ISSN: 3066-9812
Research Article

Journal of Clinical Epidemiology and Public Health

Application of Smart Method in Decision Support System to Prioritize Nutrition Intervention in Posyandu

Yuyun Yunengsih*, Adhita Arif Setyawan, & Falaah Abdussalaam

Politeknik Piksi Ganesha Bandung, Indonesia

***Corresponding author:** Yuyun Yunengsih, Politeknik Piksi Ganesha Bandung, Indonesia.

Submitted: 02 December 2024 **Accepted:** 10 December 2024 **Published:** 16 December 2024

https://doi.org/10.63620/MKJCEPH.2024.1024

Citation: *Yunengsih, Y., Setyawan, A. A., & Abdussalaam, F. (2024). Application of SMART method in decision support systems to prioritize nutrition intervention in Posyandu. J of Clini Epi & Public Health, 2(4), 01-06.*

Abstract

Improving child nutrition is one of the main focuses of posyandu services to prevent long-term health problems such as stunting, malnutrition, and other negative impacts on child development. These nutritional problems, if not addressed immediately, can result in cognitive impairment and reduced quality of life in the future. However, posyandu often faces limited resources in terms of manpower, funding and facilities. Therefore, prioritizing appropriate and effective nutrition interventions is important to ensure optimal utilization of available resources. This study aims to apply the SMART (Simple Multi-Attribute Rating Technique) method in a Decision Support System (SPK) to assist posyandu in prioritizing the most urgent and impactful interventions. In this study, five main criteria were used to evaluate intervention alternatives, namely the severity of malnutrition, the number of children in need of intervention, the availability of posyandu resources, family and community support, and the long-term risk if intervention is not carried out immediately. Based on these criteria, five alternative nutrition interventions were evaluated, including supplementary feeding (PMT), nutrition education programs for parents, regular nutrition monitoring and surveillance, posyandu cadre training, and collaboration with nearby health services. The analysis showed that PMT was the top priority with the highest score, followed by collaboration with nearby health services and regular nutritional monitoring. The application of the SMART method in SPK provides a systematic and data-driven approach, enabling more objective and customized decision-making. Thus, it is expected that the resulting decisions can significantly support the effectiveness of posyandu nutrition programs, thereby improving the health and well-being of children in the community.

Keywords: Decision Support System, Smart, Posyandu, Nutrition Intervention, Prioritization

Introduction

Child under-five nutrition remains a serious challenge in many developing countries, including Indonesia. This condition has a direct impact on children's quality of life and results in impaired growth, cognitive development, and increased risk of chronic diseases in the future. One of the government's efforts to address this problem is to develop Integrated Service Post (Posyandu) as a basic health service center at the community level. Through posyandu, various nutritional interventions are provided, especially for children under five and pregnant women, to prevent malnutrition and stunting that can have long-term consequences for the nation's next generation.

However, the implementation of nutrition programs in posyandu is often faced with various obstacles, including limited resources, such as health workers, funds, and facilities. This requires an effective strategy to prioritize nutrition interventions that suit the conditions and needs of the local community. The right decision in prioritizing interventions is expected to optimize the results achieved with the available resources. In this context, the application of a Decision Support System (SPK) based on the SMART (Simple Multi-Attribute Rating Technique) method is relevant. The SMART method provides a systematic framework in evaluating and weighting various criteria, resulting in more objective and targeted decisions.

This study aims to apply the SMART method in SPK to prioritize nutrition interventions in posyandu. Five main criteria were defined: severity of malnutrition, number of children in need of intervention, availability of posyandu resources, family and community support, and level of long-term risk. Based on these criteria, five alternative interventions were considered, namely supplementary feeding, nutrition education programs for parents, regular nutrition monitoring and surveillance, training of posyandu cadres, and collaboration with nearby health services.

It is hoped that this study can provide new insights for posyandu managers in maximizing the use of resources and strengthening the positive impact of nutrition interventions for children in the community. In addition, the application of the SMART method in this SPK can be a relevant model to be applied to various other basic health service programs in the context of limited resources.

Methodology

This research uses a quantitative approach with the SMART (Simple Multi-Attribute Rating Technique) method in a Decision Support System (SPK) to determine the priority of nutrition interventions in posyandu. The SMART method was chosen for its ability to evaluate several alternatives based on a number of criteria in a systematic and objective way.

