Pengusaha Baru. *JEISBI: (Journal of Emerging Information Systems and Business Intelligence)*, *02*(02), 24–29.

Laia, Y., Mesran, Sudipa, I. G. I., Putra, D. S., Rosyani, P., & Aryanti, R. (2023). Sistem Pendukung Keputusan Penilaian Kinerja Tenaga Honorer Menerapkan Metode Weighted Product (WP) dan Complex Proportional Assessment (COPRAS) dengan Kombinasi Pembobotan Rank Order Centroid (ROC). *Bulletin of Informatics and Data Science*, *2*(1), 19–29. https://ejurnal.pdsi.or.id/index.php/bids/index

Mahdi, F., Pri Indini, D., & Mesran. (2023). Penerapan Metode WASPAS dan ROC (Rank Order Centroid) dalam Pengangkatan Karyawan Kontrak. *Bulletin Of Computer Science Research*, *3*(2), 197–202. https://doi.org/10.47065/bulletincsr.v3i2.232

Murti, W. K., Triayudi, A., & Mesran. (2023). *Penentuan Mahasiswa Berprestasi* *dengan Menerapkan Metode Multi Attribute Utility Theory (MAUT)*. *5*(September), 122–130. https://doi.org/10.30865/json.v5i1.6823

Ndruru, R. K. (2020). Penerapan Metode Additive Ratio Assessment (ARAS) dan Rank Order Centroid (ROC) Dalam Pemilihan Jaksa Terbaik Pada Kejaksaan Negeri Medan. *Sainteks*, *1*(1), 367–372. http://prosiding.seminar-id.com/index.php/sainteks/article/view/464/457

Sari, R. N., & Hayati, R. S. (2019). Penerapan Metode Multi Attribute Utility Theory (MAUT) Dalam Pemilihan Rumah Kost. *J-SAKTI (Jurnal Sains Komputer Dan Informatika)*, *3*(2), 243. https://doi.org/10.30645/j-sakti.v3i2.144

Seran, F. A. R., Kelen, Y. P. K., & Nababan, D. (2020). Sistem Pendukung Keputusan Penentuan Jurusan Menggunakan Metode Weighted Product. *Jurnal Tekno Kompak*, *17*(1), 147–159.

Sibyan, H. (2020). IMPLEMENTASI METODE SMART PADA SISTEM PENDUKUNG KEPUTUSAN PENERIMA BEASISWA SEKOLAH. *Jurnal Penelitian Dan Pengabdian Kepada Masyarakat UNSIQ*, *7*(1), 78–83. https://doi.org/10.32699/ppkm.v7i1.1055

Sitompul, K. B., & Anwar, S. N. (2023). Sistem Pendukung Keputusan Pemilihan Smartphone Menggunakan Metode Simple Multi Attribute Rating Technique Berbasis Web. *Aiti*, *20*(1), 78–94. https://doi.org/10.24246/aiti.v20i1.78-94

Sumarno, S. M., & Harahap, J. M. (2020). Sistem Pendukung Keputusan Dalam Menentukan Pemilihan Posisi Kepala Unit (Kanit) Ppa Dengan Metode Weight Product. *JUST IT : Jurnal Sistem Informasi, Teknologi Informasi Dan Komputer*, *11*(1), 37. https://doi.org/10.24853/justit.11.1.37-44

Syafiatun Ihsani Luthfiyah, & Candra Noor Santi, R. (2022). SISTEM PENDUKUNG KEPUTUSAN (SPK) PENENTUAN ALGORITMA DAN METODE PENELITIAN DENGAN METODE SIMPLE ADDITIVE WEIGHTING (SAW). *Jurnal Informatika Dan Rekayasa Elektronik*, *5*(2), 173–180. https://doi.org/10.36595/jire.v5i2.678

Trise Putra, D. W., Santi, S. N., Swara, G. Y., & Yulianti, E. (2020). METODE TOPSIS DALAM SISTEM PENDUKUNG KEPUTUSAN PEMILIHAN OBJEK WISATA. *Jurnal Teknoif Teknik Informatika Institut Teknologi Padang*, *8*(1), 1–6. https://doi.org/10.21063/jtif.2020.v8.1.1-6