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## Implementation of SAW in Decision Making for Aid Recipients of MSMEs in Sigi Regency

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**Abstract:** This study aims to develop a data-driven framework for prioritizing Micro, Small, and Medium Enterprises (MSMEs) assistance in Sigi Regency using the Simple Additive Weighting (SAW) method. The SAW method systematically ranks MSME recipients based on predefined criteria, ensuring a fair and transparent selection process. A web-based Decision Support System (DSS) was developed to implement this method, enabling efficient data processing and large-scale information management. The study collected primary data on business type, initial capital, turnover, and location, which were analyzed using the SAW method. The results identified Laila Khaliq as the top-ranked recipient with a score of 0.85, followed by Nur Ifa (0.82), Supina (0.73), Annur Melati (0.715), and Moh. Randi (0.71), Kaharudin (0.7), and Jhon Laips (0.277). These findings provide a structured approach for government agencies and financial institutions to allocate MSME assistance more effectively.

The novelty of this research lies in integrating the SAW method with a web-based DSS, thereby enhancing the decision-making accuracy and scalability. Unlike conventional subjective selection methods, this approach introduces a systematic, data-driven ranking system that can be expanded to other regions or adapted with alternative decision-making models, thus improving MSME assistance programs.



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**Keywords:** SAW, Sigi Regency, MSMEs, Web System.

## 在西吉县为中小微型企业援助对象制定决策时实施 SAW

**摘要:** 本研究旨在使用简单加权加权 (SAW) 方法开发一个数据驱动框架, 优先考虑对 Sigi 摄政区微型、小型和中型企业 (MSME) 的援助。SAW 方法根据预定义的标准对 MSME 接收者进行系统排名, 确保选择过程公平透明。开发了基于网络的决策支持系统 (DSS) 来实现该方法, 从而实现高效的数据处理和大规模信息管理。该研究收集了有关业务类型、初始资本、营业额和位置的原始数据, 并使用 SAW 方法进行了分析。结果显示, 莱拉·卡里克以 0.85 的得分位居榜首, 其次是努尔伊法 (0.82)、苏皮娜 (0.73)、安努尔梅拉蒂 (0.715) 和莫哈末。Randi (0.71)、Kaharudin (0.7) 和 Jhon Laips (0.277)。这些发现为政府机构和金融机构提供了一种结构化的方法, 以更有效地分配中小微企业援助。本研究的创新之处在于将 SAW 方法与基于 Web 的 DSS 相结合, 从而提高决策的准确性和可扩展性。与传统的主观选择方法不同, 这种方法引入了系统的数据驱动排名系统, 可以扩展到其他地区或适应替代决策模型, 从而改善中小微企业援助计划。

**关键词:** 简单加法加权 (SAW)、西吉摄政酒店、中小微企业、网络系统

### 1. Introduction

Micro, Small and Medium Enterprises (MSMEs) play an important and strategic role in national economic development. In some countries, MSMEs are one of the key business actors in the process of national development [1]. The factors that influence the success of MSME development include business capital and turnover [2], [3]. On the other hand, [4] stated that the success factor for MSME development is the location of the business. According to the Cooperative and Small and Medium Enterprise Office of the Sigi Regency in 2022, the Sigi Regency will have a super-micro assistance (KUR) program for MSMEs actors. Therefore, this study is a decision-making tool for MSME actors who will be prioritized to receive any assistance.

Making a decision is certainly not easy because it takes several considerations so that the decision taken is the right and fair decision. One of the decision-making tools in statistics is *Simple Additive Weighting* (SAW). The SAW is a method in the field of Statistics that is often used in decision-making theory. This method can be used through a ranking process by selecting the best alternative from several existing alternatives. The initial stage in this method is the calculation of the weight of each attribute in the form of variables. As stated in [5], the advantage of the SAW method is its ability to carry

out assessments for very precise and relevant decision making because it is based on predetermined criteria, preference weights and simple calculation.

The results of the research are in the form of information on which MSME rankings are a priority in receiving assistance from the government. The information is then implemented in a database system using *the MySQL* programming language. The developed system can have a function to load various large-sized information and be applied through web displays. Furthermore, the system that has been created will be tested by validating the SAW method calculations that are conducted manually and comparing them with the calculations in the system. Through this system, it is hoped that MSME actors in Sigi Regency can easily obtain information on which the MSME actors should be a priority in obtaining assistance.

