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Simple Additive Weighting: Determination of The Local Government Officials Tanggamus Region

Satria Abadi[1)*], Miswan Gumanti[2)]

[1)2)]*Bakti Nusantara Institute*
Jl. Wisma Rini, No.09, Lampung, Indonesia
[1)]satria2601@gmail.com

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Abstract

This study aims to determine regional officials in the Tanggamus region using a decision support system based on the Simple Additive Weighting (SAW) method. The determination of regional officials is crucial in the government official environment, as these officials hold significant positions at both regional and provincial levels. The issue of selecting regional officials in the Tanggamus area is significant due to various problems such as officials' behavior, absenteeism, lack of socialization in society, and more. This study employs the SAW method, which involves variables like educational level, behavior of officials, and rank. The SAW method evaluates these variables systematically to aid in decision-making, ensuring the selection of responsible regional officials who are accountable for their duties. The findings indicate that the SAW method is effective in evaluating alternatives based on predefined criteria. Officials appointed in an area must possess honesty in performing their duties and comply with established regulations. This system allows for a more transparent and accurate process in determining regional officials. Furthermore, the SAW method's structured approach provides a fair and objective evaluation, addressing the issues of bias and inconsistency in the selection process. The results of this study are expected to provide a robust decision support information system for regional officials in the Tanggamus region. This system ensures that selected officials have the necessary qualifications and integrity to fulfill their roles effectively. By implementing the SAW method, the study aims to improve governance by fostering transparency, accountability, and efficiency in the selection process, ultimately enhancing public trust and administrative performance in the Tanggamus region.

I. INTRODUCTION

Multiple Criteria Decision Analysis (MCDA) is a topic well represented in the field of expert systems; many of them employ MCDA for solving complex problems of decision making [1]–[3]. Therefore, we suggest that the well-established and unquestionably most well-known Single Average Weighting approach serve as a metamodel in order to increase the transparency of the MCDA methods. We demonstrate how to understand the MCDA techniques using the metamodel. We base our interpretation on the traditional MCDA results, namely on Zionts and Wallenius's (1983) preference capture method, known as Simple Additive Weighting (SAW). Our suggested framework can assist in demystifying the outcomes of an MCDA approach by helping to reinterpret them. We demonstrate its operation with the TOPSIS technique, but it may be used to almost any MCDA method, including ELECTRE, PROMETEE, AHP, VIKOR, and others. The Simple Additive Weighting (SAW) method offers a systematic approach to decision-making that evaluates multiple criteria to select the best candidates for these roles. This method is particularly advantageous for its simplicity and effectiveness in multi-criteria decision analysis (MCDA).

Choosing from a range of potential actions that could be chosen via a certain process in the hopes of arriving at the best choice is the problem of decision making. A decision support system can be constructed in a number of ways by identifying the optimal choice, one of which SAW, or simple additive weighting, is one among them

* Corresponding author

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[4]. By selecting the best option from a range of options that meet specific requirements, the SAW method is a technique for handling scenarios involving fuzzy multiple attribute decision making (FMADM) [5]. Given these challenges, it is essential to develop a robust system that can aid in the transparent and effective selection of regional officials. The Simple Additive Weighting (SAW) method offers a systematic approach to decision-making that evaluates multiple criteria to select the best candidates for these important roles. This method considers various factors such as educational level, official behavior, and rank, ensuring a comprehensive assessment of each candidate's qualifications and suitability for the position.

In the realm of governance, the determination of regional officials is a critical task. Regional officials are key government employees who hold significant positions, both at the regional and provincial levels. Their roles are pivotal in ensuring the effective administration and delivery of public services. However, in the Tanggamus area, the process of determining these officials has been fraught with challenges. Issues such as inappropriate behavior of officials, absenteeism, lack of social engagement, and ineffective communication with the community have been prevalent. These problems not only hinder the efficiency of governance but also erode public trust in government institutions.

