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Analysis of Decision Support System to Determine Toddlers Eligible for Additional Food at Posyandu in Perkebunan Tanah Datar Village Using Profile Matching Method

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Abstract

The determination of toddlers eligible for the Supplementary Feeding Program (PMT) at the Integrated Health Post in Perkebunan Tanah Datar Village is still conducted manually, which can lead to subjectivity and inaccurate targeting of assistance. This study aims to develop a Decision Support System using the Profile Matching method to determine priority PMT recipients in a more objective and systematic manner. The assessment compares the actual condition of toddlers with an ideal profile by calculating GAP values across several criteria, including stunting status, nutritional status, parents' income, and mother's education level. These criteria are processed using Core Factor (60%) and Secondary Factor (40%) weighting to generate priority rankings. The system evaluation was conducted using seven toddler data samples, producing ranking results in which toddler B6 obtained the highest priority score of 4.5. The results indicate that the proposed method is able to generate consistent eligibility rankings and support a more transparent and measurable decision-making process compared to manual selection. By automating the calculation of GAP values and weighting factors, the system reduces subjectivity and improves the efficiency and accuracy of PMT recipient determination. However, this study is limited by the relatively small dataset and its implementation in a single Posyandu location. Future research may involve larger datasets and additional evaluation criteria to improve the robustness and applicability of the model in broader community health service settings.

Keywords:
Decision Support System; Profile Matching; Supplementary Feeding; Toddler; Integrated Health Post.

1. INTRODUCTION

Rapid advances in information technology have transformed the way healthcare services are managed, including services delivered at the community level, including those delivered at the community level. The utilization of information systems enables health data to be processed systematically, allowing decision-making processes to be conducted more quickly, accurately, and measurably (Organization 2022). (Kementerian Kesehatan Republik Indonesia 2023) In the field of child health, accurate decision-making is particularly critical because it is closely related to efforts to prevent nutritional problems and improve the quality of toddler growth and development. The availability of reliable information systems can support healthcare providers in making evidence-based decisions, thereby improving the effectiveness of community health programs.

One form of nutritional intervention implemented at the community level is the Supplementary Feeding Program (PMT), which targets toddlers requiring additional nutritional support. This program is implemented through Posyandu as the frontline of community healthcare services responsible for monitoring child growth and providing nutritional education to families. Previous studies indicate that nutrition intervention programs

such as supplementary feeding play an important role in improving children's nutritional status and reducing the risk of stunting when implemented consistently and supported by effective monitoring systems (Cahyaningsari, Saadah, and Usnawati 2025). However, determining which toddlers should be prioritized as PMT beneficiaries is not a simple process, as it requires the simultaneous consideration of multiple child health indicators and family-related factors. When assessments are conducted manually based on subjective judgment, the resulting decisions may lack consistency and are difficult to measure in terms of accuracy.

This condition also occurs in the implementation of the PMT program in Desa Perkebunan Tanah Datar. The determination of program eligibility still relies on manual considerations without a structured assessment system capable of integrating various indicators objectively. As a result, the decision-making process may become inefficient and potentially lead to inaccurate targeting of PMT beneficiaries. This situation highlights the need for a systematic approach that can assist health cadres in processing assessment indicators into decision recommendations that are more transparent, measurable, and analytically accountable. Previous research also emphasizes that the use of digital decision support systems can help healthcare workers process health data and determine appropriate interventions for toddlers at risk of nutritional problems (Akbar, Taufik Hidayat 2024)

One solution that can be implemented is the development of a Decision Support System (DSS) using the Profile Matching method. According to (O'Brien and Marakas 2022), a decision support system functions to transform raw data into strategic information to support objective and efficient decision-making. Several previous studies have shown that multi-criteria decision-making methods can support selection processes based on structured criteria. For example, (Sasono Wibowo 2023) applied the Profile Matching method in evaluating child growth and development and demonstrated that the method is capable of assessing the conformity of individual conditions to developmental standards in a more measurable way.(Harahap, Siregar, and Wulan 2024) developed a Profile Matching-based decision support system for contraceptive selection and found that the profile matching approach produced more consistent recommendations by considering the suitability of user conditions with ideal criteria. Furthermore, (Mahendra et al. 2023) showed that the application of Profile Matching in selection processes reduced subjectivity and resulted in more stable decisions. In addition, decision support systems have also been widely applied in the health sector to assist in determining nutritional status and identifying toddlers at risk of stunting through structured data analysis (Arifviando and Irawan 2025).

