Multidiciplinary Output Research For Actual and International Issue (MORFAI Journal) ISSN (e): 2808-6635
Volumes 5 No. 6 (2025)

DECISION SUPPORT SYSTEM FOR SELECTING DIRECT CASH ASSISTANCE RECIPIENTS IN PANTON LABU VILLAGE USING A WEB-BASED AND MFEP METHOD

Zahidi Pratama[1]*, Wahyu Fuadi[2], Nunsina[3]
[1,2,3]Jurusan Informatika, Fakultas Teknik, Universitas Malikussaleh, Aceh, Indonesia
Corresponding E-mail: zahidi.200170263@mhs.unimal.ac.id[1]* , wahyu.fuadi@unimal.ac.id[2] , nunsina@unimal.ac.id[3]

Received	: 20 May 2025	Published	: 10 July 2025
Revised	: 29 May 2025	DOI	: https://doi.org/10.54443/morfai.v5i6.3329
Accepted	: 16 June 2025	Link Publish	: https://radjapublika.com/index.php/MORFAI/article/view/3329

Abstract

The distribution of Direct Cash Assistance (BLT) often faces challenges related to data accuracy and fairness in recipient selection. This study aims to develop a web-based decision support system for selecting BLT recipients in Panton Labu Village using the Multi-Factor Evaluation Process (MFEP) method. The system was developed following the Waterfall software engineering model, utilizing PHP for programming and MySQL for database management. Data were collected through field observations, literature reviews, and interviews with village officials. The MFEP method evaluates prospective recipients based on six criteria: employment status, number of dependents, homeownership, building type, floor type, and monthly income. The system incorporates a Geographic Information System (GIS) feature to visualize applicants' home locations, with color-coded markers indicating eligibility. Testing on 120 data entries revealed that 34.2% (41 individuals) qualified for assistance using a minimum threshold score of 3.00. The system successfully automated calculation processes, enhanced transparency through digital mapping, and provided a user-friendly interface. This implementation demonstrates the effectiveness of the MFEP method in supporting objective, systematic, and targeted decision-making for social assistance programs at the village level.

Keywords: ***Decision Support System, Direct Cash Assistance, Multi-Factor Evaluation Process, Geographic Information System, Digital Mapping*.**

INTRODUCTION

The advancement of science and technology has driven various sectors to continuously innovate in addressing challenges in technology and information systems. Computers have now become a primary tool in supporting diverse activities, including public services that are increasingly shifting toward digitalization (Fricticarani et al., 2023). In line with this progress, government officials—particularly at the village level—must be encouraged to adopt computerized information systems to enhance work efficiency and public service delivery (Huque & Ferdous, 2024). The integration of information technology not only supports the performance of village governments but also significantly contributes to the overall improvement of community welfare (Pribadi et al., 2025). One government program that heavily relies on data accuracy and fair distribution is Direct Cash Assistance (Bantuan Langsung Tunai/BLT). BLT is a form of social aid provided through cash transfers, either conditionally (conditional cash transfer) or unconditionally (unconditional cash transfer), to underprivileged communities (Safira, 2021).

This program is designed to alleviate the economic burden of low-income households, particularly in developing countries, with the aim of fulfilling their basic needs. As a concrete government effort to address economic inequality, BLT is distributed selectively based on assessments by village officials, who have a deeper understanding of their residents' social and economic conditions (Andika, 2023). However, in practice, the distribution of this aid often faces significant challenges, particularly regarding data accuracy and reliability. Many cases have been found where eligible beneficiaries are unregistered, while deceased individuals remain listed as recipients. These inaccuracies are generally caused by manual data collection processes and weak validation systems (Lukman, 2023).

To address these issues, an information system-based solution is needed to facilitate a more objective, accurate, and efficient beneficiary assessment process. This study aims to develop a Decision

Support System (DSS) for selecting potential BLT recipients in Panton Labu Village using a web-based Multi-Factor Evaluation Process (MFEP) method. The system is designed to process various criteria, such as occupation, monthly income, number of dependents, homeownership status, and building type, to generate structured recommendations for aid recipients. Additionally, the system is equipped with a mapping feature for Panton Labu Village based on the coordinate points of residents' homes. This feature visually displays data on eligible and ineligible beneficiaries, with green markers indicating qualified recipients and red markers indicating those who do not meet the criteria.

