Brilliance
Research of Artificial Intelligence

E-ISSN : 2807-9035
Volume 6, Number 3, August 2026
https://doi.org/10.47709/brilliance.v6i3.9276

SAW Method In Determining Social Assistance Recipients At The Bandar Pasir Mandoge Subdistrict Office

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open access

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Article History:
Submitted: 17-07-2026
Accepted: 30-07-2026
Published: 04-08-2026

Keywords:
Utilization of Simple Additive Weighting (SAW); Decision Support System; PKH Social Assistance; Selection of Social Assistance Recipients; Bandar Pasir Mandoge Sub-district Office.

ABSTRACT

This study aims to design and implement an information system to improve the efficiency and accuracy of data processing in organizational activities. The research was motivated by problems found in the existing system, where data management was still conducted manually, resulting in frequent errors, data redundancy, and delays in report generation. These limitations negatively affected the overall performance and decision-making process within the organization. To address these issues, a system was developed using a structured methodology that includes requirements analysis, system design, implementation, and testing. The proposed system integrates data processing, transaction management, and reporting into a single platform, enabling real-time data access and more effective information management. System testing was conducted using functional testing methods to ensure that all features operate according to user requirements and system specifications. The results show that the system successfully improves operational efficiency by reducing processing time, minimizing human error, and increasing data accuracy. Furthermore, the system provides timely and well-structured reports that support better and faster decision-making processes. Based on the evaluation results, it can be concluded that the developed system is feasible and effective in solving the identified problems. The implementation of this system is expected to enhance overall organizational performance and can be further developed by integrating additional features to meet future needs and technological advancements.

INTRODUCTION

In line with the development of digital transformation in public administration, one sector that requires special attention is the management and distribution of social assistance (bansos) (Afi & Lenggu, 2025). Social assistance (bansos) is a government policy instrument that plays a strategic role in efforts to improve public welfare and reduce social inequality (Susanti & Erlin Kurniati, 2025). Social assistance programs are designed as a form of social protection for vulnerable groups, whether due to economic constraints, specific social conditions, or the impact of changes in the economic and development landscape (Takdir et al., 2025). Through the distribution of social assistance, the government seeks to ensure that the basic needs of the people are met and to promote more equitable social justice (Muhammad Furqon et al., 2025). In the context of local government, the implementation of social assistance programs is a critical responsibility that must be managed effectively and in a targeted manner (Fidianto, 2024). Local governments serve as policy implementers who deal directly with the real-world conditions of communities on the ground. Therefore, the processes of data collection, selection, and determination of social assistance recipients must be carried out meticulously to ensure that the assistance provided truly reaches those who are eligible (Darmawan et al., 2024).

As the population grows and socioeconomic conditions become more diverse, the complexity of social assistance management also increases (Mustika et al., 2024). Each potential recipient has different characteristics, such as the head of household's income, the number of dependents, the head of household's employment status, living conditions, and ownership of valuable assets (Seftira & Novianti, 2023). The multitude of criteria that must be considered means that the process of determining social assistance recipients can no longer be carried out simply or based solely on subjective assessments. A systematic and objective assessment mechanism is needed so that the decisions made accurately reflect the conditions of the community (Abidin, 2023).

The Bandar Pasir Mandoge Subdistrict is one of the administrative districts in Asahan Regency, North Sumatra Province, which possesses various social and economic statistics that provide an overview of the conditions of its community. "Bandar Pasir Mandoge Subdistrict in Figures 2024" describes the general state of this area based on 2023 data, covering the social, economic, and demographic characteristics of its population. This report serves as a vital database for planning development programs and social assistance at the subdistrict level. As part of its poverty alleviation strategy, the regency government, through the subdistrict office, is responsible for distributing various types of social assistance to eligible residents, including families with low-to-middle economic status.

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In Asahan Regency as a whole, the percentage of the poor population has generally declined year over year, from 8.21% in March 2023 to 8.12% in March 2024, which is equivalent to approximately 61,340 people. These data reflect the changing socioeconomic conditions of the community that influence the need for social assistance programs. On the other hand, poverty remains one of the social issues that continues to pose a major challenge to national development in Indonesia. Although various development programs have been implemented by both the central and local governments, the reality is that there are still segments of the population unable to adequately meet their basic needs—whether in terms of the economy, education, health, or housing. This situation calls for public policies that are targeted, sustainable, and based on accurate data to ensure that the assistance provided truly reaches those who are eligible. One form of government policy aimed at addressing the issue of poverty is the Social Assistance (Bansos) program.