### 2. Methods and Materials

This study employs the Simple Additive Weighting (SAW) method, a multi-criteria decision-making technique that calculates a weighted sum of performance ratings for each alternative. The process involves normalizing the decision matrix [6], assigning weights to the criteria, and computing the final rankings to determine the priority MSME assistance recipients. To enhance accuracy and

efficiency, the SAW method was implemented in a web-based decision support system (DSS) using MySQL for data management. The DSS facilitates structured decision-making by processing large datasets and presenting results interactively. This approach ensures a systematic, data-driven evaluation of alternatives, thus improving transparency and reliability in decision-making processes [7], [8].

## 2.1. Population and Sample

The population in this study is all MSMEs actors in Sigi Regency. The sample used in this study were super microentrepreneurs in Sigi Regency, namely 35 MSME actors. The research object in this study was selected based on the significance of MSMEs (Micro, Small, and Medium Enterprises) in Sigi Regency, which play a crucial role in the local economy but often face challenges in obtaining financial assistance. The selection criteria focused on super microentrepreneurs, as they represent the most vulnerable group in need of structured decision-making for aid distribution.

The selection of the sample was carried out using a non-random sampling technique, namely *purposive sampling*. *Purposive sampling* is sampling based on intentionality [9]. This sampling technique was carried out considering the limitations of time, cost and manpower.

## 2.2. Data Collection and Analysis

The data used in this study were obtained using conducted collaboration with the Cooperative and Small and Medium Enterprise Office of Sigi Regency. This research received approval from the Tadulako University and was ratified by No. 1890/UN 28.1.28/KM/2022. In the meantime, the types of data are quantitative and qualitative. Primary data was collected by surveyors in the field. The data is in the form of business type, initial capital, turnover and business location of MSME actors in Sigi Regency.

## 2.3. Data Analysis Technique

Several analysis steps of the SAW method are as follows:

### a. Determination of the Criteria

According to [10], criteria determine standards or basic rules in which alternative decisions are ordered according to the wishes of the criteria themselves. In other words, criteria are general terms that include the concepts of attribute values and goals.

### b. Determination of the Criteria Weight

The criteria weight is the score of each criterion, which describes the level of importance of these criteria in decision making [11]. In making decisions, there are usually several criteria with different levels of importance. These criteria are very influential on the results of the decision making. Moreover, the level of

importance of these criteria can be in the form of weight values. In determining the weight value of these criteria, there are several ways or methods, one of which is by ranking [12].

### c. Match Rating Determination

One way to determine the suitability rating for each alternative for each criterion is to compare an element to other elements using the level of importance contained in the SAW method [13].

### d. Matrix Normalization

Normalization is a technique by doing a turn *top-bottom* approximation, which is used to help identify relationships. The formula to look for the matrix normalization is given in Equation (1) [14].

$$r_{ij} = \begin{cases} \frac{X_{ij}}{MaxX_{ij}}, & \text{if } j \text{ is benefit attribute} \\ \frac{MinX_{ij}}{X_{ij}}, & \text{if } j \text{ is cost attribute} \end{cases} \quad (1)$$

where

$r_{ij}$  : Normalized work rating value

$X_{ij}$  : Attribute values owned by each alternative

$MaxX_{ij}$  : The greatest value of each criterion

$MinX_{ij}$  : The smallest value of each criterion

*benefit* : If the greatest value is the best

*cost* : If the smallest value is the best

### e. Preference Calculation

Preference calculation is part of the decision-making component of an individual. Determine the preference value for each alternative ( $V_i$ ) by adding the product of the normalized matrix ( $r_{ij}$ ) with the weight value ( $W_j$ ). The value of  $V_i$  is selected as the best alternative. The following is the formula for finding preferences [15].