However, although previous studies have demonstrated the effectiveness of decision support systems and multi-criteria methods in various contexts, most of these studies focus on general selection problems or nutritional status classification and have not specifically addressed the determination of eligibility for community-based nutritional intervention programs such as the Supplementary Feeding Program (PMT). In addition, earlier research generally emphasizes ranking alternatives based on weighted criteria without thoroughly analyzing the conformity between the actual conditions of toddlers and the ideal profile required for PMT beneficiaries. This condition indicates a research gap in the application of decision support systems that integrate health and socio-economic indicators to determine PMT eligibility in community healthcare services.

Based on this research gap, this study offers novelty through the integration of the Profile Matching method with operationally defined PMT eligibility indicators in the context of community healthcare services. Unlike previous studies that mainly focus on value ranking or criteria weighting, the proposed approach evaluates the conformity between the actual profile of toddlers and an ideal profile as the basis for decision recommendations. This approach produces a selection mechanism that is more transparent, measurable, and analytically traceable.

Therefore, this study proposes the development of a web-based Decision Support System using the Profile Matching method to determine the eligibility of toddlers as PMT recipients. The method compares actual conditions with an ideal profile based on operationally defined indicators to generate a quantitative level of conformity as the basis for decision recommendations. This study aims to design a system capable of supporting the determination of PMT recipients in a more objective, efficient, and consistent manner within the context of community healthcare services.

2. RESEARCH METHOD

The research workflow employed in the development of the Decision Support System for determining eligible toddlers for the Supplementary Feeding Program (PMT) was systematically structured, beginning with problem identification and concluding with system testing. Each stage was carefully designed to ensure that the decision-making process is objective, measurable, and accountable. The stages of the research methodology are presented in Figure 1.