Several key issues have been identified that impede the effectiveness of governance: 1) Inappropriate Behavior of Officials: instances of misconduct and unethical behavior among officials have been reported, which undermine the credibility and integrity of the government. 2) Absenteeism among officials disrupts the continuity and consistency of governance. It leads to delays in decision-making and service delivery, affecting the overall efficiency of the administration. 3) Lack of Social Engagement: Effective governance requires officials to engage with the community, understand their needs, and address their concerns. However, there has been a noticeable lack of social engagement, leading to a disconnect between the government and the people it serves. 4) Ineffective Communication: Communication is key to effective governance. The failure to communicate policies, decisions, and initiatives clearly to the public has resulted in misunderstandings, mistrust, and dissatisfaction among the community. 5) The Need for a Robust Selection System, given these challenges, there is a pressing need for a robust system that can aid in the transparent and effective selection of regional officials. A systematic approach to decision-making is essential to ensure that the most qualified and suitable candidates are appointed to these important positions.

The significance of this study lies in its potential to enhance the decision-making process in the appointment of regional officials. By employing the SAW method within a decision support system, this research aims to address the existing gaps in the selection process. The goal is to ensure that the appointed officials are not only qualified but also exhibit the integrity and accountability required to perform their duties effectively. This approach promises to improve the overall governance in the Tanggamus region by fostering a more transparent, accountable, and effective administrative framework. This study is particularly timely and relevant as it seeks to contribute to the broader objective of strengthening governance structures at the regional level. The implementation of a decision support system based on the SAW method can serve as a model for other regions facing similar challenges. Ultimately, this research aims to support the development of a governance system that is capable of meeting the needs and expectations of the community, thereby enhancing public trust and participation in the governmental processes. The Tanggamus region, like many other areas, faces numerous challenges in the selection and management of its regional officials.

II. Literature Review

Decision Support Systems are part of computer-based information systems, including knowledge-based systems (knowledge management) which are used to support Decision Support in an organization or company. In the journal [6]. According to Moore and Chang (1980), decision support systems can be described as decision-oriented, planning-oriented, future-oriented and used at unusual times. Thus, one definition of SPK can be drawn, namely an adaptive, flexible and interactive computer-based system that is used to solve unstructured problems so as to increase the value of the decisions taken. According to [7][8], decision support system the decision support system put forward by Michael S Scott Morton and Peter GW Keen, in the book Management Information Systems (McLeod, 1998) states that a decision support system is an information producing system aimed at a problem that must be created by the manager.

According to Raymond McLeod, Jr. defines a decision support system as an information system intended to assist management in solving the problems it faces (McLeod, 1998). The full definition is a specific information generating system aimed at solving a particular problem that must be solved by managers at various levels.

Litlle's definition states that a decision support system is a computer-based information system that produces various alternative decisions to assist management in dealing with various structured or unstructured problems using data or models. In the journal (Agus Lahinta Lecturer in Informatics Engineering, Gorontalo State University). Semi-structured problems have characteristics that are the intersection of structured problems and structured problems and unstructured problems. Two of these characteristics are:

1. Some parts of the problem occur repeatedly, temporarily
2. Some parts of the problem involve human subjectivity

The structured part of the problem can be handled well by computer applications built for that problem, while the unstructured part of the problem is handled by human decision makers [9].

III. METHODS

Research methodology is a crucial element in any scientific study, as it determines how researchers collect, analyze, and interpret data. In this context, this study employs several methods, one of which is the Simple Additive Weighting (SAW) method. According to Novel-terlaris-iwan.blogspot.com, the SAW method, also known as the weighted addition method, is used to find the weighted sum of performance ratings for each alternative across all attributes [10]

Basic Concept of the SAW Method

The basic concept of the SAW method is to calculate the weighted sum of performance ratings for each alternative based on all available attributes. This process involves normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. Normalization is essential to ensure that each evaluated attribute has the same scale, allowing for fair and accurate comparisons between the evaluated alternatives. The stages in this research method emphasize research activities for problem identification, accompanied by the aims and expected benefits of the research. Furthermore, to support problem-solving, a Decision Support System (DSS) and Visual Basic Programming are needed. In the journal by Deddy [11], the basic concept of the SAW method is to find the weighted sum of performance ratings for each alternative and all attributes. The SAW method can assist in decision-making on a problem with calculations that yield the highest value as the best alternative.