Identification of Criteria and Subcriteria

The first step in this study was to identify relevant criteria for prioritizing nutrition interventions at the posyandu. The criteria used in this study consist of five main elements, namely:

- **Malnutrition Severity:** Measures the prevalence of malnutrition in the posyandu area.
- **Number of Children in Need of Intervention:** Assesses the number of children under five who need nutrition interventions.
- **Availability of Posyandu Resources:** Assesses the availability of resources at the posyandu, including health workers, facilities, and funds.
- **Family and Community Support:** Measures the level of community and family participation and support for nutrition intervention programs at the posyandu.
- **Long-term Risk Level:** Identifies the potential long-term impact that could occur if there is no immediate intervention.

Each criterion is then broken down into more specific sub-criteria, which will be used for further assessment.

- Determination of Intervention Alternatives

This study considered five alternative nutrition interventions that can be carried out in posyandu, namely:

- Supplementary Feeding Program (PMT)
- Nutrition Education Program for Parents
- Periodic Nutrition Monitoring and Surveillance
- Training of Posyandu cadres on nutrition management
- Collaboration with nearby health services

Alternative Assessment Based on Criteria

After the criteria and intervention alternatives are determined, the next step is to provide an assessment of each alternative based on the predetermined criteria. The assessment is carried out by providing a score for each alternative on each criterion, using a rating scale from 1 to 5, where:

- 1 means very irrelevant or bad,
- 5 means very relevant or very good.

This score is calculated based on data obtained from the relevant posyandu, surveys, and interviews with health workers and the community.

Criteria Weighting

Each criterion was weighted based on its importance to the success of the nutrition intervention. The weights were determined using literature analysis and consultation with nutritionists and health workers. The weights for each criterion are as follows:

- Severity of Malnutrition: 30%
- Number of Children in Need of Intervention: 25%
- Availability of Posyandu Resources: 20%
- Family and Community Support: 15%
- Long-term Risk Level: 10%

The total weight given must add up to 100%.

Alternative Total Value Calculation

After the scores and weights are determined, the total value for each alternative is calculated by multiplying the score obtained on each criterion by the specified weight. Then, the multiplication results for each criterion are summed to produce the final value of each alternative. The calculation is done by the formula:

$$Alternative\ Value = \sum (Score\ on\ Criteria \times Criteria\ Weight)$$

The alternative with the highest total value is considered a priority intervention that must be implemented.

Result Analysis

The results of the calculation will be analyzed to determine the intervention alternatives with the highest scores, which will be prioritized in the posyandu program. This analysis will provide an overview of the most effective and efficient interventions based on real conditions in the field.

Validation and Verification

The validation process is conducted to ensure that the data used in the calculations are accurate and representative. Verification is carried out by involving health workers, posyandu cadres, as well as local communities to ensure that the results obtained match the real conditions in the field.

Results

The application of the SMART (Simple Multi-Attribute Rating Technique) method in a Decision Support System (SPK) to prioritize nutrition interventions in posyandu has provided significant results in assisting more objective and structured decision making. Based on the results of the calculations carried out, the five alternative nutrition interventions that have been evaluated, namely Providing Supplementary Food (PMT), Nutrition Education Program for Parents, Periodic Nutrition Monitoring and Monitoring, Training Posyandu Cadres on Nutrition Management, and Collaboration with Nearby Health Services, show clear differences in terms of implementation priorities based on predetermined criteria.

The following is the set score according to the specified alternative

Score	Description
1	Very unsuitable.This alternative has a very minimal contribution to the rated criteria, or is not relevant at all.
2	Unsuited.T his alternative makes a low contribution to the criteria, but still has little impact or relevance.
3	A pretty reasonable. This alternative criteria is to have an impact, be applied, but not chosen the optimal.
4	Good.This alternative is relevant and contribute significantly to the criteria.Worthy of the implementation of the measurable.
5	Very good. This alternative is very relevant, meets the optimal requirement of criteria, and have maximum potential results according to purpose.

Discussion

Alternative Assessment Based on Score

Criterion	Weight	PMT	Nutrition Education	Monitoring	Cadre Training
Severity of Malnutrition	0,30	4	3	5	3
Number of Children in Need	0,25	5	3	4	4
Resource Availability	0,20	3	4	2	4
Family and Community Support	0,15	4	5	3	4
Long-Term Risk Level	0,10	5	3	4	4

Calculation of Total Value for Each Alternative

Each alternative is calculated by multiplying the score by the weight of the criteria and adding them up.