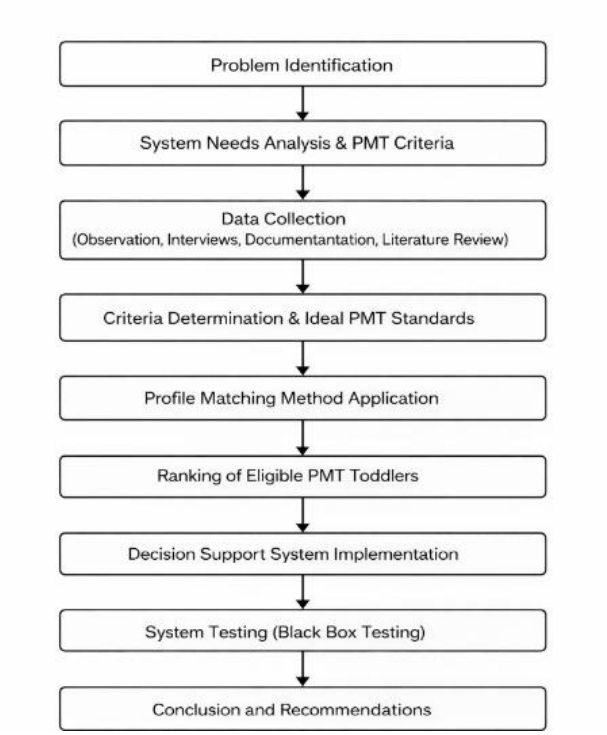

Figure 1. Research Framework

2.1. Data Collection Method

Data collection in this study was conducted through a series of complementary stages to obtain a comprehensive understanding of the process for determining eligible toddlers for the Supplementary Feeding Program (PMT) at Posyandu Desa Perkebunan Tanah Datar. The first stage involved direct observation at the research site. The researcher observed the implementation flow of Posyandu activities, including the weighing and recording of toddlers, as well as the procedures used by health workers and community health cadres to determine priority and assessment criteria for PMT recipients. Subsequently, interviews were conducted with the village midwife and Posyandu cadres to obtain more detailed information regarding the criteria applied, the considerations taken into account during the selection process, and the challenges encountered, particularly when the number of eligible toddlers exceeded the available assistance capacity. To strengthen the field findings, relevant documentation was also collected and analyzed. In addition, a literature review was conducted through credible online sources to establish a theoretical foundation concerning decision support systems, the Profile Matching method, fundamental concepts of nutrition, and the implementation of the PMT program. The interview results were analyzed using a qualitative descriptive approach. Information obtained from the village midwife and Posyandu cadres was used to identify key indicators considered in determining the eligibility of toddlers for the Supplementary Feeding Program (PMT). These indicators were then translated into measurable assessment criteria in the Profile Matching method. The interview results also served as the basis for determining the ideal values of each criterion and for classifying the criteria into Core Factors and Secondary Factors.

2.2. Problem Identification

The determination of PMT recipients at Posyandu Desa Perkebunan Tanah Datar is still conducted manually and relies heavily on subjective judgment by Posyandu cadres. This condition results in an inefficient process, limited accuracy, and a potential risk of misallocation. Based on the case observed in this study, the number of registered toddlers frequently exceeds the available quota, which may lead to inconsistencies and perceived unfairness in the selection process. This issue constitutes the primary focus of the present research. Therefore, a more structured and objective system is required to support a transparent, consistent, and efficient decision-making process in determining eligible PMT recipients.

2.3. Profile Matching Method

This study employs the Profile Matching method, a decision-making technique commonly used to compare the actual condition of an object with a predetermined standard or ideal profile. The core principle of this method is to measure the degree of conformity between actual values and ideal values. The smaller the difference between the two, the higher the level of suitability of the object with respect to the expected criteria (Fajar, and Pujiyanta 2025). In practice, the Profile Matching method operates by calculating the difference (gap) between the actual score and the target score for each criterion. These gap values are then converted into weighted scores based on a predefined conversion scale (Maharani and Anggraeni 2024). The

weighted scores are subsequently processed to determine the overall suitability of each alternative. In this study, the ideal profile for each criterion was determined based on interviews with the village midwife and Posyandu cadres, who are authorized healthcare professionals responsible for assessing toddlers' nutritional status. Therefore, the evaluation standards applied in this research were not subjectively defined by the researcher but were established based on professional judgment from qualified health personnel.

The evaluation process using the Profile Matching method generally consists of several stages, as follows:

a. Determination of Assessment Criteria and Their Weights
   The assessment criteria were established based on the indicators applied in Posyandu services. These criteria were categorized into two groups:
   1) Core Factors (CF). Core Factors represent the primary criteria that directly determine the priority of PMT allocation. These include Stunting status, and Nutritional status of the toddler.
   2) Secondary Factors (SF). Secondary Factors represent supporting criteria that influence the level of priority. These include Parents' income, and Mother's educational level.
b. The gap value represents the difference between the actual score of each toddler and the predetermined ideal score (Hakim, Geasela, and Hansen 2024). The gap calculation is performed using Equation:

$$\text{GAP} = \text{Alternative Value} - \text{Ideal value}$$

   The resulting gap values were subsequently converted into numerical weights to represent the level of priority for PMT allocation. The weight mapping scheme was determined through consultation with healthcare professionals to ensure that it accurately reflects the operational priority of nutritional intervention in community health services. In this study, the actual values were obtained from Posyandu records and toddler health assessments conducted by healthcare personnel. The assessment used a scoring scale ranging from 1 to 4, where a score of 4 represents the highest priority level according to the PMT eligibility criteria. Meanwhile, the ideal value was set at 4 for each criterion as the benchmark for evaluating the conformity between the toddler's actual condition and the expected standard for PMT recipients.
c. GAP mapping constitutes a fundamental procedure in the Profile Matching method, aiming to determine the difference between the actual profile values and the expected (ideal) profile values (Pranoto et al. 2023). This process enables the measurement of the degree of conformity between real conditions and predefined standards as the basis for subsequent evaluation.