Supplementary information, such as complete resident biodata, living status (alive or deceased), and housing conditions, can also be displayed on the map, thereby enhancing data transparency and accuracy. By adopting the MFEP method in the decision support system, the decision-making process becomes faster, more systematic, and less prone to evaluation errors (Widyassari et al., 2024). Furthermore, this system is expected to assist village governments in formulating fairer and more targeted aid distribution policies while increasing public trust in the beneficiary selection process. This research also serves as a platform for developers to explore the application of the MFEP method in information systems and demonstrate its effectiveness in solving real-world societal problems. The implementation of this system is expected to serve as an example of how information technology can support data-driven social programs, particularly in rural communities in Indonesia.

LITERATURE REVIEW

Decision Support Systems and MFEP (Multi-Factor Evaluation Process)

A Decision Support System (DSS) is a computer-based system designed to assist decision-making processes, particularly in semi-structured or unstructured situations. This system functions as a tool that helps decision-makers by providing relevant information, models, or analytical tools (Anwar & Tanti, 2023). DSS typically involves four main stages: intelligence, design, choice, and implementation which support data processing and generate accountable recommendations (Nunsina et al., 2022). The MFEP is one of the commonly used decision-making methods within DSS. Each alternative's score on a given criterion is multiplied by its corresponding weight to calculate a total score. The alternative with the highest total score is considered the best choice (Mukhlis, 2023). The MFEP method begin with :

- Determining the criteria and their relative weights (NBF)
- Assigning evaluation values for each alternative on each criterion (NEF)
- Calculating the Evaluation Weight Value (NBE) using the formula

  $NBE = NBF \; x \; NEF$
- Calculating the Total Evaluation Weight (TBE) for each alternative by summing all NBE values using the formula

  $TBE = \sum_{i=1}^{n} BE_n$
- Ranking the TBE values to determine the alternative with the highest value as the final result

Direct Cash Assistance (BLT)

Direct Cash Assistance (BLT) is a form of social protection program provided directly to poor or vulnerable populations. This program aims to sustain purchasing power and mitigate the economic impact of emergency situations such as pandemics or fuel price hikes (Dewi & Andrianus, 2021). However, BLT distribution often faces challenges, especially in ensuring that the aid reaches the intended recipients.

Geographic Information Systems and Google Maps

Geographic Information Systems (GIS) are computer-based systems used to manage spatial data, enabling more detailed visualization and analysis of geographical information (Syintia et al., 2025). GIS is highly relevant in the context of aid distribution, as it allows for the mapping of impoverished areas, spatial monitoring of aid delivery, and location-based decision-making.

Google Maps, as one of the most widely used digital mapping platforms, provides interactive mapping features that are useful for real-time visualization of aid recipient locations (Palindung, 2022).

Previous Research

Several previous studies have applied the MFEP method for multi-criteria decision-making. Ramadhani et al. (2022) applied MFEP to select eligible MSME recipients for capital assistance, demonstrating the system's ability to generate transparent and accountable results. Maulana et al. (Maulana & Awaru, 2024) developed a web-based system to select business types, achieving 81% user approval, indicating strong system usability. Yanto et al. (Yanto & Yunus, 2021) employed MFEP to determine electricity subsidy eligibility with 100% accuracy, highlighting the method's practical effectiveness. Nasution et al. (Nasution et al., 2022) used MFEP to evaluate students eligible for educational support, establishing a minimum evaluation score as a selection threshold. Other studies explored alternative methods. Utomo et al. (Utomo et al., 2024) implemented the TOPSIS method for determining recipients of the Indonesia Smart Program (PIP), achieving 78% alignment with real-world data. Overall, these studies confirm that DSS approaches using multi-factor evaluation methods like MFEP significantly enhance accuracy, transparency, and efficiency in aid recipient selection processes. However, most studies remain limited to numerical evaluations and lack integration with spatial analysis or interactive web-based visualization features.

Research Gap

Although MFEP has been applied in various social decision-making contexts, few studies have integrated it with GIS-based spatial analysis and interactive web visualization to support BLT distribution. This research aims to fill that gap by developing a DSS that combines MFEP with mapping features and online accessibility. This approach is expected to improve accuracy, efficiency, and accountability in distributing direct cash assistance at the local level.