$$V_i = \sum_{j=1}^n W_j r_{ij} \quad (2)$$

where

$V_i$  : ranking for each criterion

$W_j$  : weight value of each criterion

$r_{ij}$  : normalized work rating value

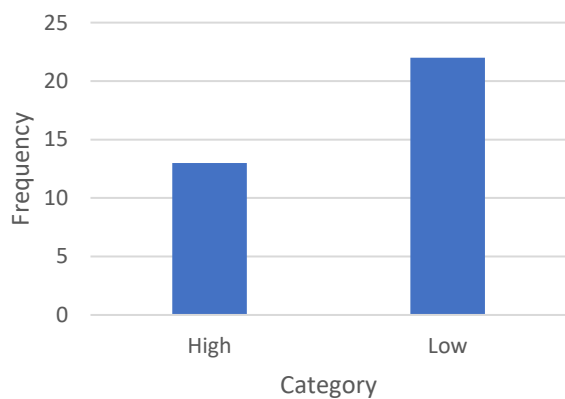
## 3. Results and Discussion

### 3.1. Data Description

Description of the data is conducted to know the general description of the characteristics of each variable. Data are described according to their type. The variables used in this study consisted of 2 types of data. The variables of initial capital and turnover are quantitative data while the variables of type of business and business location are qualitative data. The following characteristics of each variable are used:

a. Capital

Initial capital is the entire cost needed to satisfy of goods and raw materials to start a business. For the initial capital variables, the original data is converted into two categories, namely “Low” and “High”. The two categories are differentiated based on the mean. Data with the “Low” category is coded by 1 and for the “High” category is coded by 2. Data that is below or equal to the mean is included in the data with the “Low (1)” category, while data that is above the mean is categorized with “High (2)” category. The mean of initial capital for MSMEs in the Sigi Regency is Rp. 1.500.000,-. The characteristics of the initial capital data are given in Figure 1.

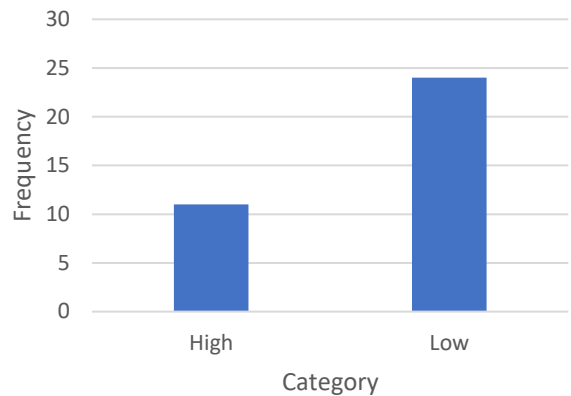


**Figure 1. Distribution of MSME actors' initial capital by category (developed by authors)**

Based on Figure 1, information can be obtained that Sigi Regency MSMEs with low initial capital are more dominant when compared to Sigi Regency MSMEs with high initial capital. This means that there are more MSMEs in Sigi Regency with an initial capital of ≤ Rp. 1,500,000, so it can be said that the government's strategy to provide assistance to MSMEs in Sigi Regency is very appropriate.

b. Turnover

Turnover is the overall income from the sale of a company's products without any deduction of costs within a certain period. Likewise for the turnover variable, the raw data is also converted into two categories, namely “Low” and “High”, which are the same as the initial capital variable. The two categories are differentiated based on the mean. Data in the “Low” category are coded by 1 and the “High” category is coded by 2. Data that is below or equal to the mean is included in the data with the “Low (1)” category, while data that is above the mean is categorized in the “High (2)” category. The mean turnover of MSMEs in Sigi Regency is Rp. 800,000,-. The characteristics of the turnover data are presented in Figure 2.

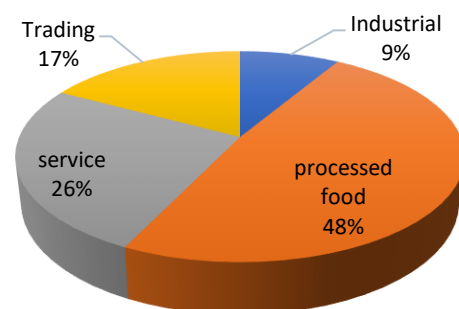


**Figure 2. Turnover distribution of MSME actors by category (developed by authors)**

Based on Figure 2, information can be obtained that the Sigi Regency MSMEs with low turnover are more dominant when compared to the Sigi Regency MSMEs with high turnover. This means that there are more MSMEs in Sigi Regency with a turnover of ≤ Rp. 800,000,-, so that MSMEs in Sigi Regency are eligible to receive assistance from the government.

c. Type of Business

The type of business is a classification or grouping of businesses based on the characteristics or types of products or services offered. Variable types of business are distinguished based on 4 categories, namely industrial business, trading business, service and processed food. Figure 3 presents the characteristics of the type of business data.