1) *Implementation of the SAW Method in Research*
   The implementation process of the SAW method in this research involves several key stages, each of which plays an important role in determining accurate and reliable final results. Generally, the procedure to use the SAW method to solve a problem includes the following steps (Sembiring, Fauzi, Khalifah, Khotimah, & Rubiati, 2020):
2) *Determine Criteria*
   The first step in the SAW method is to identify the criteria used as references in decision-making. These criteria must be relevant to the responsibilities and performance of local government officials. Examples of criteria include experience, education, community engagement, policy effectiveness, and leadership skills.
3) *Assign Weights to Criteria*
   After determining the criteria, the next step is to assign weights to each criterion based on its importance. Each criterion is assigned a weight reflecting its importance relative to the others. Weights can be determined through expert consultations, stakeholder input, or more formal weighting methods such as the Analytical Hierarchy Process (AHP).These weights must sum up to 1 (or 100%). Weights can be assigned through expert judgment, stakeholder input, or surveys.
4) *Rate the Alternatives*
   Local government officials are evaluated based on each of the determined criteria and given a score. This score can be subjective or objective, depending on the nature of the evaluated criterion. Each local government official is evaluated against each criterion and given a score. Scores can be based on a predefined scale, such as 1 to 10, where a higher score indicates better performance.
5) *Normalize the Scores*
   The scores given to each criterion must be normalized to ensure they can be compared directly. Normalization ensures all criteria have the same influence in the overall evaluation.
6) *Calculate the Weighted Scores*
   The normalized scores are then multiplied by the weights assigned to each criterion. The products are summed for each alternative to get the overall score.
7) *Final Rank the Alternatives*
   Finally, the local government officials are ranked based on their overall scores. Lgovernment officials are ranked from the best to the worst. This ranking helps identify the best-performing officials who are suitable for promotion or additional responsibilities the official with the highest score is considered the best alternative according to the criteria and weights used.

The primary advantage of using a DSS with the SAW method is its ability to handle large amounts of data quickly and accurately. Additionally, the DSS can be modified and tailored to the specific needs of the user, such as adding new criteria, adjusting criterion weights, or updating performance data of officials.

The SAW method has several advantages that make it popular in various decision-making applications. Some of these advantages include: 1) Simplicity and Ease of Understanding: The SAW method has a simple and easy-to-understand basic concept, making it easy to apply in various decision-making contexts. 2) Flexibility: This method can be applied to various types of decision-making problems, from simple to complex ones. 3) Effectiveness in Handling Multiple Criteria: The SAW method is effective in handling decision-making problems

involving multiple criteria, as it can combine various criteria into a single composite score. However, the SAW method also has some disadvantages, including the limited in handling uncertainty: The SAW method is less effective in handling uncertainty or variability in data, as it relies on deterministically assigned scores and weights and no consideration for criterion interactions: This method does not account for the possible interactions or correlations between evaluated criteria, which may result in outcomes that do not fully reflect the complexity of the problem.

IV. RESULTS

System analysis is a process aimed at understanding the existing system by analyzing positions, job descriptions, processes, and existing provisions or rules. This research utilizes the Simple Additive Weighting (SAW) method to perform this analysis comprehensively. The SAW method is renowned for its simplicity and effectiveness in multi-criteria decision-making processes. The steps undertaken in this research are as follows:

1) Determine Criteria
The first step involves identifying the criteria that will be used as a reference in decision-making. These criteria should be relevant and comprehensive, reflecting various dimensions of the performance and responsibilities of the officials. Commonly used criteria in this context include education level, rank, official behavior, and certificates of award.