METHOD

Research Approach

This research uses a software engineering approach with the phased Waterfall model. This model was chosen because of its systematic and structured flow, making it suitable for research that requires clear stages from start to finish.

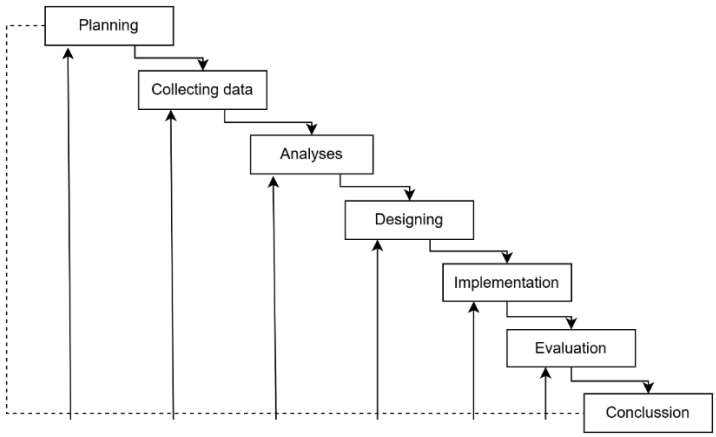

Image 1: Research Approach

The Waterfall model consists of seven main stages. First, planning is done to determine the research scope and objectives. Next, data collection is conducted through observation or literature study to support the analysis process. The analysis stage aims to identify system requirements and determine technical solutions. Then, the analysis results are used in the design stage, where the system structure and process flow are designed. After that, the implementation stage realizes the design into a program. The created program will undergo testing to ensure functionality and reliability. Finally, the conclusion stage summarizes the research results and evaluates the system that has been built.

Data Treatment

Data is a crucial element in supporting the validity and reliability of research. In this study, the data used was obtained through various collection techniques tailored to the research needs and objectives. The primary data source was the residents of Panton Labu Village, collected directly from the field to ensure accuracy. This data is highly relevant in supporting the hypothesis regarding the MFEP (Multi-Factor Evaluation Process)-based social aid distribution decision support system. The detailed data collection methods used in this study are as follows :

- Observation : Researchers conducted direct field observations to understand the village's social structure, resident data management, and aid distribution processes.
- Literature Review : Examined MFEP theory and implementation, web system development (PHP and MySQL), and decision-making models from scientific sources.
- Interview : Conducted with village officials to obtain population data, beneficiary criteria, and verification systems, while identifying administrative challenges.

Evaluation Methods

Evaluation was carried out by testing the system using prepared test data. This testing aimed to determine whether the system functions as intended and produces valid and consistent results. The system's success was measured based on Accuracy of calculations, Precision of geographic mapping and Ease of use for system operators. With this approach, the developed system is expected to not only deliver objective and transparent results but also serve as a practical tool for village governments in decision-making processes related to social aid distribution.

RESULTS AND DISCUSSION

This section presents the implementation results of the decision support system based on the Multi-Factor Evaluation Process (MFEP) method for determining eligibility for Direct Cash Assistance (BLT) in Panton Labu Village. The evaluation was conducted in stages, beginning with manual calculations on sample data to ensure that the method aligned with the theoretical framework. Subsequently, automated system testing was performed on the complete dataset.

Manual Calculation Using MFEP

Before digital implementation, manual calculations were done on sample recipients to verify the method's accuracy. MFEP evaluates each candidate using weighted criteria such as occupation, dependents, homeownership, building type, floor type, and income. Normalized values are multiplied by weights and summed to produce a final score. An example calculation for a candidate named Tihadanah is shown below :

Table 1. Example Data of Tihadanah

No	Evaluation Criteria	Raw Value	Normalized Value	Weighted	Weighted Score (Value × Weight)
1	Occupation	Housewife	4	0.20	0.80
2	Number of Depents	0 Persons	1	0.20	0.20
3	Homeownership	Owned	1	0.20	0.20
4	Building Type	Wooden Structure	5	0.10	0.50
5	Floor Type	Concrette	3	0.10	0.30
6	Monthly Income	Rp 1.800.000	3	0.20	0.60
		Total Score			**2.60**

A score of 2.60 indicates a relatively high eligibility level. The same process was applied to other candidates for comparison. This manual calculation confirms that MFEP can systematically and objectively evaluate aid eligibility and serves as a foundation to validate the developed system logic.