However, in practice at the subdistrict level, the process of determining who is eligible to receive social assistance often still faces several serious issues regarding the objectivity and accuracy of decisions. At the Bandar Pasir Mandoge Subdistrict Office, the selection of social assistance recipients is generally based on manual data collection derived from village reports, field observations, and consultations with local officials. Although this approach is intended to identify those who are truly in need, in practice this mechanism has not been fully able to ensure that decisions are truly based on measurable and consistent assessments.

In addition, another equally important issue is the limitations in the management and utilization of data on potential social assistance recipients. The data available at the Bandar Pasir Mandoge Subdistrict Office is generally still stored in the form of documents or simple tables, so it has not been optimally processed to support decision-making. The process of searching for, updating, and analyzing data takes a relatively long time and is prone to errors. This situation becomes even more challenging when the number of potential recipients to be evaluated is quite large, while available human resources and time are limited.

The objective of this study is to apply the SAW (Simple Additive Weighting) method in a decision support system to determine recipients of social assistance at the Bandar Pasir Mandoge Subdistrict Office in a systematic, objective, and data-driven manner, thereby replacing the manual selection process that has been used to date (Sitompul & Anwar, 2023) and developing a web-based decision support system that can assist the Bandar Pasir Mandoge Subdistrict Office in making decisions more effectively, transparently, and efficiently, while ensuring that social assistance is accurately targeted to those in genuine need (Pratama & Maulida, 2022).

LITERATURE REVIEW

The advancement of digital transformation in public administration has encouraged the adoption of technology-based systems to improve service effectiveness, including in social assistance distribution. Social assistance programs play a crucial role in reducing social inequality and improving community welfare; therefore, the selection process of beneficiaries must be conducted accurately and objectively (Afi & Lenggu, 2025). However, in practice, the selection process is often still carried out manually, leading to subjectivity and potential inaccuracies in targeting recipients. This limitation highlights the need for a structured system that can manage data efficiently and support decision-making processes in a more transparent and accountable manner (Abidin, 2023).

One approach that can be applied is a Decision Support System (DSS), which is designed to assist decision-makers in evaluating multiple criteria systematically. DSS has been widely implemented in various domains to improve decision accuracy and efficiency, particularly in cases involving complex evaluation processes (Ardana et al., 2022). By utilizing a computerized system, data processing can be performed more quickly, accurately, and consistently.

The Simple Additive Weighting (SAW) method is one of the most commonly used methods in DSS because of its simplicity and effectiveness in ranking alternatives. The SAW method works by normalizing criteria values and calculating weighted sums to obtain preference values for each alternative. This method enables decision-makers to evaluate multiple criteria such as income level, number of dependents, employment status, housing conditions, and asset ownership in a structured manner (Syahputra et al., 2022).

Previous studies have demonstrated that multi-criteria decision-making methods such as SAW and SMART can improve the objectivity and transparency of decision-making processes. For instance, research by (Pratama & Maulida, 2022) applied a decision support system to evaluate business partner performance using the SMART method and showed improved decision accuracy. (Afi & Lenggu, 2025) developed a decision support system for business location selection, which demonstrated that structured weighting methods can significantly enhance decision quality.

Based on previous studies, it can be concluded that the implementation of a decision support system using the SAW method is appropriate for determining social assistance recipients. This approach allows for objective evaluation based on multiple criteria and helps ensure that assistance is distributed more accurately and fairly.

METHOD

Based on the problems identified and the limitations of the existing system, this study proposes the development of an information system to improve the efficiency and accuracy of data processing. The system is designed to address issues related to manual data management, such as data redundancy, processing delays, and human error. By implementing a computerized system, it is expected that organizational activities can be carried out more effectively

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and efficiently.

In order to achieve the research objectives, a systematic and structured approach is required. The methodology used in this study includes several stages, starting from problem identification and requirement analysis, followed by system design, implementation, and testing. Each stage is carried out to ensure that the developed system meets user needs and functions properly according to the defined requirements.