Table 1. GAP Value Weighting

No	Difference (GAP)	Weight Value
1	0	5
2	1	4,5
3	-1	4
4	2	3,5
5	-2	3
6	3	2,5
7	-3	2
8	4	1,5
9	-4	1

The GAP weighting scheme was developed through the integration of relevant literature on the Profile Matching method and professional considerations from healthcare practitioners based on Posyandu service practices.

To provide a clearer understanding of the Profile Matching calculation procedure, an example of GAP computation for one toddler is presented in Tables 2 and 3. This example illustrates how the difference between the actual value and the ideal value is converted into weighted scores that will later be used in the calculation of Core Factors and Secondary Factors.

Table 2. Example Data

Criteria	Ideal Value	Toddler Value
Stunting Status	4	3
Nutritional Status	4	3
Parents Income	4	2
Mother Education	4	2

The GAP calculation results based on the example data are presented in Table 3.

Table 3. GAP Calculation

Criteria	Calculation	GAP	Weight
Stunting Status	3 − 4	-1	4
Nutritional Status	3 − 4	-1	4
Parents Income	2 − 4	-2	3
Mother Education	2 − 4	-2	3

d. The average Core Factor (CF) score was calculated using Equation

$$NCF = \frac{\sum NC}{\sum IC}$$

Where:
NCF = Average Core Factor score
NC = Total GAP weight score of the Core Factor criteria
IC = Number of items within the Core Factor
The average Secondary Factor (SF) score was calculated using Equation

$$NSF = \frac{\sum NS}{\sum IS}$$

Where:
NSF = Average Secondary Factor score
NS = Total weighted GAP value of the Secondary Factor criteria
IS = Number of items within the Secondary Factor category

e. Total Score Calculation and Ranking
The total score of each alternative was calculated by combining the weighted Core Factor and Secondary Factor values as formulated in Equation.

$$NT = (x\% \times NCF) + (y\% \times NSF)$$

Where:
NT = Total score
NCF = Average Core Factor score
NSF = Average Secondary Factor score
x% = Weight of the Core Factor (60%)
y% = Weight of the Secondary Factor (40%)

The determination of assessment criteria and their classification into Core Factors and Secondary Factors was based on the results of interviews with the village midwife and Posyandu cadres, as well as supported by relevant literature on child nutrition assessment. Indicators that directly reflect the nutritional condition of toddlers were categorized as Core Factors because they represent the main determinants of PMT eligibility. Meanwhile, socio-economic indicators that indirectly influence the risk of nutritional problems were categorized as Secondary Factors.

3. RESULTS AND DISCUSSION

3.1. Analysis Results

3.1.1. Data analysis

Data analysis represents the initial stage in the implementation of a Decision Support System (DSS) (Millah et al. 2023). In this study, the Profile Matching method was applied using data obtained from observations and interviews. The alternative data and assessment criteria used as inputs for the decision support system calculation are presented table 4.

Table 4. Alternative Data and Criteria Assessment

No	Toddler	Criteria			
		Status Stunting	Status Gizi	Parents' Income	Mother's Education
1	B_1	Risk of Stunting	Good Nutrition	3.000.000	SMA
2	B_2	Risk of Stunting	Malnutrition	3.700.000	SMA
3	B_3	Normal	Malnutrition	2.000.000	SMP
4	B_4	Risk of Stunting	Malnutrition	2.000.000	SMA
5	B_5	Severe Stunting	Malnutrition	2.000.000	SMP
6	B_6	Normal	Good Nutrition	2.600.000	SMA
7	B_7	Risk of Stunting	Malnutrition	1.700.000	SD

3.1.2. Identification of Criteria and Sub-Criteria

The criteria used in the assessment consisted of stunting status and nutritional status, which were classified as Core Factors, as well as parents' income and mother's educational level, which were categorized as Secondary Factors. The weighting composition of 60% for Core Factors and 40% for Secondary Factors was determined based on priority considerations in accordance with internal Posyandu policy.