2) Determine Suitability Rating
Each alternative (in this case, each official) is evaluated against the identified criteria. A suitability rating is assigned to each alternative for each criterion. This rating helps in quantifying the performance of each official based on the established criteria.

3) Create Decision Matrix
Once the ratings are determined, a decision matrix is created based on these criteria. This matrix forms the foundation for further analysis and normalization processes.

4) Normalize the Matrix
The decision matrix is normalized to ensure comparability across different criteria. This normalization process adjusts the ratings based on equations suited to the type of attribute (whether it is a benefit or cost attribute) to obtain a normalized matrix R.

The SAW method, also known as the weighted addition method, aims to find the weighted sum of performance ratings for each alternative from all attributes. This method requires the normalization of the decision matrix (X) to a scale that can be compared with all existing alternative ratings. As stated by Kusumadewi in Nugraha's journal, normalization ensures that each criterion has an equal impact on the overall decision-making process, thereby enhancing the accuracy and fairness of the assessment.

A. Advantages of the SAW Method

The SAW model offers several advantages over other decision retrieval models. One significant advantage is its ability to make precise assessments based on the values of criteria and predetermined preference weights. This precision is crucial in contexts where decisions have long-term implications, such as the appointment of government officials.

Moreover, the SAW method excels in selecting the best alternative from a set of available options due to its ranking process after determining the weight value for each attribute. This ranking process is methodical and transparent, ensuring that the chosen alternative aligns with the predefined criteria and weights, thereby facilitating a rational and objective decision-making process .

Several variables are essential for this assessment, including:

1. Rank: The hierarchical position of the official within the organization.
2. Educational Level: The highest level of formal education attained by the official.
3. Official Behavior: The conduct and professionalism demonstrated by the official in their duties.
4. Certificate of Award: Recognition or awards received by the official for outstanding performance

B. Required Criteria

The determination of an official relies heavily on specific criteria that are crucial for a thorough and accurate evaluation. These criteria include:

1. Education Level (X1): The educational qualifications of the official, ranging from undergraduate degrees to doctoral levels.
2. Official Behavior (X2): The official's demeanor, including attributes such as politeness, integrity, and adherence to professional standards.
3. Rank (X3): The official's rank within the organizational hierarchy, which influences their responsibilities and authority.

4. Certificate of Award (X4): The number and significance of awards or recognitions received by the official, reflecting their excellence in performance.

The following tables provide a detailed breakdown of the criteria and the corresponding marks assigned to each level within these criteria:

TABLE 1
RANK CRITERIA

Rank	Mark
Group II	2
Group III	3
Group IV	4

TABLE 2
LEVEL OF EDUCATION

Educational Level	Mark
SI (Bachelor)	3
S2 (Master)	4
S3 (Doctorate)	5

TABLE 3
OFFICIAL BEHAVIOR

Official Behavior	Mark
Very Polite	4
Polite	3
Not Polite	2

TABLE 4
CERTIFICATE OF AWARD

Official Behavior	Mark
3 – 5 awards	2
10 – 15 awards	3
20 – 30 awards	4

C. Detailed Explanation of the SAW Method Steps

To thoroughly understand the application of the SAW method, it is essential to delve into each step in greater detail. This section aims to provide a comprehensive analysis of each phase involved in the implementation of the SAW method for evaluating local government officials.

1) Determine Criteria

The identification of criteria is a fundamental step in the SAW method. Criteria are selected based on their relevance to the performance and responsibilities of the officials. For instance, education level is a crucial criterion because it reflects the official's knowledge and expertise, which are essential for performing their duties effectively. Similarly, official behavior is another important criterion as it indicates the professionalism and ethical standards maintained by the official.