1. Supplementary Feeding (PMT)

PMT Value = (0,30 x 4) + (0,25 x 5) + (0,20 x 3) + (0,15 x 4) + (0,10 x 5)
= 1,2 + 1,25 + 0,6 + 0,6 + 0,5 = 4,15

2. Nutrition Education Program for Parents

Nutrition Education Value = (0,30 x 3) + (0,25 x 3) + (0,20 x 4) + (0,15 x 5) + (0,10 x 3)
= 0.9 + 0.75 + 0.8 + 0.75 + 0.3 = 3.5

3. Monitoring and Monitoring of Periodic Nutrition

Nutrition Education Value = (0,30 x 5) + (0,25 x 4) + (0,20 x 2) + (0,15 x 3) + (0,10 x 4)
= 1.5 + 1.0 + 0.4 + 0.45 + 0.4 = 3.75

4. Posyandu Cadre Training on Nutrition Management

Nutrition Education Value = (0,30 x 3) + (0,25 x 4) + (0,20 x 4) + (0,15 x 4) + (0,10 x 4)
= 0.9 + 1.0 + 0.8 + 0.6 + 0.4 = 3.7

5. Collaboration with Nearby Healthcare Services

Nutrition Education Value = (0,30 x 4) + (0,25 x 5) + (0,20 x 3) + (0,15 x 4) + (0,10 x 3)
= 1.2 + 1.25 + 0.6 + 0.6 + 0.3 = 3.95

Based on the Calculation Above, the Priority of Intervention for Posyandu is as follows:

1. Supplemental Feeding (PMT) - Score: 4.15
2. Collaboration with Nearby Healthcare Services - Score: 3.95
3. Periodic Nutrition Monitoring and Monitoring - Score: 3.75
4. Posyandu Cadre Training on Nutrition Management - Score: 3.7
5. Nutrition Education Program for Parents - Score: 3.5

So, the first priority intervention that should be carried out is Supplementary Feeding (PMT), followed by Collaboration with the Nearest Health Service.

Figure 1: Dashboard Display

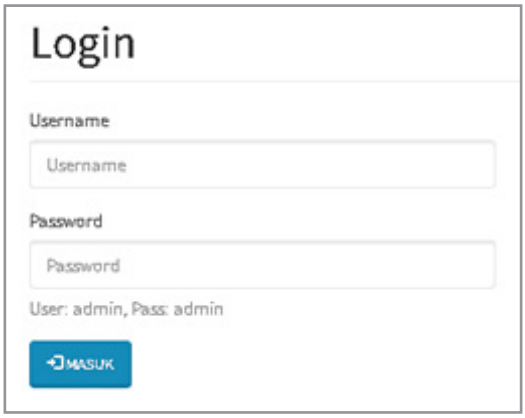


Figure 2: Login Display

Figure 3: Choose an Alternative

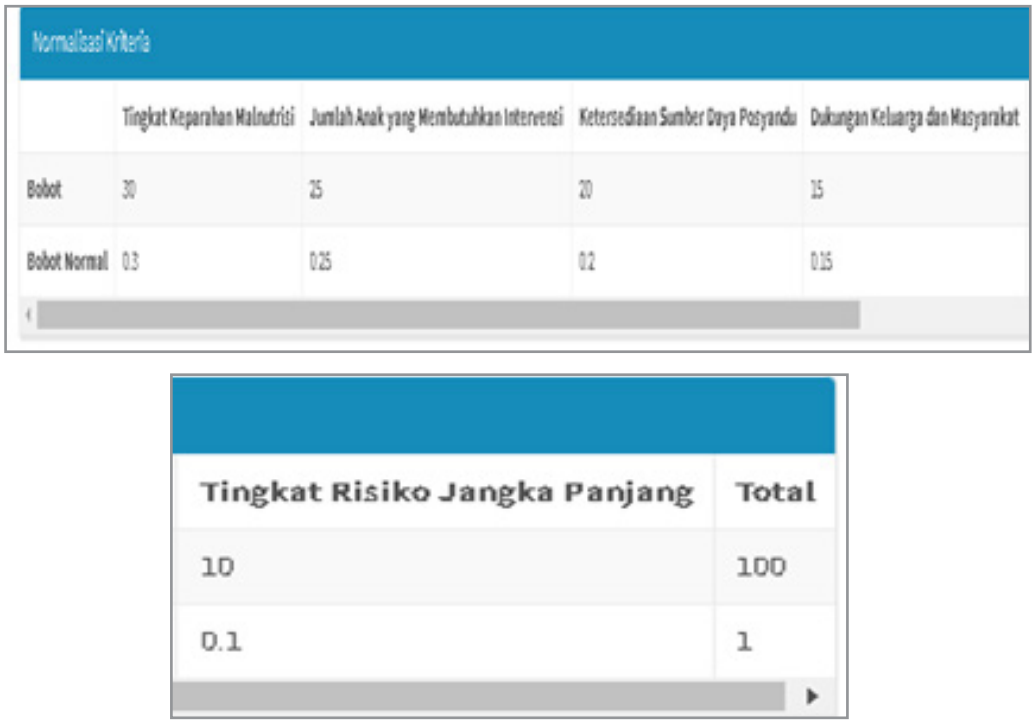
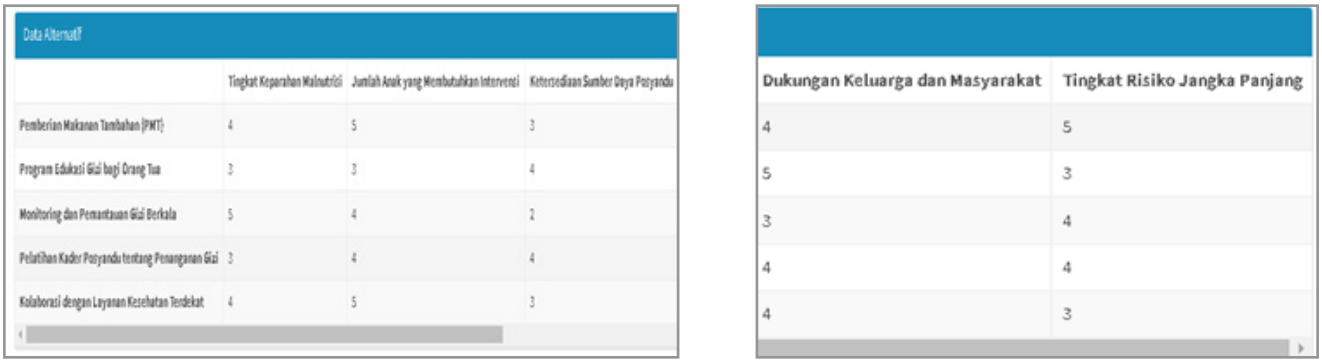