Full Dataset Implementation and Classification

After manual validation, the MFEP method was applied to 120 potential aid recipients using six criteria: employment, dependents, homeownership, building type, floor type, and income. Normalized values were calculated with assigned weights to generate a final score.

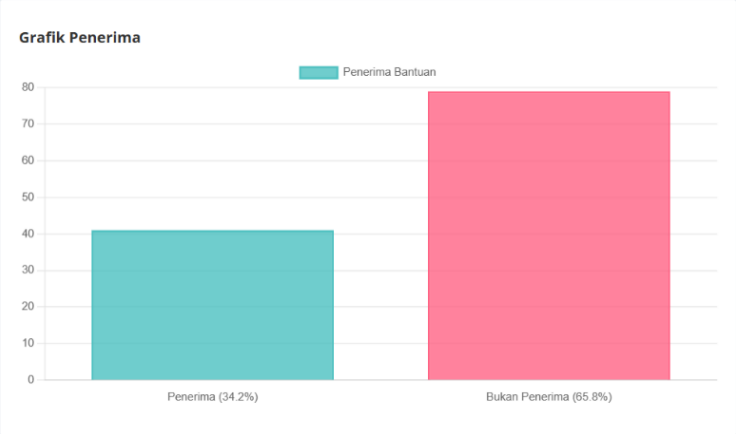

Image 2: Recipient Distribution

A threshold of 3.00 was set to classify eligibility. Candidates scoring ≥ 3.00 were labeled "Eligible," while others were "Ineligible." As a result, 34.2% (41 people) were eligible, and 65.8% (79 people) were not. Ineligible individuals typically had higher incomes or better housing, while eligible ones had lower incomes and poorer living conditions. The system ensures fair, data-driven classification and allows threshold adjustment to match policy needs.

Comparison of Manual and System-Based Beneficiary Selection Results

A comparison between the village's manual selection and the system-based MFEP results showed notable differences. Of the 24 recipients chosen manually from 120 residents, only 18 (69.2%) met the system's eligibility threshold of 3.00, while 6 (30.8%) did not. This indicates partial alignment between manual and system-based decisions. The system also identified other individuals not selected manually but with higher eligibility scores, suggesting that manual selection may be influenced by subjective factors such as personal relationships or local familiarity. Image 3 visualizes this comparison, where green bars represent matched recipients and red bars indicate those who did not meet the threshold, marked by a dashed vertical line.

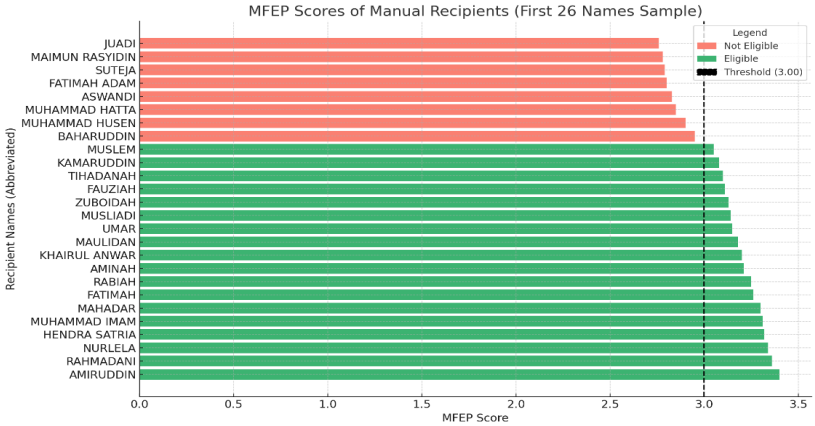

Image 3: Sample of Distribution MFEP Score

As shown in the graph, the majority of manual recipients scored above the threshold; however, there were a number of individuals with relatively low scores who were not recommended for aid by the system. Furthermore, Figure 4 illustrates the proportion of alignment between manual and system-based selections. The pie chart reinforces the data by showing that although most manual recipients were aligned with system criteria, a considerable portion did not meet the objective eligibility standards.