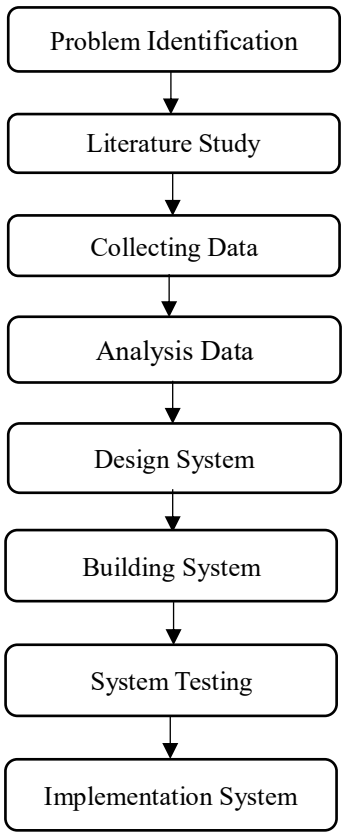

Figure 1. Stage of Research

This study employs a quantitative method with the following steps:

Problem Identification

This stage is the initial phase of the research, in which the researcher must first identify the issue to be studied at the Bandar Pasir Mandoge Subdistrict Office. The issue to be examined is that the process of determining social assistance recipients at the Bandar Pasir Mandoge Subdistrict Office is still conducted manually and is not yet supported by a structured system. This situation causes the selection process to take a considerable amount of time and has the potential to result in misallocation of assistance. Furthermore, the assessment criteria used lack clear management and weighting, so that various important factors such as the head of household's income, the number of dependents, the head of household's employment status, living conditions, and ownership of valuable assets are not being optimally utilized. The absence of a decision-support system also hinders the objective processing of data and the formulation of recommendations.

Literature Study

The literature review phase of this study serves as the theoretical foundation supporting the research. This literature review discusses the concept of decision support systems as tools for rational and objective decision-making, particularly in the process of determining recipients of social assistance. In addition, this study explains the theory and stages of the Simple Additive Weighting (SAW) method, ranging from the determination of criteria, the assignment of weights, the normalization of values, to the calculation of preference values. With this literature review, this study has a strong scientific basis, clarifies the conceptual framework, and ensures that the methods used are appropriate for the issues under study and the research objectives to be achieved.

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Collecting Data

The data collection phase of this study was conducted to obtain accurate and relevant information as a basis for applying the Simple Additive Weighting (SAW) method in determining social assistance recipients at the Bandar Pasir Mandoge Subdistrict Office. The data collected included information on potential social assistance recipients along with the assessment criteria used, such as the head of household's income, the number of dependents, the head of household's employment status, living conditions, and ownership of valuable assets. Data collection was carried out through a documentary review of sub-district archives and reports, direct observation of residents' conditions, and interviews with relevant parties. The data obtained were then screened and validated to ensure they met the research requirements and were ready for use in a systematic analysis process.

Analysis Data

The data analysis stage in this study was conducted to process data on residents eligible for social assistance using the Simple Additive Weighting (SAW) method. This analysis process begins with determining criteria and assigning weights based on their level of importance, followed by normalizing the values of each criterion to ensure they are on a uniform scale. Next, preference values for each alternative are calculated by summing the products of the normalized values and the criteria weights. The results of this analysis will produce a ranking of residents based on their eligibility for social assistance. Through this data analysis stage, the resulting decisions become more objective and measurable and can serve as the basis for recommendations regarding the selection of social assistance recipients for the following year.

Design System

In this stage, the researcher will describe in detail the system to be designed to assist the Bandar Pasir Mandoge subdistrict office. Additionally, in this stage, the researcher will design the input, process, and output structure of the decision support system to determine which residents are eligible to receive social assistance. The system design here includes the creation of an information system flowchart, UML (Unified Modeling Language), ERD (Entity-Relationship Diagram), flowchart, DFD (Data Flow Diagram), and a user interface (UI) design that incorporates the steps of the Simple Additive Weighting (SAW) algorithm (Tanti et al., 2022).

Building System

System development is a follow-up activity carried out by the researcher after completing the system design process. At this stage, the researcher will develop the system using the PHP programming language, the CodeIgniter 4 framework, and MySQL as the system's database (Rahman et al., 2022).

System Testing

Once the system has been designed and built, the system testing phase begins. This is done to identify the strengths and weaknesses of the system and to determine whether there are any errors in it. Here, the researcher uses both black-box and white-box testing methods; the testing involves observing the execution results based on system test data while simultaneously examining each functional component of the system (Ardana et al., 2022).