Table 5. Core Factor and Secondary Factor Criteria

No	Criteria	Factor	Bobot
C_1	Status Stunting	Core Factor	60%
C_2	Status Gizi	Core Factor	
C_3	Parents' Income	Secondary Factor	40%
C_4	Mother's Education	Secondary Factor	

The sub-criteria weighting scheme applied in this study was established based on empirical findings derived from direct field observations.

Table 6. Mapping of Sub-criteria Weight Values

C_1 Status Stunting		
Id	Status Stunting	Bobot
1	Stunting Berat	1
2	Stunting Sedang	2
3	Risiko Stunting	3
4	Normal	4
C_2 Status Gizi		
Id	Status Gizi	Bobot
1	Gizi Buruk	1
2	Gizi Kurang	2
3	Gizi Baik	3
4	Gizi Lebih	4
C_3 Parents' Income		
Id	Parents' Income	Bobot
1	< Rp 1.000.000	1
2	Rp 1.000.000 - 2.000.000	2
3	Rp 2.000.000 – 3.000.000	3
4	> Rp 3.000.000	4
C_4 Mother's Education		
Id	Mother's Education	Bobot
1	Tidak Sekolah	1
2	SD	2
3	SMP	3
4	SMA	4

3.1.3. Calculation Analysis

3.1.3.1. Determination of Alternative Weight Scores

Each alternative was assigned a numerical weight based on the predefined sub-criteria under each evaluation criterion. These weight scores served as the basis for subsequent GAP calculation.

Table 7. Alternative Weight Values

No	Toddler	Kriteria			
		Status Stunting	Status Gizi	Parents' Income	Mother's Education
1	B_1	3	3	3	4
2	B_2	3	2	4	4
3	B_3	4	2	3	3
4	B_4	3	2	3	4
5	B_5	1	2	3	3
6	B_6	4	3	3	4
7	B_7	3	2	2	2

3.1.3.2. Calculating the Difference

The GAP calculation was performed to measure the degree of deviation between the actual alternative score and the predefined target score, thereby quantifying the level of conformity with the ideal standard.

Table 8. Difference Calculation

Alternatif	Toddler	C_1	C_2	C_3	C_4
A_1	B_1	3	3	3	4
A_2	B_2	3	2	4	4
A_3	B_3	4	2	3	3
A_4	B_4	3	2	3	4
A_5	B_5	1	2	3	3
A_6	B_6	4	3	3	4
A_7	B_7	3	2	2	2
Target Value that has been set		4	4	4	4
A_1	B_1	-1	-1	-1	0
A_2	B_2	-1	-2	0	0
A_3	B_3	0	-2	-1	-1
A_4	B_4	-1	-2	-1	0
A_5	B_5	-3	-2	-1	-1
A_6	B_6	0	-1	-1	0
A_7	B_7	-1	-2	-2	-2

3.1.3.3. Determination of GAP Weights

After the GAP values for each prospective PMT recipient were obtained, each alternative was assigned a weighted score based on the corresponding GAP value, as presented in Table 1. Each criterion had previously been categorized into either the Core Factor or the Secondary Factor group, with predetermined weighting proportions applied to each factor.

Table 9. GAP Value

Alternatif	Toddler	CF (60%)		SF (40%)	
		C_1	C_2	C_3	C_4
A_1	B_1	4	4	4	5
A_2	B_2	4	3	5	5
A_3	B_3	5	3	4	4
A_4	B_4	4	3	4	5
A_5	B_5	2	3	4	4
A_6	B_6	5	4	4	5
A_7	B_7	4	3	3	3

3.1.3.4. Total Score

The total score represents the final value used as the basis for ranking toddlers eligible for PMT assistance. This score was obtained by combining the Core Factor and Secondary Factor values according to the predetermined weighting proportions.