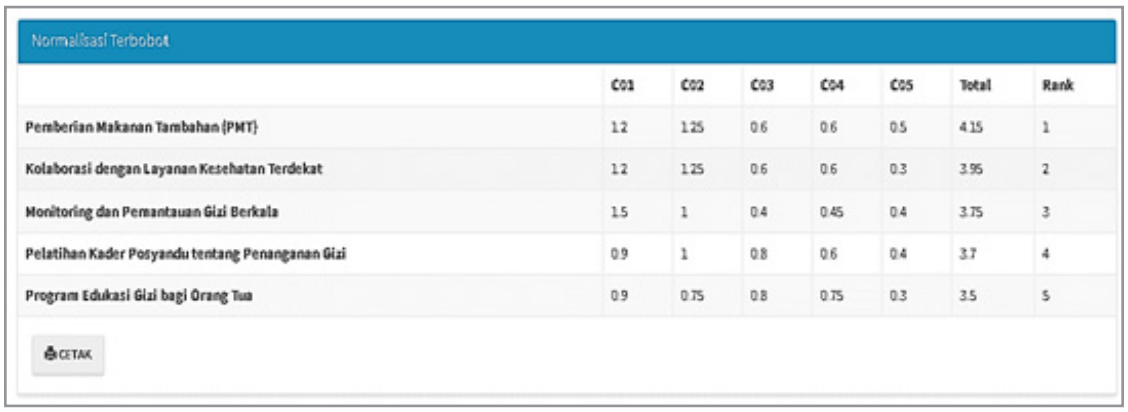
Figure 4: Normalizing Criteria Display



Data Alternatif

	Tingkat Kejadian Malnutrisi	Jumlah Anak yang Membutuhkan Intervensi	Ketersediaan Sumber Daya Posyandu	Dukungan Keluarga dan Masyarakat	Tingkat Risiko Jangka Panjang
Pemberian Makanan Tambahan (PMT)	4	5	3	4	5
Program Edukasi Gizi bagi Orang Tua	3	3	4	5	3
Monitoring dan Pemantauan Gizi Berkala	5	4	2	3	4
Pelatihan Kader Posyandu tentang Penanganan Gizi	3	4	4	4	4
Kolaborasi dengan Layanan Kesehatan Terdekat	4	5	3	4	3

Figure 5: Alternative Data Views



Normalisasi Terbobot

	C01	C02	C03	C04	C05	Total	Rank
Pemberian Makanan Tambahan (PMT)	1.2	1.25	0.6	0.6	0.5	4.15	1
Kolaborasi dengan Layanan Kesehatan Terdekat	1.2	1.25	0.6	0.6	0.3	3.95	2
Monitoring dan Pemantauan Gizi Berkala	1.5	1	0.4	0.45	0.4	3.75	3
Pelatihan Kader Posyandu tentang Penanganan Gizi	0.9	1	0.8	0.6	0.4	3.7	4
Program Edukasi Gizi bagi Orang Tua	0.9	0.75	0.8	0.75	0.3	3.5	5