Implementation System

This phase represents the final outcome and follow-up actions taken by the researchers based on the series of activities carried out from the system design phase through the system testing phase. System implementation is the process of finalizing the design outlined in the approved system design document, as well as testing and deploying the new system.

RESULT

Analysis Data

Based on the analysis of the current system, the proposed system, the problem analysis, system requirements, and the overall data analysis, it is evident that the quality of input data significantly influences the accuracy of the decisions generated by the system. Benefit-type criteria indicate that the higher the value, the better the eligibility level, while cost-type criteria indicate that the lower the value, the higher the priority for receiving assistance. For the "Household Head's Income" (C1) criterion, which is a cost-type criterion, prospective recipients with lower income levels will receive a higher eligibility score because they are considered to be in greater need of assistance (Syahputra et al., 2022). The "Number of Dependents" (C2) criterion is a benefit-type criterion; the more family members a household has as dependents, the greater the economic needs that must be met, thereby increasing the likelihood of receiving assistance. Furthermore, the Head of Household's Employment Status (C3) and Housing Conditions (C4) also fall under the "benefit" category. Employment status is used to assess the family's level of economic stability, while housing conditions reflect the prospective recipient's level of well-being and quality of life.

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Table 1. Criteria

Criteria Code	Criteria	Category
C1	Household Head's Total Income	Cost
C2	Number of Dependents	Benefit
C3	Household Head's Employment Status	Benefit
C4	Housing Conditions	Benefit
C5	Ownership of Valuable Assets	Cost

Design System

The use case diagram describes the interaction between an actor the administrator and the information system to be developed. The proposed use case diagram is shown in Figure 2. The use case diagram is shown in Figure 2.

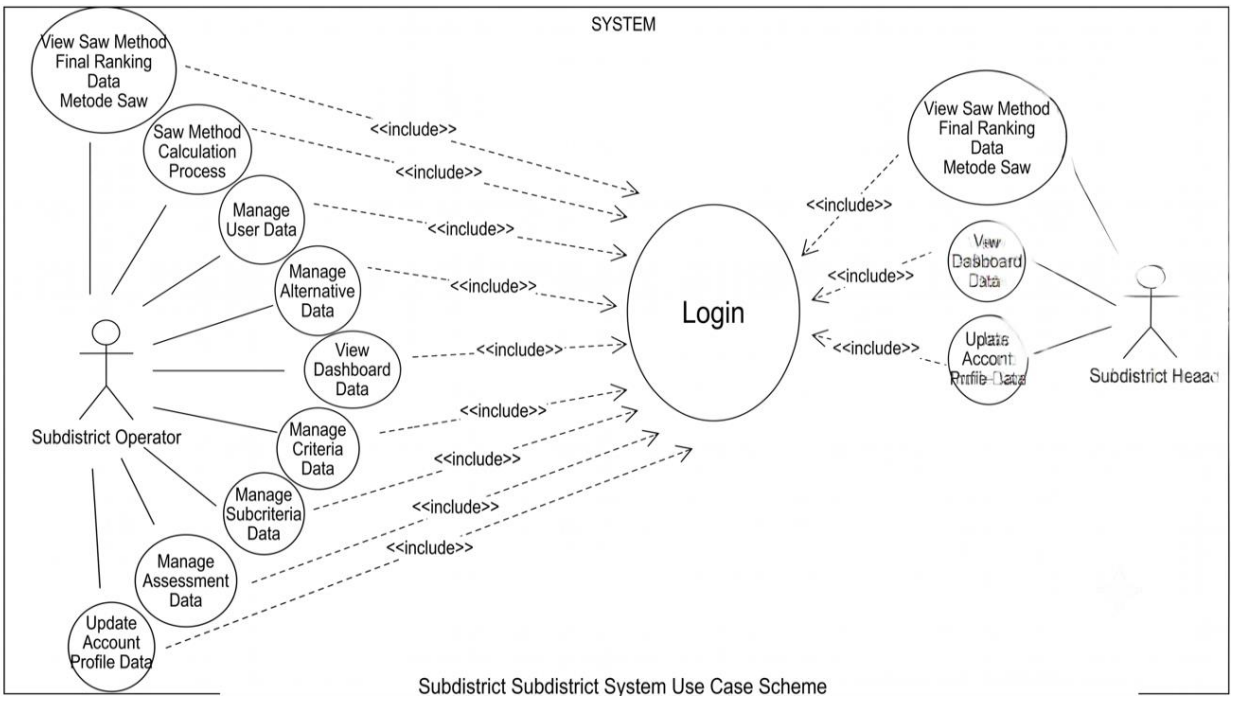

Figure 2. Design System

Figure 2 illustrates the overall workflow of the proposed system in determining social assistance recipients. The process begins with data collection, where information about potential beneficiaries is gathered based on predefined criteria such as income, number of dependents, occupation, housing condition, and asset ownership.