Table 10. Calculation Results

Alternatif	Toddler	CF	SF	Hasil
A_1	B_1	4	4,5	4,2
A_2	B_2	3,5	5	4,1
A_3	B_3	4	4	4
A_4	B_4	3,5	4,5	3,9
A_5	B_5	2,5	4	3,1
A_6	B_6	4,5	4,5	4,5
A_7	B_7	3,5	3	3,3

Based on the calculation results presented in Table 9, toddler B6 obtained the highest total score of 4.5, indicating the highest level of priority for receiving the Supplementary Feeding Program (PMT). This result suggests that the toddler's condition is closest to the ideal profile defined by the evaluation criteria. Meanwhile, toddler B5 obtained the lowest score of 3.1, indicating a lower level of priority compared to the other alternatives. The ranking results demonstrate how the Profile Matching method systematically evaluates each criterion and produces a measurable priority order. By applying this approach, the decision-making process becomes more objective because each toddler is evaluated based on quantifiable indicators rather than solely relying on subjective judgment.

3.2. System Design

According to (Arianti et al. 2022), Unified Modeling Language (UML) is utilized as a system design tool to model the workflow of the developed Decision Support System. The application of UML aims to provide a clear structural and functional representation of the system. In this study, a Use Case Diagram was employed to illustrate how actors interact with the system.

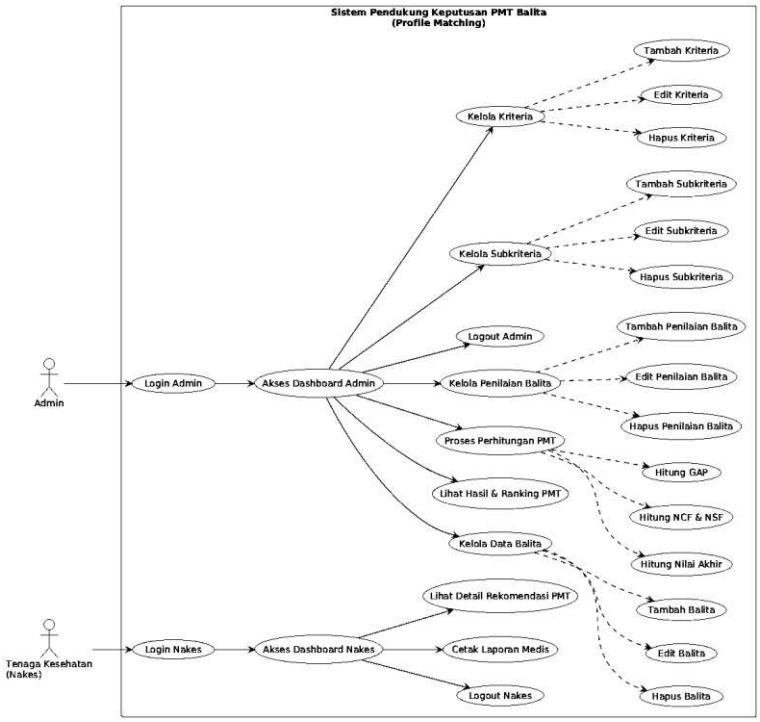

Figure 2. Use Case Diagram

3.3. System Implementation

The system implementation was carried out using Visual Studio Code as the development environment, with PHP as the programming language.

3.3.1. Login Page Implementation

The login page serves as the initial interface through which users access the system. It functions to authenticate user credentials before granting access to the main features of the application.