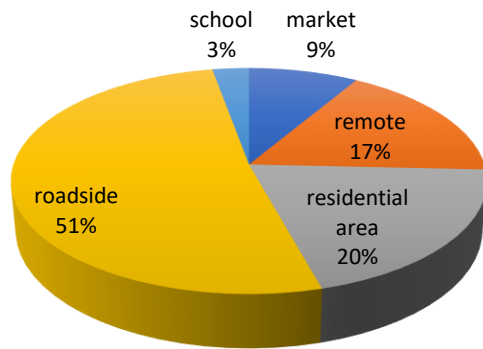


**Figure 3. Distribution of MSME business types by category (developed by authors)**

From Figure 3, we can obtain information that the type of business developed by MSMEs in Sigi Regency is mostly processed food (48%), while the rest is divided into several percentages for other types of businesses such as 26% for service, 17% for trading and 9% for industrial businesses. Currently, processed food businesses are in great demand by the public because they require initial capital that is not too large compared to trading or industrial businesses.

d. Business Location

Business location is where a business or company activity operates and performs activities to produce goods and services. The selection and determination of strategic business locations will determine the success of a business in the future. The variable business location is distinguished based on 5 categories, namely roadside, residential area, market, school and remote area. Figure 4 shows the characteristics of the business location data.



**Figure 4. Distribution of MSME business locations by category (developed by authors)**

Based on Figure 4, information can be obtained that most of the MSMEs in Sigi Regency have businesses which are located on the edge of the road compared to other locations. This aims to make their products known to the public more quickly because the location is easy to reach. In addition, roadside access is more crowded by motorists. As a result, the opportunity for people to visit their business place is greater.

**3.2. Simple Additive Weighting (SAW) Method**

The following are the steps for the SAW method calculation.

a. Determination of the Criteria and Alternatives

In making a decision, it must have criteria that will be used as consideration and must be related to the raised case. The criteria used in the priority recipients of assistance for micro, small and medium enterprises (MSMEs) using the Simple Additive Weighting (SAW) method can be seen in Table 1.

**Table 1. Variable criteria code (cooperative and small and medium enterprise office of Sigi Regency) (compiled by the authors)**

Criteria	Variable Name	Criteria Code
Criterion 1	Initial Capital	C <sub>1</sub>
Criterion 2	Turnover	C <sub>2</sub>
Criterion 3	Type of Business	C <sub>3</sub>
Criterion 4	Business Location	C <sub>4</sub>

In Table 1, the initial capital variable is criterion 1 with criterion code C<sub>1</sub>, the turnover variable is criterion

2 with criterion code C<sub>2</sub>, the type of business variable is criterion 3 with criterion code C<sub>3</sub>, and the business location variable is criterion 4 with criterion code C<sub>4</sub>. Moreover, the alternatives that will be selected in this study as priority recipients of micro, small and medium business assistance in Sigi Regency are the names of business owners of the MSME. The alternative names of the business owners can be seen in Table 2.

**Table 2. Alternative criteria code (cooperative and small and medium enterprise office of Sigi Regency) (compiled by the authors)**

Alternative	Name of the MSME Recipient	Alternative Code
Alternative 1	Annur Melati	A <sub>1</sub>
Alternative 2	Anton	A <sub>2</sub>
Alternative 3	Yosis Dama	A <sub>3</sub>
Alternative 4	Diki Kurniawan	A <sub>4</sub>
Alternative 5	Fadlun S. Habsy	A <sub>5</sub>
⋮	⋮	⋮
Alternative 35	Yufita	A <sub>35</sub>

Table 2 shows the names of the business owners of the MSME in Sigi Regency who are considered for business assistance from the government. The list of names is then used as an alternative in the SAW method. It is known that alternative 1 is the name of the owner by Annur Melati with the alternative code A<sub>1</sub>, alternative 2 is the owner name by Anton with the alternative code A<sub>2</sub>, alternative 3 is the owner name by Yosis Dama with the alternative code A<sub>3</sub>, alternative 4 is the owner name by Diki Kurniawan with the alternative code A<sub>4</sub>, and alternative 5 is the owner name by Fadlun S. Habsy with alternative code A<sub>5</sub> then it is up to alternative 35 is the owner name by Yufita with the alternative code A<sub>35</sub>.