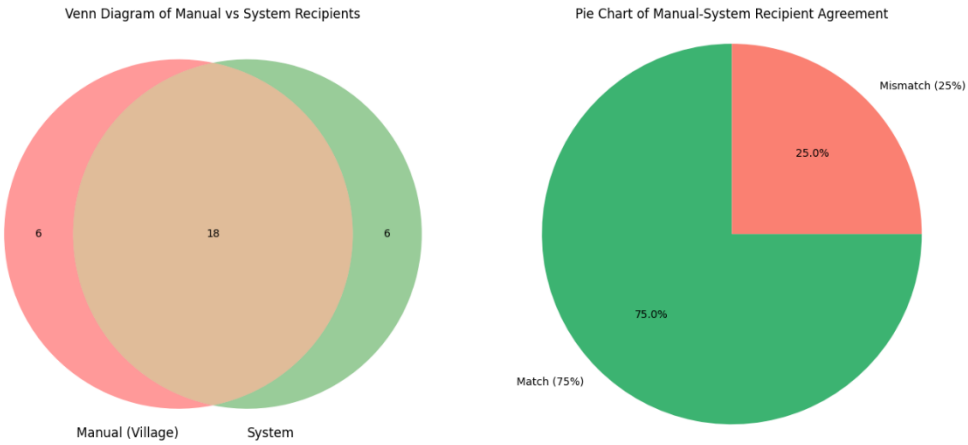

Image 4: Proportion Of Alignment Between Manual And System-Based Selections

From this analysis, it can be concluded that the application of an MFEP-based decision support system can assist village governments in ensuring a more objective, fair, and data-driven process for selecting aid recipients. The system can also help reduce subjectivity in decision-making and enhance transparency to the public. Nevertheless, flexibility can still be maintained by adjusting the eligibility threshold to accommodate local policy considerations without compromising equity in aid distribution.

GIS Implementation

To complement the numerical results, the system includes a Geographic Information System (GIS) feature that maps the residence of each potential beneficiary. This spatial visualization enhances transparency and helps village officials verify field conditions and aid distribution. Image 5 displays green dots for eligible recipients and red dots for ineligible ones. Clicking a dot reveals details such as name, coordinates, housing status, and photos (if available).

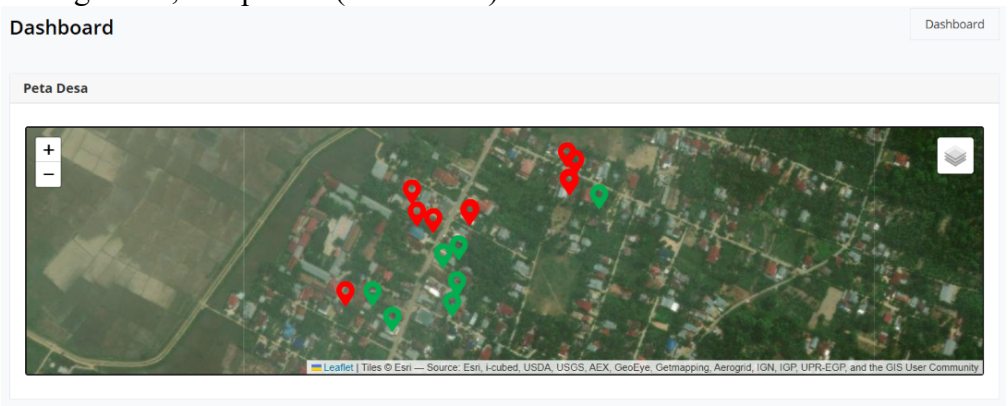

Image 5: Map GIS

The system also features an interactive dashboard with distribution charts, statistical data, and easy navigation menus, including Resident Data, Evaluation Parameters, MFEP Calculations, Score Settings, and Recipient Lists. Designed with a user-friendly interface, the system allows operators to manage evaluations without advanced technical skills. These visual tools improve monitoring and enable more effective, location-based policy decisions.

System Interface Implementation

The decision support system for BLT recipient selection is implemented as a web-based application. The system automatically performs calculations using the Multi-Factor Evaluation Process (MFEP) method without requiring manual intervention. Administrators only need to input resident data, set criteria parameters and weights, and determine the minimum eligibility score. Subsequently, the system will calculate the evaluation scores and present the final results :

1) Login Page

Image 6: Login Page

The login page serves as the entry point for administrators, requiring a valid email and password. Real-time validation ensures that incorrect credentials trigger explicit error messages. The interface is designed to be simple yet secure, restricting access to authorized users only.