CETAK

Figure 6: Weighted Normalized Display (Ranking)

Conclusion

The application of the SMART (Simple Multi-Attribute Rating Technique) method in the Decision Support System (SPK) to determine the priority of nutrition interventions in posyandu has succeeded in providing a structured and objective solution in dealing with nutrition problems in the community. Based on the results of the analysis of five alternative nutrition interventions, namely Supplementary Feeding (PMT), Nutrition Education Program for Parents, Periodic Nutrition Monitoring and Monitoring, Posyandu Cadre Training, and Collaboration with the Nearest Health Service, it can be concluded that:

1. Supplemental Feeding (PMT) is the most priority alternative with the highest total score (4.15), as it can directly address malnutrition and malnutrition problems in children under five who need immediate intervention.
2. Collaboration with the Nearest Health Service (value 3.95) is an important second alternative, as it expands the scope of the intervention by involving various health services outside the posyandu, improving coordination and further monitoring.
3. Periodic Nutrition Monitoring and Monitoring (value 3.75) is also very necessary to maintain the continuity of nutrition programs by providing continuous monitoring of the nutritional development of children under five.
4. Posyandu Cadre Training (score 3.7) and Nutrition Education Program for Parents (score 3.5) are relevant alternatives, although they have lower scores, as they can play a role in increasing local capacity and public awareness of the importance of nutrition interventions.

From the results of the implementation of the SMART method, it can be seen that interventions that are direct and oriented to urgent nutritional needs, such as PMT, should be a top priority, while other alternatives, such as posyandu cadre training and nutrition education programs, will strengthen long-term efforts and program sustainability.

Reference

1. Anwar, F., Santoso, I. (2021). Application of SMART Method in Prioritizing Nutrition Interventions in Community Health Centers. Journal of Health Information Systems, 12(2), 145-158.
2. Candra, Dimas Aditya. (2024) Decision Support System For Selecting The Best Online Loan Application Using The Smart Method. AI and SPK: Journal of Artificial Intelligence and Decision Support Systems, 1(4), 229-235.
3. Dedi Irawan, M. (2023). Smart and Borda Decision Support System. CV Widina Media Utama. https://repository.penerbit-widina.com/publications/567089/sistem-pendukung-keputusan-metode-simple-multi-attribute-rating-technique-smart
4. Febrian, Arief. (2023). The Application of the SMART Method in Determining the Best Messaging Application. AI and SPK: Journal of Artificial Intelligence and Decision Support Systems, 1(3), 197-207.
5. Goodwin, P., Wright, G. (2020). Decision Analysis for Management Judgment (6th ed.). Wiley.
6. Lestari, I., Hernawati, E., Ananda, D. (2019). Web-based Posyandu data processing application (Case study: Posyandu Cipagalo). eProceedings of Applied Science, 5(2), 1191.

7. Marakas, G. M., O'Brien, J. A. (2022). Decision Support Systems in the Healthcare Sector. Prentice Hall.
8. MDPI., Healthcare. (2023). Implementation of Multi-Criteria Decision-Making Methods in Nutrition Programs. Healthcare, 11(2), 456-468.
9. Ministry of Health, Republic of Indonesia. (2022). Guidelines for the Implementation of Posyandu Nutrition Programs. Jakarta: Kemenkes RI.
10. Plos One. (2021). A Systematic Review of Clinical Decision Support Systems in Public Health. PLOS ONE, 16(3), e0247079.
11. Power, D. J., Heavin, C. (2021). Decision Support, Analytics, and Business Intelligence (4th ed.). Springer.
12. Putranto, Ilham Dwi, Dina, Maulina. (2023). Decision support system with SMART method to determine the best teachers." Journal Automation Computer Information System, 3(2), 92-102.
13. Sari, M., Setiawan, W. (2022). Decision Support System for Child Nutrition Assessment using SMART. Journal of Public Health Informatics, 15(1), 25-37.
14. SpringerLink. (2021). Innovations in Decision Support Systems for Health Management. Journal of Health Management, 19(4), 289-305.
15. Turban, E., Sharda, R., Delen, D. (2021). Decision Support and Business Intelligence Systems (11th ed.). Pearson.
16. Ummah, Faizatul, Ari Kusdiyana, Muhamad., Ganda, Saputra. (2021). Empowerment of Posyandu Cadres in Website-Based Recording and Reporting. Abdimasmuhla Journal, 2(1).