b. Weight of the Importance of Each Criterion

Each criterion has an importance weight. The sum of the importance weights is 1. The interval in this study is 0-1. The greater the weight of the criteria, the more important the criteria are. In order to obtain the weight of the criteria, the interview was conducted with Rolly, the head of the Cooperative and MSME office. The importance weight value for each criterion is presented in Table 3.

**Table 3. Criteria weight (cooperative and small and medium enterprise office of Sigi Regency) (compiled by the authors)**

Criteria	Criteria Weight
Initial Capital	0.3
Turnover	0.3
Type of Business	0.2
Business Location	0.2

Based on the results of the interviews that can be seen in Table 3, the initial capital and turnover criteria have a criterion weight of 0.3, respectively, while the criteria for type of business and business location have a weight value of 0.2.

c. Alternative Weighting Process (Suitable Rating of Each Alternative on Each Criterion)

In this step, we formed the suitability rating value of each alternative on each criterion. To calculate the suitability rating of each alternative for each criterion, data from 35 alternatives were used, namely the names of MSME actors and 4 criteria, namely initial capital, turnover, type of business, and business location. In determining the suitability rating, the weight value of each criterion is entered into the suitability rating table, which has been adjusted to the value from the criteria table. Table 4 shows the suitable rating table.

**Table 4. Alternative criteria code (cooperative and small and medium enterprise office of Sigi Regency) (compiled by the authors)**

Alternative	Criteria			
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
A <sub>1</sub>	1.000.000	5	4	5
A <sub>2</sub>	500.000	2	3	1
A <sub>3</sub>	3.000.000	2	3	1
A <sub>4</sub>	2.500.000	2	2	4
A <sub>5</sub>	250.000	1	4	5
⋮	⋮	⋮	⋮	⋮
A <sub>35</sub>	250.000	4	3	5

Table 4 indicates that each alternative value on the turnover criteria (C<sub>2</sub>), type of business (C<sub>3</sub>), and business location (C<sub>4</sub>) is a suitable value (the largest value is the best). Moreover, the turnover criteria (C<sub>2</sub>), type of business (C<sub>3</sub>), and business location (C<sub>4</sub>) given are assumed to be the benefit criteria. The initial capital criterion is a suitable value (the smallest value is the best). Moreover, the initial capital criteria given are assumed to be a cost criterion.

d. Matrix Normalization

The next step is to find the divisor value that is the largest criterion alternative value for the benefit criteria. On the other hand, for the cost criteria, the divisor value is the smallest criterion alternative value for each criterion. The normalization value is obtained from each alternative value, which is divided by the divisor value for each criterion that has been obtained previously. The following is an illustration of calculating the normalization value ( $r_{ij}$ ) using Equation 1.

$$r_{11} = \frac{50.000}{1.000.000} = 0,05, r_{21} = \frac{5}{5} = 1, r_{31} = \frac{4}{4} = 1, r_{41} = \frac{5}{5} = 1$$

Table 5 presents the results of the complete matrix normalization.

**Table 5. Matrix normalization results (cooperative and small and medium enterprise office of Sigi Regency) (compiled by the authors)**

Alternative	Criteria			
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
A <sub>1</sub>	0,05	1	1	1
A <sub>2</sub>	0,1	0,4	0,75	0,2
A <sub>3</sub>	0,017	0,4	0,75	0,2
A <sub>4</sub>	0,02	0,4	0,5	0,8
A <sub>5</sub>	0,2	0,2	1	1
⋮	⋮	⋮	⋮	⋮
A <sub>35</sub>	0,2	0,8	0,75	1