After data collection, the system proceeds to the data processing stage using the Simple Additive Weighting (SAW) method. In this stage, each criterion is normalized to ensure comparability among different scales. Then, weights are assigned to each criterion based on their level of importance in the decision-making process.

The next stage involves calculating the preference values by multiplying the normalized values with their respective weights and summing the results. These preference values are then used to rank the alternatives, where higher scores indicate higher priority for receiving social assistance.

Finally, the system generates the output in the form of a ranked list of eligible recipients, which can be used by decision-makers to ensure a fair, objective, and transparent distribution process.

Implementation System

The implementation phase of a system provides a detailed explanation of the results of the analysis and design discussed in the previous chapter. When the designed system is implemented, it can be operated and used optimally according to requirements. This chapter will outline the methods and steps for implementing the software design, the hardware and software requirements, and system testing.

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Login Page

The user login page is the webpage that users access to enter the website's main page, where they will verify their accounts to log in to the website's main page.

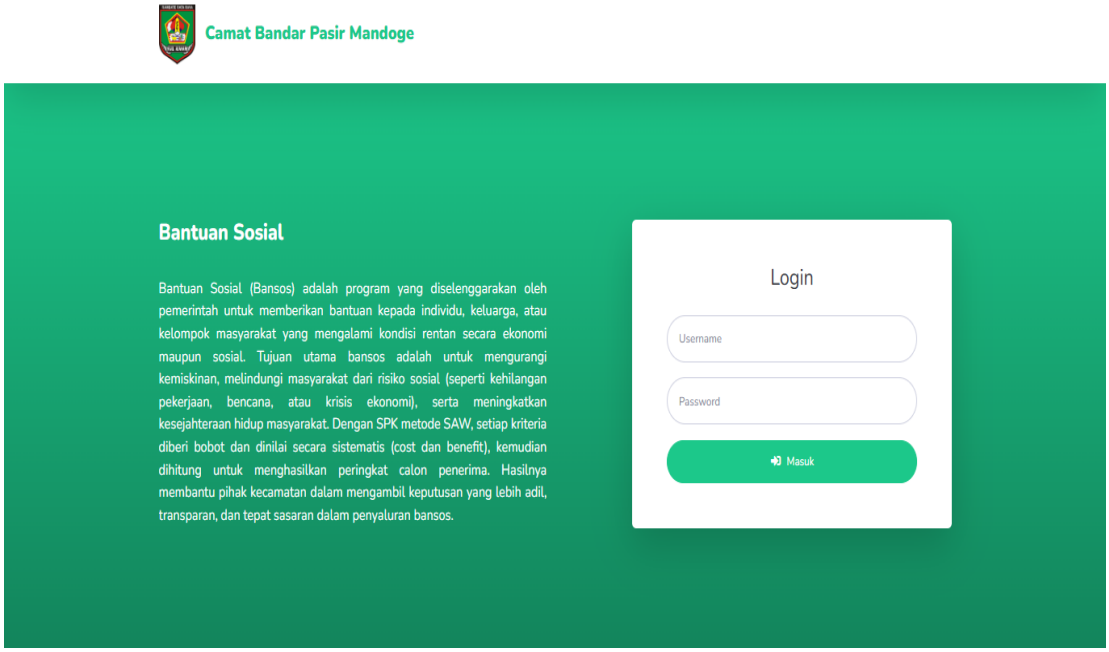

Figure 3. Login Page

Home Admin

The website's main menu page is the page that users can access after successfully verifying their login to the website.