2) Determine Suitability Rating

After selecting the criteria, the next step is to evaluate each official against these criteria. The suitability rating is assigned based on how well each official meets the specified criteria. This rating process is typically conducted using a predefined scale, such as a 1 to 10 scale, where higher scores indicate better performance. The rating is often based on both quantitative data (e.g., years of experience, number of awards) and qualitative assessments (e.g., feedback from peers and superiors).

3) Create Decision Matrix

The decision matrix is a tabular representation of the suitability ratings for each official across all criteria. This matrix serves as the foundation for further analysis and normalization. It provides a clear and organized way to view and compare the performance of all officials based on the selected criteria.

4) Normalize the Matrix

Normalization is a critical step to ensure that the suitability ratings are comparable across different criteria. This process involves transforming the ratings into a standardized scale, typically between 0 and 1, using normalization equations suited to the type of attribute (benefit or cost). For example, if a criterion is a benefit

attribute (higher values are better), the normalization might involve dividing each rating by the maximum rating observed. Conversely, for cost attributes (lower values are better), normalization might involve dividing the minimum rating by each rating.

5) Calculate Weighted Scores

Once the decision matrix is normalized, the next step is to calculate the weighted scores. This involves multiplying each normalized rating by the weight assigned to the corresponding criterion. The weighted scores are then summed for each official to obtain an overall performance score. The weights reflect the relative importance of each criterion, ensuring that more critical criteria have a greater influence on the final score.

6) Rank the Alternatives

The final step in the SAW method is to rank the officials based on their overall performance scores. Officials with higher scores are considered to have performed better according to the evaluated criteria. This ranking helps decision-makers identify the best candidates for promotions, awards, or other forms of recognition. It also provides a transparent and objective basis for making such decisions

D. Comprehensive Analysis of Criteria and Weight Assignment

The effectiveness of the SAW method hinges on the careful selection and weighting of criteria. This section provides a more in-depth analysis of how criteria are selected and weights are assigned, ensuring a balanced and fair evaluation process.

Criteria Selection

Criteria are selected based on their relevance to the job responsibilities and performance expectations of the officials. In the context of local government officials, common criteria include:

1. Education Level: Reflects the official's formal qualifications and theoretical knowledge.
2. Rank: Indicates the official's position within the organizational hierarchy, reflecting their experience and authority.
3. Official Behavior: Assesses the official's conduct, professionalism, and adherence to ethical standards.
4. Certificate of Award: Recognizes the official's achievements and contributions to their field or organization

Weight Assignment

Weights are assigned to criteria based on their relative importance. This process often involves consultation with experts and stakeholders to ensure that the weights accurately reflect the priorities of the organization. For instance, if education level is deemed more important than rank, it will be assigned a higher weight. The sum of all weights must equal 1 (or 100%) to maintain consistency and balance in the evaluation process.

Practical Implementation and Case Study Analysis

The practical implementation of the SAW method involves applying the theoretical steps to real-world scenarios. This section presents a case study analysis to illustrate the application of the SAW method in evaluating local government officials in Tanggamus.

Case Study: Evaluating Local Government Officials in Tanggamus

In this case study, the SAW method is applied to evaluate and rank local government officials based on the criteria of education level, rank, official behavior, and certificates of award. The following steps outline the implementation process:

1) Criteria Identification and Weight Assignment

Education Level: Weight = 0.25
Rank: Weight = 0.20
Official Behavior: Weight = 0.30
Certificate of Award: Weight = 0.25

2) Evaluation and Rating

Each official is evaluated based on the selected criteria and assigned a rating. For example, Official A might receive the following ratings:

Education Level: 4 (Bachelor's degree)
Rank: 3 (Group III)
Official Behavior: 5 (Very Polite)
Certificate of Award: 2 (3-5 awards)

3) Normalization

The ratings are normalized to a scale of 0 to 1. For example, if the highest education level rating is 5, the normalized rating for Official A would be 4/5 = 0.8

4) Weighted Score Calculation

The normalized ratings are multiplied by the corresponding weights to obtain the weighted scores. For example, the weighted score for Official A's education level would be 0.8 * 0.25 = 0.2.