From Table 5, it can be seen that the matrix normalization process is carried out by calculating alternative values in the form of benefit, then the value of each column is divided by the maximum value of each criterion. Whereas *cost* the minimum criterion value is divided by the value of each column. The alternative normalization results A<sub>1</sub> are criterion C<sub>1</sub> = 0,05, C<sub>2</sub> = 1, C<sub>3</sub> = 1, C<sub>4</sub> = 1, the normalization result A<sub>2</sub> is criterion C<sub>1</sub> = 0.1, C<sub>2</sub> = 0,4, C<sub>3</sub> = 0,75, C<sub>4</sub> = 0.2, the normalization result of alternative A<sub>3</sub> is criterion C<sub>1</sub> = 0,017, C<sub>2</sub> = 0,4, C<sub>3</sub> = 0,75, C<sub>4</sub> = 0.2, the normalization result of alternative A<sub>4</sub> is criterion C<sub>1</sub> = 0,02, C<sub>2</sub> = 0,4, C<sub>3</sub> = 0,5, C<sub>4</sub> = 0.8, the normalized result of alternative A<sub>5</sub> is criterion C<sub>1</sub> = 0,2, C<sub>2</sub> = 0,2, C<sub>3</sub> = 1, C<sub>4</sub> = 1 by following the normalization results of alternative A<sub>35</sub> is criterion C<sub>1</sub> = 0,2, C<sub>2</sub> = 0,8, C<sub>3</sub> = 0,75, C<sub>4</sub> = 1.

e. Preference Calculation

In this step, a calculation is carried out to find the preference value ( $V_i$ ), which is obtained from the value of the weight of the importance criteria ( $W_j$ ) multiplied by the normalized matrix ( $r_{ij}$ ). The following illustrates the preference calculation for each alternative using Equation 2.

$$V_1 = (0,3 \times 0,05) + (0,3 \times 1) + (0,2 \times 1) + (0,2 \times 1) = 0,715$$

The preference value is presented in Table 6.

**Table 6. Preference Calculation Results (Cooperative and Small and Medium Enterprise Office of Sigi Regency) (compiled by the authors)**

Alternative	Criteria Weight
V <sub>1</sub>	0.715
V <sub>2</sub>	0.340
V <sub>3</sub>	0.315
V <sub>4</sub>	0.386
V <sub>5</sub>	0.52
⋮	⋮
V <sub>35</sub>	0.65

In Table 6, the preference value for Alternative  $V_1$  is obtained is 0.715, alternative  $V_2$  is 0.340, alternative  $V_3$  is 0.315, alternative  $V_4$  is 0.386, alternative  $V_5$  is 0.52 then it is up to alternative  $V_{35}$  is 0.65.

f. Ranking Results

Finally, the ranking results were obtained, which were sorted from the highest to the lowest. The results are presented in Table 7.

**Table 7. Ranking Results (compiled by the authors)**

No	Name of the MSME Recipient	$V_i$
1	Laila Khaliq	0,85
2	Ifa only	0,82
3	Supine	0,73
4	Annur Melati	0,715
5	Moh. Randi	0,71
⋮	⋮	⋮
35	John Laips	0,277

From Table 7, Laila Khaliq has the highest or largest score from the 35 alternatives and the 4 existing criteria with a value of 0.85. As a result, Laila Khaliq is the chosen alternative as the best alternative. In other words, Laila Khaliq was a priority in selecting Sigi Regency MSME assistance, followed by Nur Ifa with a score of 0.82, Supina with a score of 0.73, Annur Melati with a value of 0.715, and Moh. Randi with a score of 0.71, Kaharudin with a score of 0.7 to Jhon Laips who got the lowest score with a score of 0.277.

**3.3 Web System Implementation**

The system implementation is the step of testing, which is carried out on an approved system design, followed by installation, to start the system that has been created. Furthermore, the system testing was conducted to check whether a program that has been created can be executed according to certain standards. The system testing is the most important thing that finds errors or deficiencies in the program that is being tested. The following is an explanation along with pictures about the design of the information system for prioritizing the aid recipient for Micro, Small and Medium Enterprises (MSMEs) in Sigi Regency, Central Sulawesi using the Simple Additive Weighting (SAW) method.

- The Main Menu

The main menu is the initial menu that is displayed the first time we access the website.

- Login User

Before the user enters the website, the user must first login. Figure 5 shows the user login form.