2) Dashboard and Map Page

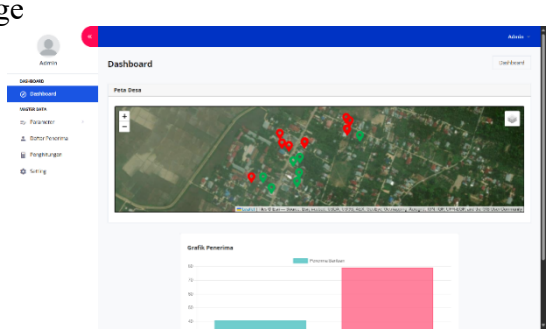

Image 7: Dashboard and Map Page

After login, users access a dashboard featuring a GIS-based digital village map. The map displays household locations with color-coded eligibility status: green for eligible and red for ineligible aid recipients. This visual representation supports efficient field validation, allowing officials to quickly identify and assess each case. Map points are interactive, providing detailed information such as names, addresses, and house photos when available.

3) Parameter Page

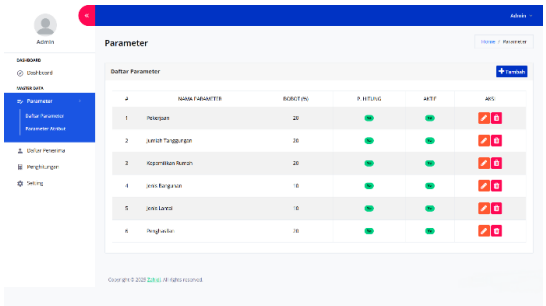

Image 8: Parameter Page

Admins configure and assign weights to assessment criteria (e.g., employment, income) and can enable or disable parameters, allowing flexible adaptation to local policies and different aid periods.

4) Parameter Attribute Page

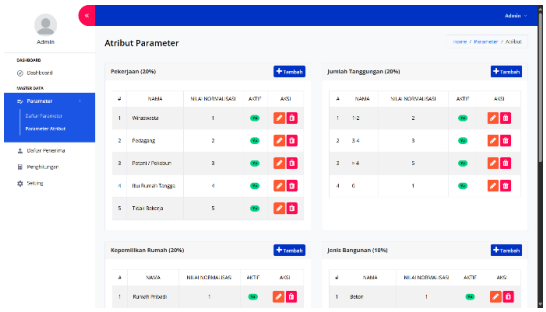

Image 4: Parameter Attribute Page

Each parameter has a dedicated subpage listing its attributes and corresponding normalization values. For instance, the employment parameter includes job types (e.g., entrepreneur, farmer, homemaker) with normalized scores indicating vulnerability or priority levels. Attributes are fully customizable to local contexts, and administrators can easily activate, edit, or delete them. This page ensures that assessment values align with local socioeconomic conditions.

5) Recipient List Page

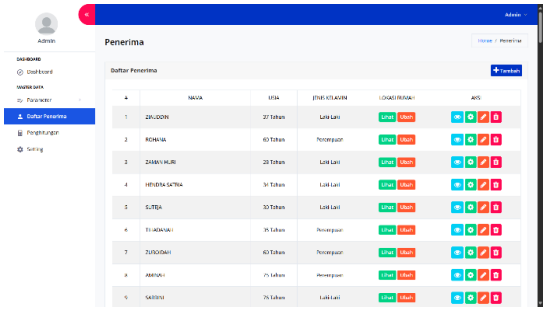

Image 4: Recipient List Page

Displays resident data with editable personal details and map locations. Admins can update or delete entries to maintain accurate eligibility records.

6) Calculation Page

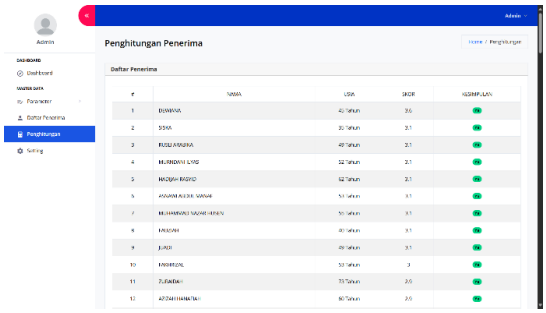

Image 4: Calculation Page

Once data and parameters are configured, the system automatically performs MFEP-based eligibility calculations. Results are displayed in a locked, color-coded table indicating final scores and eligibility status, preventing further edits. This page supports village officials in making informed final decisions.