5) Ranking

The weighted scores for all criteria are summed to obtain the overall performance score for each official. Officials are then ranked based on their overall scores. In this case, Official A's overall score might be 0.2 (education level) + 0.6 (rank) + 1.5 (official behavior) + 0.5 (certificate of award) = 2.8.

This case study demonstrates the practical application of the SAW method in evaluating and ranking local government officials. The method provides a structured and objective approach to decision-making, ensuring that the selected officials meet the necessary performance and responsibility criteria.

Preliminary Design

Figure 1 is the initial page where the program was created but cannot be run yet. There are several additional menus in it, namely, Process, repeat and exit.
That way the program can be made well.

TABLE 5
TABLE OF OFFICIALS 1

Criteria	Mark
Rank	4
Educational Level	5
Official Behavior	4
Certificate of Award	3
Score	16 / Very Good

TABLE 6
OFFICIAL TABLE 2

Criteria	Mark
Rank	4
Educational Level	4
Official Behavior	3
Certificate of Award	3
Score	14 / Good

The program created is as follows:

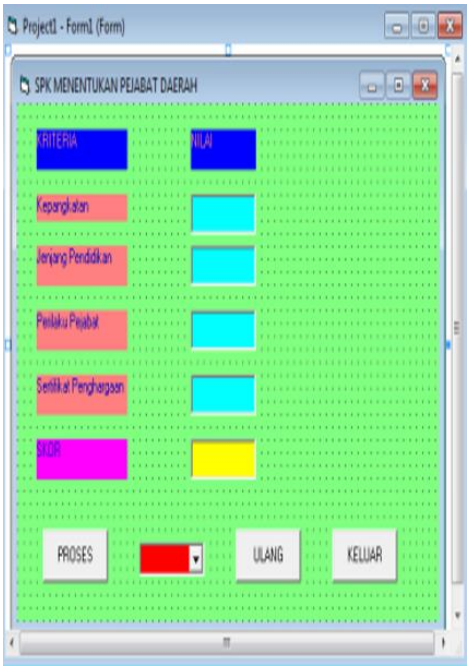

Figure 1. Main Page Program

Figure 2 When the data has been entered, this is the result of the data input process where the data is entered based on criteria that have been determined through the calculation process.

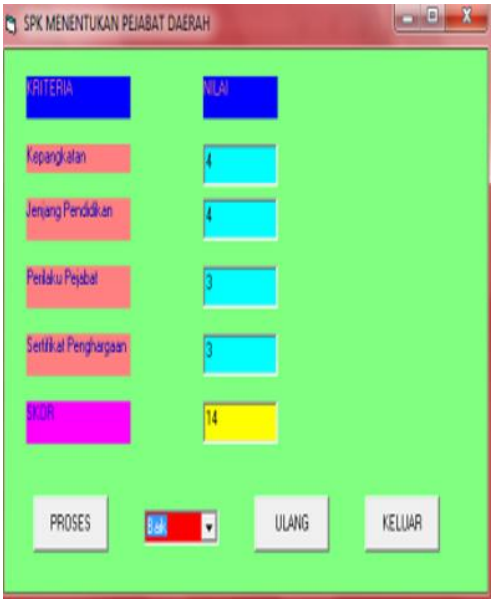

Figure 2. Data has been entered

Figure 3 is a formula resulting from making a program, because if you don't use this formula, the program will not run well, and the data cannot be selected properly, so the formula is very important in a program.