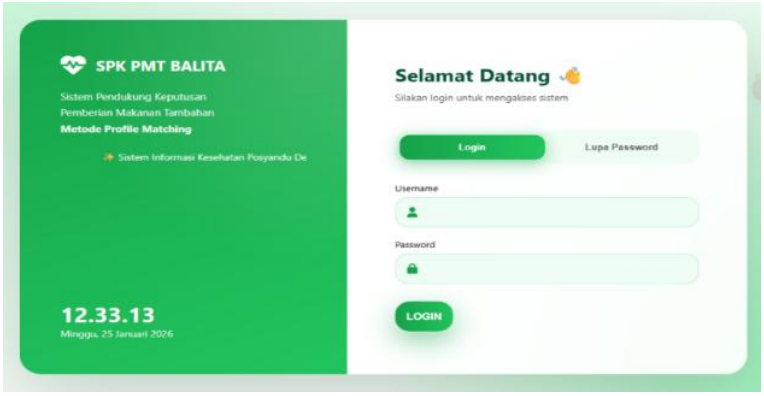

Figure 3. Login Page

3.3.2. Dashboard Page Implementation

The dashboard page presents general information about the Posyandu, including its vision and mission, organizational profile, and relevant information regarding the Supplementary Feeding Program (PMT). This interface provides users with an overview of institutional context before proceeding to data processing and decision analysis features.

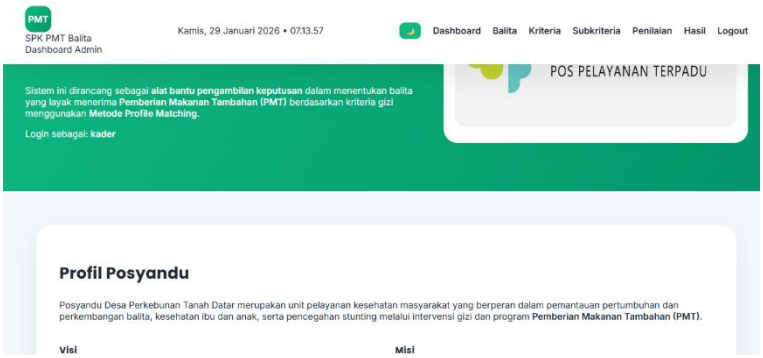

Figure 4. Dashboard page

3.3.3. Results Page Implementation

The results page displays the output of the assessment data processing, presenting the ranked list of alternatives recommended as the basis for decision-making. This interface provides a clear representation of the final evaluation scores and priority order generated by the system.

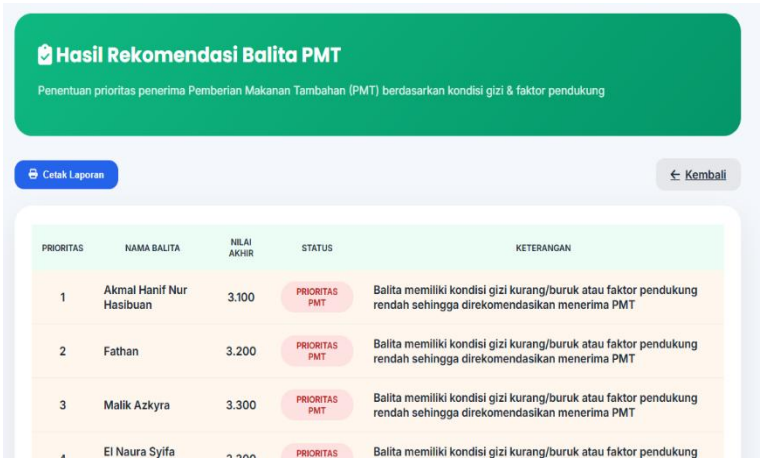

Figure 5. Results Page

3.4. Comparison with Manual Selection

Prior to the implementation of the decision support system, the determination of PMT recipients at Posyandu Desa Perkebunan Tanah Datar was conducted manually by Posyandu cadres based on observational judgment and general consideration of toddlers' conditions. Although this approach allowed

health workers to use their practical experience, it often resulted in inconsistencies and difficulties when the number of eligible toddlers exceeded the available assistance quota.

By implementing the Profile Matching-based decision support system, the evaluation process becomes more structured and transparent. Each toddler is assessed using the same criteria and scoring mechanism, which reduces the potential for subjective bias. In addition, the system is capable of automatically generating ranking results based on calculated scores, enabling health workers to identify toddlers who should be prioritized for PMT assistance more efficiently. Therefore, the system provides a more systematic and accountable decision-making process compared to the previous manual method.