7) Minimum Score Setting Page

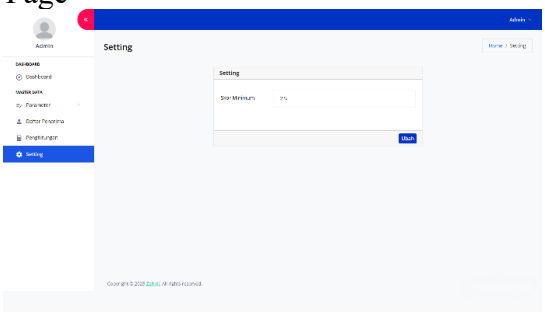

Image 4: Minimum Score Setting Page

As an added flexibility feature, this page allows administrators to set the eligibility threshold score (e.g., default 3.00). Residents scoring above this value are automatically categorized as eligible. This setting is crucial for adapting evaluations to budget constraints, village priorities, or social dynamics without systemic modifications. Overall, the interface is designed not only for rapid and accurate data processing but also to present easily interpretable results for village-level policymakers. Web-based implementation enables multi-location accessibility (with internet connection) and facilitates collaborative, transparent data management.

CONCLUSION

This study successfully developed a web-based decision support system for selecting recipients of Direct Cash Assistance (BLT) in Panton Labu Village using the Multi-Factor Evaluation Process (MFEP) method. The system was able to evaluate 120 prospective recipient data points based on six main criteria: employment status, number of dependents, homeownership, building type, floor type, and monthly income. Implementation results showed that 34.2% (41 individuals) were deemed eligible to receive assistance, while 65.8% (79 individuals) did not meet the criteria, using a minimum threshold score of 3.00. The strength of this system lies in its ability to integrate a Geographic Information System (GIS) that visualizes the home locations of prospective recipients, with green markers indicating eligible candidates and red markers indicating ineligible ones. This mapping feature enhances transparency and facilitates field verification by village officials. The web-based system enables multi-location access and collaborative data management, replacing the manual system that was prone to inaccuracies.

System validation was conducted through manual calculations on sample data to ensure the accuracy of the MFEP method, followed by implementation on the complete dataset. The system proved capable of producing consistent and reliable calculations. The interface was designed to be user-friendly, featuring secure login pages, an interactive dashboard, flexible parameter settings, resident data management, and adjustable score thresholds based on village policies. The implementation of the MFEP method proved effective in providing objective, systematic, and measurable assessments. This system not only eliminates subjectivity in the selection process but also provides comprehensive documentation for every decision made. The system's flexibility in adjusting criterion weights and threshold values allows for adaptation to changes in policies or socioeconomic conditions. Overall, this study makes a significant contribution to the application of information technology for social assistance programs at the village level. The developed system can enhance public trust in the selection process for social aid recipients, support fairer and more targeted decision making, and ensure transparency in aid distribution. The findings of this study can also serve as a reference for developing similar systems in other villages across Indonesia, demonstrating how technology can support data-driven social programs in rural communities.

REFERENCES

Andika, N. W. (2023). Implementasi Peraturan Bupati Kabupaten Tulang Bawang Nomor 10 Tahun 2018 Tentang Tata Cara Pemberian Bantuan Sosial Kepada Penyandang Disabilitas Dan Lanjut Usia Berdasarkan Perspektif Fiqh Siyasah. UIN RADEN INTAN LAMPUNG.

Anwar, M., & Tanti, L. (2023). Penerapan Metode Oreste Dalam Sistem Pendukung Keputusan Pengangkatan Jabatan Supervisor Berbasis Web. *Jurnal Info Digit (JID)*, *1*(3), 1114–1128.

Dewi, R., & Andrianus, H. F. (2021). Analisis pengaruh kebijakan bantuan langsung tunai (BLT) terhadap kemiskinan di indonesia periode 2005-2015. *Menara Ilmu: Jurnal Penelitian Dan Kajian Ilmiah*, *15*(2).