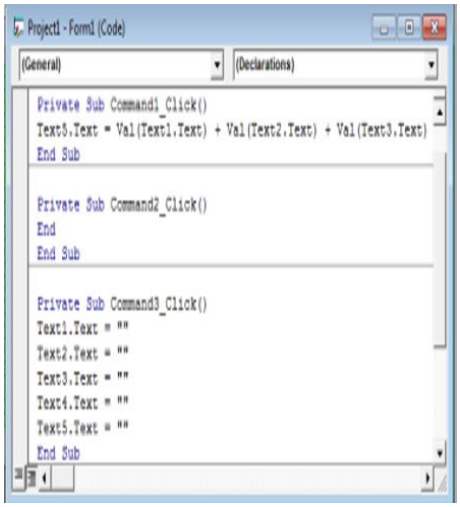

Figure 3. Formulas in the Program

From the program results criteria above, it is clear that officials who are very good, good and not so good have certain scores. From the simulation above, we are sure that having an official variable to determine regional officials using the SAW and Visual Basic method decision support system will be better.

V. DISCUSSION

The application of the Simple Additive Weighting (SAW) method in determining regional officials in the Tanggamus region demonstrates several significant findings and implications for governance and decision-making processes. This section discusses the efficacy of the SAW method, its benefits and limitations, and the broader implications for public administration.

A. Efficacy of the SAW Method

The study found that the SAW method provides a robust framework for evaluating multiple criteria, ensuring a comprehensive assessment of each candidate. By integrating variables such as educational level, official behavior, and rank, the SAW method systematically ranks candidates based on their overall performance scores. This structured approach enhances the transparency and accuracy of the selection process, mitigating issues related to bias and subjectivity. The findings indicate that the SAW method is effective in identifying the most qualified

and suitable candidates for regional official positions, thus promoting meritocracy and integrity in public administration.

B. Benefits and Limitations

One of the primary benefits of the SAW method is its simplicity and ease of implementation. Decision-makers can easily understand and apply the method, making it accessible for various levels of government and administrative bodies. Additionally, the SAW method's ability to handle multiple criteria simultaneously ensures a balanced evaluation, accounting for various aspects of a candidate's qualifications and suitability. However, the method also has limitations. It relies heavily on the accurate assignment of weights to each criterion, which can be subjective and potentially influence the final outcomes. Furthermore, the method does not account for interactions between criteria, which might affect the holistic evaluation of candidates.

C. Broader Implications for Public Administration

The implementation of a decision support system (DSS) using the SAW method has broader implications for public administration beyond the Tanggamus region. The study underscores the importance of transparency, accountability, and systematic evaluation in governance. By adopting such methods, other regions can enhance their decision-making processes, leading to more efficient and trustworthy public administration. The SAW method, integrated within a DSS, can serve as a model for improving the selection of government officials, thereby fostering public trust and enhancing the overall effectiveness of governance structures. The successful application in Tanggamus suggests that this approach could be replicated in other regions facing similar challenges, ultimately contributing to better governance and public service delivery across various administrative contexts.

VI. CONCLUSIONS

Based on the results of this study, it is evident that a decision support system (DSS) plays a crucial role in the determination of regional officials. Implementing predetermined methods, such as the Simple Additive Weighting (SAW) method, significantly enhances the decision-making process. The SAW method offers a structured and systematic approach, allowing for the evaluation of multiple criteria to ensure that the most qualified and suitable candidates are selected for important positions within the government.

The necessity of a DSS arises from the complex nature of decision-making, which involves considering various alternative solutions and analyzing their potential outcomes. The SAW method's ability to provide a transparent, objective, and consistent evaluation process addresses issues such as bias, inconsistency, and subjectivity that often plague traditional selection methods. Moreover, the SAW method facilitates a comprehensive assessment of candidates based on essential criteria such as educational level, behavior, and rank. This ensures that the selected officials possess the necessary qualifications, integrity, and accountability required to perform their duties effectively.

In conclusion, the implementation of a DSS utilizing the SAW method represents a significant advancement in the selection process of regional officials. This approach not only improves the accuracy and fairness of the decision-making process but also enhances the overall governance framework. By fostering transparency and accountability, the DSS contributes to the development of a more efficient and trustworthy administrative system, ultimately benefiting the Tanggamus region and potentially serving as a model for other regions facing similar challenges.

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