3.5. Implementation Challenges

Despite the advantages offered by the developed decision support system, several challenges may arise during its implementation. One of the main challenges is the need for user training, particularly for Posyandu cadres who may have limited experience with digital systems. Adequate training and guidance are necessary to ensure that users can operate the system effectively and accurately input assessment data.

Another potential challenge is system accessibility, especially in areas with limited technological infrastructure or unstable internet connectivity. In such situations, the availability of appropriate hardware and stable network access becomes an important factor in ensuring the successful utilization of the system in routine Posyandu activities.

This study has several limitations that should be acknowledged. First, the number of toddler samples used in this study was relatively small, consisting of only seven alternatives. A larger dataset may provide more comprehensive evaluation results and improve the reliability of the decision-making model.

The criteria used in this study were limited to four indicators, namely stunting status, nutritional status, parents' income, and mother's educational level. Future research may consider incorporating additional indicators, such as health history or household environmental conditions, to provide a more comprehensive assessment of toddlers' eligibility for the Supplementary Feeding Program.

3.6. System Testing (Black Box Testing)

Software testing was conducted to ensure that the developed system functions in accordance with user requirements and is capable of producing accurate and reliable outputs (Apriliandra and Nuryasin 2024). The testing method applied in this study was Black Box Testing, a software testing approach that focuses on evaluating system functionality without examining the internal code structure.

Based on the testing results, all system functions operated as intended. Therefore, the system was deemed functionally valid and suitable for use as a decision-support tool in Posyandu health services.

Table 11. System Testing

No.	Test Scenario	Expected Result	Testing Result	Conclusion
1	The administrator enters a username and password on the login page	The system verifies the credentials and displays the dashboard page	The system successfully displayed the administrator dashboard	Functioned properly
2	The administrator adds toddler data	The toddler data are stored in the system database	The toddler data were successfully saved and displayed	Functioned properly
3	The system performs the Profile Matching calculation	The system generates GAP values and ranking results for PMT recipients	The system successfully displayed the ranking results	Functioned properly
4	The administrator views the PMT recipient recommendation results	The system displays the priority order of PMT recipients	The ranking data were successfully displayed	Functioned properly

Based on the Black Box Testing results presented in Table 10, all system functions operated as expected. Each tested feature successfully produced the intended output without encountering functional errors. The login module properly authenticated users, the data input module successfully stored toddler assessment data, and the Profile Matching calculation module correctly generated GAP values and ranking results.

These results indicate that the developed decision support system is capable of supporting the process of determining eligible toddlers for the Supplementary Feeding Program (PMT). The system can process input data, perform automatic calculations using the Profile Matching method, and generate ranking results accurately and efficiently. Therefore, the system is considered functionally reliable and ready to be utilized as a decision support tool in Posyandu services.

4. CONCLUSION

This study demonstrates that the implementation of the Profile Matching method effectively supports the determination of toddlers eligible for PMT in a more objective and measurable manner compared to manual assessment practices at Posyandu Desa Perkebunan Tanah Datar. The profile conformity–based approach, which evaluates alignment between actual conditions and predefined ideal standards, enhances transparency and consistency in the selection process. Furthermore, the developed system operated in accordance with user requirements and can be utilized as a decision-support tool within community-level healthcare services.

However, this study is limited by the relatively small dataset and its focus on a single Posyandu location, which restricts the generalizability of the findings. Future research is recommended to apply the system to larger datasets or to conduct comparative analysis with alternative multi-criteria decision-making methods in order to evaluate model stability and robustness.

Practically, this research contributes a structured decision support model that assists Posyandu cadres in determining PMT recipient priorities more accurately and systematically. The proposed system also has the potential to be implemented in other Posyandu or community health service centers that face similar challenges in determining PMT recipients. By adopting a structured and data-driven evaluation approach, the system can improve the efficiency, transparency, and accountability of nutritional assistance programs. In a broader context, the implementation of such decision support systems may support community-based health services in delivering more targeted nutritional interventions to reduce the risk of stunting and malnutrition among toddlers.

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