Fricticarani, A., Hayati, A., Hoirunisa, I., & Rosdalina, G. M. (2023). Strategi pendidikan untuk sukses di era teknologi 5.0. *Jurnal Inovasi Pendidikan Dan Teknologi Informasi (JIPTI)*, *4*(1), 56–68.

Huque, A. S., & Ferdous, J. (2024). Electronic public service delivery: progress and challenges in Bangladesh. *Public Administration and Policy*, *27*(1), 19–30.

Lukman, A. (2023). Sistem Pendukung Keputusan Pemilihan Penerima Bantuan Sosial Dengan Metode Mfep (Studi Kasus: Desa Sekarwangi). Universitas Sangga Buana YPKP.

Maulana, R., & Awaru, T. (2024). Sistem Pendukung Keputusan Penentuan Jenis Bisnis Dengan Metode Multifactor Evaluation Process. *Jurnal INSYPRO (Information System and Processing)*, *9*(1).

Mukhlis, A. (2023). Sistem Pendukung Keputusan Penentuan Jurusan Menggunakan Metode Multi Factor Evaluation Process (Mfep) Di Sman 5 Soppeng. *Jurnal Ilmiah Sistem Informasi Dan Teknik Informatika (JISTI)*, *6*(1), 9–19.

Nasution, N. S. F., Lubis, I., Dalimunthe, Y. A., & Lubis, H. (2022). Sistem Pendukung Keputusan Pemberian Bantuan pada Siswa Kurang Mampu dengan Metode Multifactor Evaluation Process (MFEP). *REMIK: Riset Dan E-Jurnal Manajemen Informatika Komputer*, *6*(4), 909–917.

Nunsina, N., Fadhilah, C., & Kulbahri, K. (2022). Suport System Decision (DSS) Presma Elections Of Uniki Using Simple Additive Weighthing Methode (SAW). *Dharmawangsa: International Journal of the Social Sciences, Education and Humanitis*, *3*(2), 7–17.

Palindung, M. (2022). Aplikasi Pemesanan Servis Kendaraan Pada Bengkel Berbasis Android Menggunakan Metode Haversine Formula. Universitas Fajar.

Pribadi, K. I., Santoso, S. E. B., Dirgantari, N., & Hartikasari, A. I. (2025). Pengaruh Komitmen Organisasi, Transparansi, Pemanfaatan Teknologi Informasi Terhadap Akuntabilitas Pengelolaan Dana Desa Dengan Partisipasi Masyarakat Sebagai Varibel Moderasi. *Jurnal Akuntansi Dan Keuangan*, *13*(1), 39–52.

Ramadhani, W. A., Irawati, N., & Maulana, C. (2022). Penerapan Metode Multifactor Evaluation Process (MFEP) Untuk Menentukan Kelayakan Penerima Bantuan Pinjaman Modal Usaha Kecil Menengah. *Build. Informatics, Technol. Sci*, *4*(1), 50–59.

Safira, L. (2021). Persepsi Masyarakat Terhadap Dana BantuanLangsung Tunai (BLT) dalam Meningkatkan Perekonomian Keluarga menurut Perspektif Ekonomi Islam (Studi pada Masyarakat Kecamatan Glumpang Baro Kabupaten Pidie). UIN Ar-Raniry.

Syintia, I., Fuadi, W., & Yunizar, Z. (2025). Geographic Information System for Mapping Drug Abuse Areas in Lhokseumawe City Using the Average Linkage Method. *Journal of Advanced Computer Knowledge and Algorithms*, *2*(1), 1–6.

Utomo, M. N., Pranoto, Y. A., & Rudhistiar, D. (2024). Sistem Pendukung Keputusan Menentukan Calon Penerima Bantuan Program Indonesia Pintar Menggunakan Metode Topsis Berbasis Website. *JATI (Jurnal Mahasiswa Teknik Informatika)*, *8*(5), 8553–8559.

Widyassari, A. P., Carreon, J. R., & Wahyusari, R. (2024). Systematic Review Of Expert System For Detecting Mental Health Disorders In College Students. *Jurnal Teknik Informatika (Jutif)*, *5*(6), 1737–1746.

Yanto, B. H., & Yunus, Y. (2021). Evaluasi Penentuan Kelayakan Pemberian Subsidi Listrik dengan Metode MFEP. *Jurnal Informatika Ekonomi Bisnis*, 109–114.