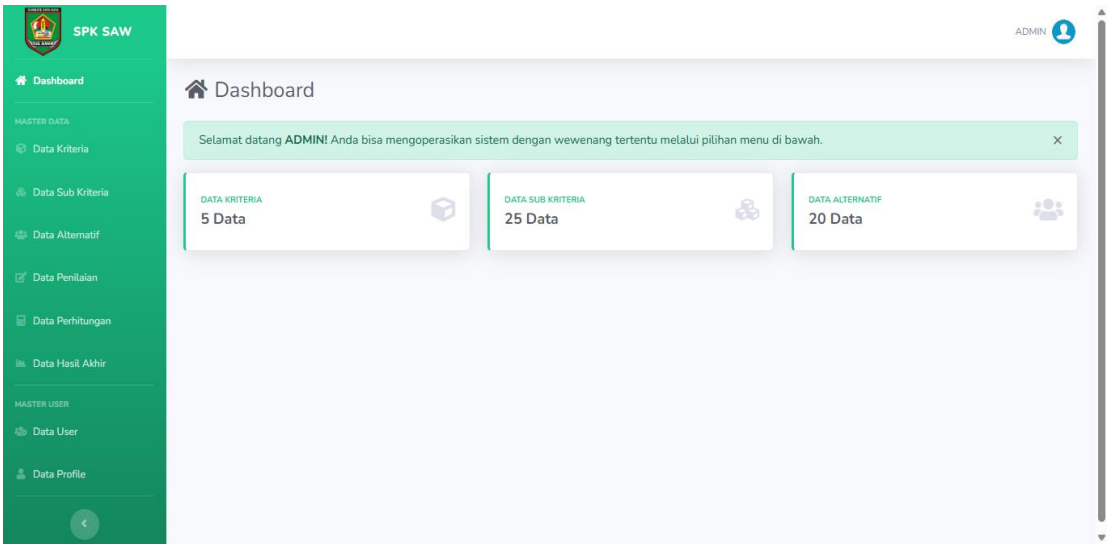

Figure 4. Dashboard Admin

Criteria Page

The "Add Evaluation Criteria Data" page is a webpage that users can access to enter additional evaluation criteria and weight values to be used in the Simple Additive Weighting (SAW) calculation performed by the system.

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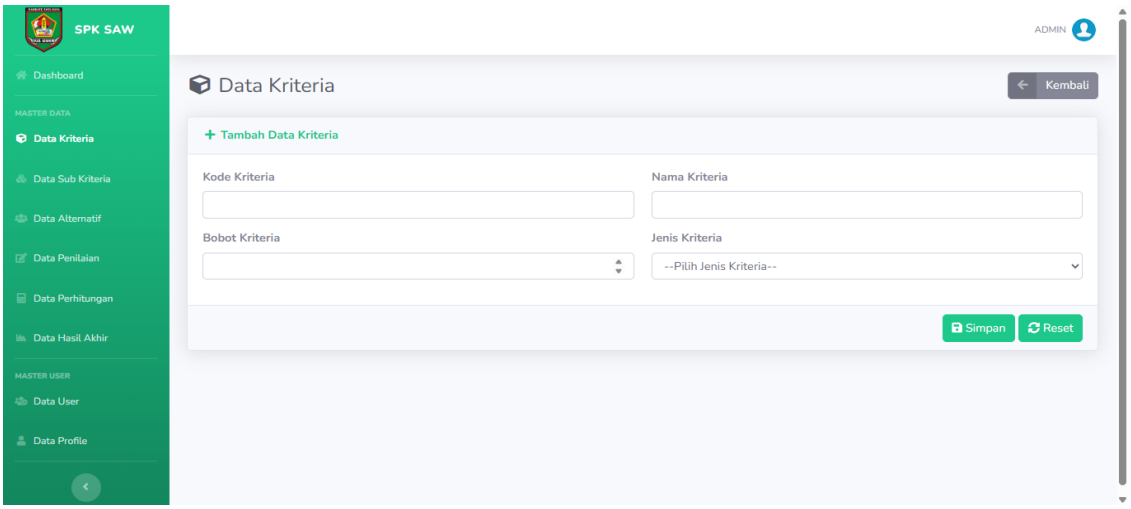

Figure 5. Criteria Page

Sub Criteria Page

The "Add Assessment Subcriteria Data" page is a webpage that users can access to enter additional data regarding the assessment ranges to be used in the Simple Additive Weighting (SAW) calculation performed by the system.