Decision Support System  
 Prioritization of MSME Assistance Recipients

Using the Simple Additive Weighting Method

LOGIN



**Figure 5. Login user Display (developed by authors)**

- Ranking Menu

The ranking menu section displays information about the results of the SAW method data analysis in the form of priority levels that receive MSME assistance based on calculations from each matrix. The display of the ranking menu is presented in Figure 6.

Ranking Using SAW Method

Step 1: Decision Matrix (X)

Alternatif Name	Criteria			
	Starting Capital	Revenue	Business Type	Business Location
Annur Melati	1000000	5	4	5
Anton	500000	2	3	1

**Figure 6. Ranking Menu Display (developed by authors)**

- Alternative Menu

The alternative menu section displays a list of names of MSME owners in Sigi Regency, Central Sulawesi who wish to receive MSME assistance. Figure 7 shows the alternative menu.

Alternatif Number	Alternatif Name
A1	Annur Melati
A2	Anton

**Figure 7. Alternative Menu Display (developed by authors)**

- Criteria Menu

The criteria menu section displays several assessments used in deciding which MSMEs are the priority to obtain assistance. Some of these criteria are business capital, turnover, type of business and business location. The display of criterion menu is given in Figure 8.

Criteria Name	Type	Weight	Order	Assessment Method
Starting Capital	Cost	0.3	0	Input
Revenue	Benefit	0.3	1	Choice

**Figure 8. Display of the Criteria Menu (developed by authors)**

- **Admin Login Main Menu**

The administrator must input the username and password to login in this menu. The admin login menu is shown in Figure 9.

**Figure 9. Admin Login Main Menu Display (developed by authors)**

## 4. Discussion

The findings of this study highlight the effectiveness of the Simple Additive Weighting (SAW) method in providing a data-driven approach for prioritizing MSME assistance. By systematically ranking recipients based on multiple criteria, this method enhances transparency and fairness in decision-making. The development of a web-based Decision Support System (DSS) further improves efficiency, allowing government agencies and financial institutions to make informed funding decisions with minimal subjectivity.

However, some challenges were encountered during data collection, including scheduling constraints and variations in response accuracy. Future research should explore alternative decision-making methods, such as AHP or TOPSIS, to compare results and improve decision accuracy. Expanding the sample size and geographic coverage would also help validate the robustness of the model, making it more adaptable for broader applications in MSME assistance programs.

## 5. Conclusion

Based on the research results, the SAW method identified the priority MSME assistance recipients in Sigi Regency, with Laila Khaliq (0.85) ranking highest, followed by Nur Ifa (0.82), Supina (0.73), Annur Melati (0.715), Moh Randi (0.71), Kaharudin (0.7), and Jhon Laips (0.277). However, challenges arose during data

collection, particularly scheduling difficulties due to the busy nature of MSME actors and variations in response accuracy. To address these issues, future studies should consider structured appointment systems and digital survey tools. Additionally, applying alternative decision-making methods, such as AHP or TOPSIS, would allow for comparative analysis and enhance decision accuracy. Expanding the survey scope and including more MSME participants will further validate the robustness of the web-based system.

This study contributes to the academic field by introducing a systematic, data-driven approach to MSME assistance prioritization and improving transparency and fairness in fund allocation. Unlike traditional subjective selection methods, the SAW-based ranking system provides a structured decision-support model. Future research should focus on refining decision-making frameworks and expanding the methodology to broader contexts, ensuring a more scalable and adaptable system for MSME support distribution.

## Declarations

### *Author Contributions*

Conceptualization, J. and F.; methodology, J., F., I.S. and S.H; software, S.H; validation, F., and M.F.; formal analysis, M.F.; investigation, V.G.T.; resources, V.G.T.; data curation, M.F.; writing—original draft preparation, J., F., M.F, and I.S.; writing—review and editing, H.S.; visualization, I.S.; supervision, M.F.; project administration, H.S.; funding acquisition, J. All authors have read and agreed to the published version of the manuscript.

### *Data Availability Statement*

The data presented in this study are available on request from the corresponding author.

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### *Institutional Review Board Statement*

Rigorous ethical guidelines were adhered to throughout the study to ensure participant privacy and data confidentiality in compliance with institutional and national research standards.

### *Informed Consent Statement*

Participation in the study was voluntary, and informed consent was obtained from all participants prior to their involvement.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this manuscript. In addition, ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies were completely observed by the authors.

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