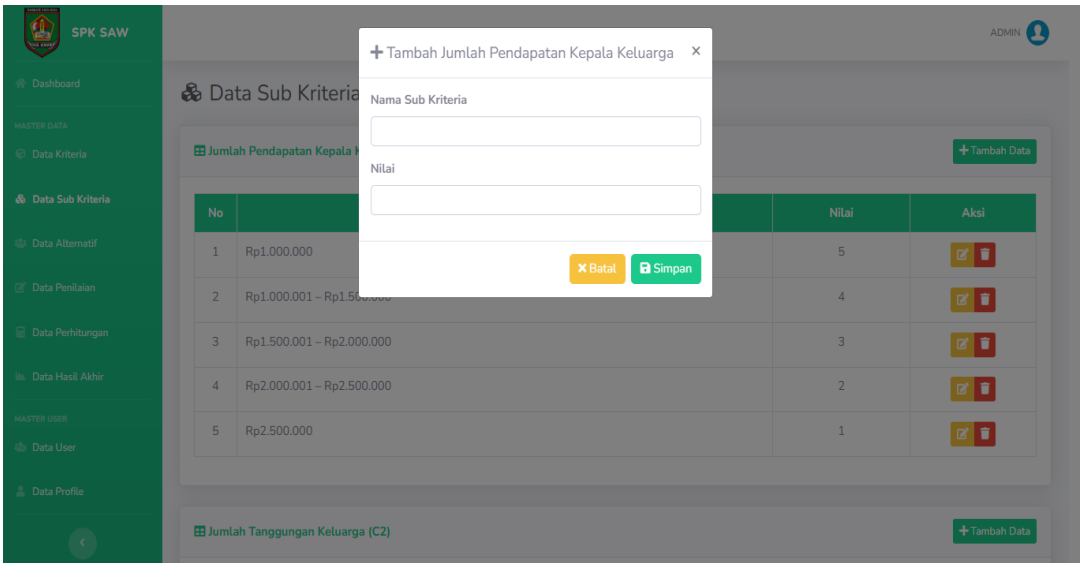

Figure 6. Sub Criteria Page

Alternative Page

The "Add Alternative Data (Residents)" page is a webpage that users can access to enter alternative data (on residents) to be used in the Simple Additive Weighting (SAW) calculation performed by the system.

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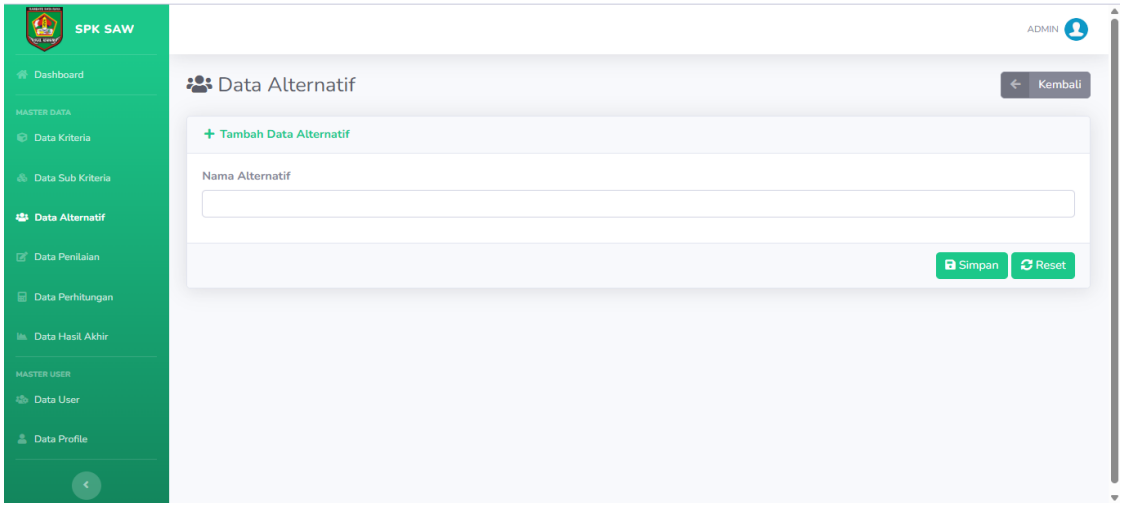

Figure 7. Alternative Page

Result Page

The Final Results Data Page is a webpage that users can access to view the ranking results calculated using the Simple Additive Weighting (SAW) method, which will be run by the system based on the evaluations that have been conducted.

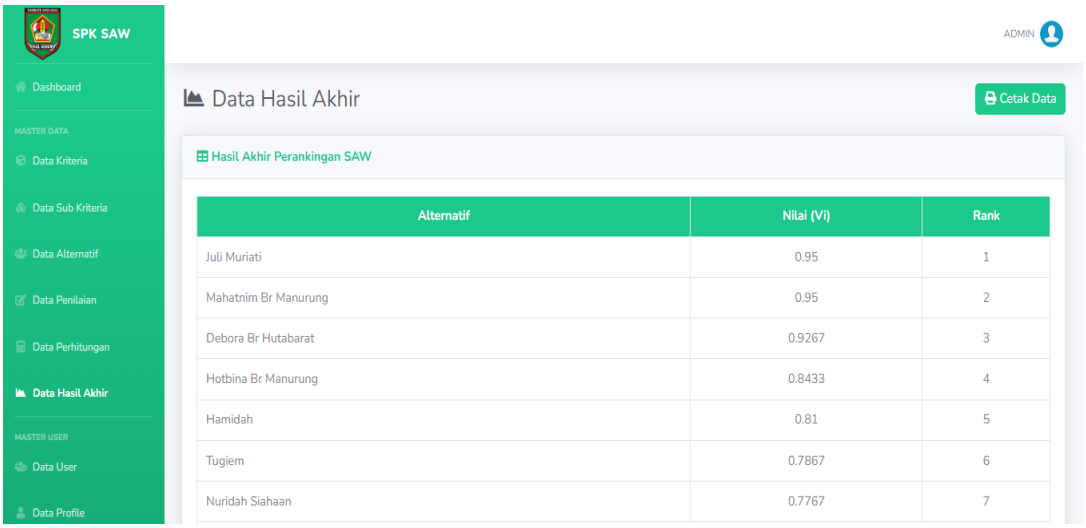

Figure 8. Result Page

Figure 8 illustrates the final stage of the decision-making process, where the system displays the ranking results of prospective social assistance recipients. This page is generated after all data have been processed using the Simple Additive Weighting (SAW) method. The process begins with the system retrieving the normalized values of each criterion for all alternatives (residents). These values are then multiplied by their respective weights, which represent the importance level of each criterion. The results of these calculations are summed to obtain a final preference value (V) for each alternative.

Next, the system automatically sorts the alternatives based on their preference values in descending order. Residents with higher preference values are given higher priority for receiving social assistance, as they are considered more eligible according to the defined criteria. The Result Page presents this ranking in a structured and easy-to-understand format, allowing decision-makers to quickly identify the most eligible recipients. This process ensures that the selection is conducted objectively, transparently, and based on quantitative analysis rather than subjective judgment.

DISCUSSION

The results of this study indicate that the implemented system provides significant improvements compared to the previous manual process. Before the system was developed, data management, transaction recording, and reporting were performed manually, which often led to data redundancy, delays, and a higher risk of errors.

After the implementation of the system, all processes are integrated and automated, resulting in improved efficiency and accuracy. The system enables faster data processing, minimizes human error, and provides real-time

E-ISSN : 2807-9035
Volume 6, Number 3, August 2026
https://doi.org/10.47709/brilliance.v6i3.9276

access to information. In addition, report generation can now be performed instantly, supporting better decision-making.

These findings demonstrate that the developed system effectively addresses the identified problems and improves overall operational performance. Therefore, the system is considered feasible and beneficial for implementation in supporting business processes.

CONCLUSION

Based on the research conducted, it can be concluded that this study successfully designed and developed a web-based decision support system capable of assisting the process of determining social assistance recipients at the Bandar Pasir Mandoge Subdistrict Office in a more effective, efficient, and structured manner. The system was designed using the PHP programming language with the CodeIgniter 4 framework and a MySQL database, enabling it to manage all data related to the beneficiary selection process from criteria and sub-criteria data, alternative data (potential beneficiaries), and assessment data to automatically generate final reports.

The application of the Simple Additive Weighting (SAW) method in the decision support system provides objective calculation results based on five main criteria: household head's income, number of dependents, household head's employment status, housing conditions, and ownership of valuable assets. The normalization and weighting processes performed by the SAW method yield preference values (V) that serve as the basis for determining the priority of social assistance recipients. Based on the ranking results, Juli Muriati was identified as the recipient with the highest preference value of 0.95, placing her in 1st rank, followed by Mahatimin Br. Manurung with a value of 0.95 in 2nd rank, and Debora Br. Hutabarat with a value of 0.93 in 3rd rank. Next were Hotbina Br. Manurung (0.84), Hamidah (0.81), and Minam Br. Sitorus (0.56) in last place.

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