



WEIGHTED PRODUCT METHOD AS A MODEL FOR DECISION MAKING STRATEGIES FOR HANDLING STUNTING TODDLERS

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Abstract

Stunting in toddlers is a public health issue that still needs great attention. Stunting is a long-term nutritional problem that is recognized as a national priority. Based on data from the Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting reflects a high risk of developmental disorders that affect children's future. This research was conducted with the aim of identifying priorities for handling stunting toddlers with the analysis of the Decision Support System (SPK), using *Weighted Product* (WP). This study uses a quantitative approach involving interviews, observations, and literature studies conducted in the work area of the UPT Puskesmas Bandung Baru. Using ten alternatives for toddlers who were analyzed based on five criteria, namely: nutritional status (BB/U), physical growth (TB/U), upper arm circumference (LiLA), age, and vitamin A consumption intake. The study's findings indicate that both methods produced stable highest ratings for A9 alternatives, while the lowest ratings were obtained on A1, A7, and A8. This research can help health centers and related institutions in setting stunting intervention priorities more objectively, efficiently, and responsive to policy changes.

1.0. INTRODUCTION

At the Lampung Province level, the stunting rate shows a decrease and improvement. Based on data from Bappeda in 2024, the stunting rate will drop to 14.9% in 2023, although it is still above the national target and remains a regional challenge. Meanwhile, according to the Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting in Pringsewu Regency in the same year was recorded at 15.8%. This problem lies not only in the high stunting rate, but also in the non-optimal strategy in determining priority toddlers who need immediate intervention [4]. In practice, goal setting is often not based on structured data, so there is a risk of inaccuracies in the allocation of resources and programs. This data misalignment can also cause interventions that are not on target, especially in the group of toddlers who need intensive care the most. Therefore, stunting monitoring activities are very important to identify children at risk and design appropriate and measurable interventions [5].

In this case, the importance of technological support in decision-making must be carried out precisely, quickly and accurately, one of the technological approaches that can be used in this situation is by applying the concept of the Decision Support system (SPK). The Decision Support System is an approach to evaluating alternatives based on a number of relevant

criteria, so that the decisions taken are more rational and measurable. In the case of this study, SPK assists in the process of determining priorities for handling stunting objectively and efficiently. By implementing a multi-criteria decision-making method, one of which is *Weighted Product* (WP) which uses weighting and multiplication as the basis for calculation.

Various previous studies have applied the WP method in various fields, including the health and social fields. In the study, Alan Hartawan, et al., (2023) applied the Moora method in the selection of complementary foods for breast milk. The SPK system that was built succeeded in providing the best menu recommendations with the results of calculating the value of measurable preferences. The system was tested using *the blackbox* and UAT methods, and obtained a user satisfaction rate of 91.8%. by demonstrating the reliability of the system in decision-making [6] . The next study by Gathut Riadhi & Sri Anardani (2023) explained that the use of the Moora method in the web-based SPK system makes it easier for health center officers to determine stunting conditions appropriately, with the results of the system running well as needed [7] . Furthermore, research from Ella Nuraini & Muhammad Hari Ramadhan (2020) the use of the Moora Method is considered effective in helping the assessment of the growth and development of toddlers because it produces a ranking based on objective and rational preference values. Then a study conducted by Sumi Khairani, et al., (2025) the application of the WP Method proved to be effective in determining the optimal complementary food because it was able to process various criteria and produce accurate and valid decisions according to manual calculations. Erne Gernaria Sihombing, et al., (2020) also reviewed in his research that the WP Method is considered effective in selecting the best baby food with a gradual calculation process that produces accurate rating outputs and accelerates the Decision process. [8] [9] [10]

Although various previous studies have proven the effectiveness of *the Weighted Product* method in decision-making in the field of child health. However, studies that specifically apply this method in the context of handling stunting toddlers are still very limited, especially in areas that face limited health resources and infrastructure, such as at the village level. This study applies taxpayers specifically for the priority of handling stunting toddlers with more focused criteria. In addition, this research is based on real field data from the Health Center, so that the results of the analysis can be directly applied to support more objective and targeted decision-making at the basic health service level. This condition creates relevant research novelty to be answered, as well as the main basis for conducting the analysis of *the Weighted Product* method in this study. Thus, this research is expected to make a scientific contribution by presenting an analysis of *the Weighted Product* method in determining the priority of handling stunting under five, so that the most accurate, efficient, and appropriate methods can be found to help the decision-making process in the field, especially in areas with limited resources.

2.0. RESEARCH METHODS

Data Collection Methods

Sugiyono (2013) stated that data collection techniques can be carried out by *interviews*, questionnaires, observations, and a combination of the three [22] . This research will use data collection techniques by: observation, interview, literature study.

a. Observation

Observation is a way of collecting data by observing directly, phenomena or actions on location. In this study, observations were carried out by looking directly at the monitoring and service activities of stunted toddlers at the Bandung Baru health center [23]

b. Interview

Interviews are a method of data collection that is carried out through dialogue between researchers and resource persons to obtain more detailed information. In this study, semi-structured interviews were conducted with health workers and health center cadres to obtain information about the criteria for determining priority stunting toddlers, the factors that affect them, and their experience in monitoring and intervention.

c. Literature Study

According to Sugiyono (2017:291), literature study is an important step where after a researcher determines the research topic, the next step is to conduct a theoretical study. This study utilizes a literature study to analyze the literature related to stunting topics, decision-making systems, and *Weighted Products*.

Use of the Weighted Product (WP) Method

The *Weighted Product* (WP) method plays a role in determining the order of priority handling according to the combination of risk factors for each toddler. Its advantage lies in its ability to recognize small differences between choices. The steps in this study are:

1. Defining the Results matrix
2. Multiply all the values of each weighted criterion, with the following formula equation:

$$S_i = \prod_{j=1}^n x_{ij}^{w_j} \dots\dots\dots(3)$$

Where:

S_i = Value preferences for
Alternative I

X_{*ij} = Alternative initial values on the Jth criterion

W_j = Weight of the J criterion

n = Number of criteria

For the cost criterion, the weight (W_j) is given a negative value so that the value is reduced in the calculation.

3. Calculate the value of vector V, using the following equation:

$$V_i = \frac{S_i}{\sum_{i=1}^m S_i} \dots\dots\dots(4)$$

The V_i value is used to compare priorities between alternatives. The higher the value the better the alternative.

4. Compile the priority of toddlers based on the value of V. Provided that the greater the value of V, the higher the priority of the toddler.

Determination of Alternatives

In this study, the alternative is an individual under five identified with stunting who is the object of analysis and evaluation in determining intervention priorities. In this study, an alternative was obtained from the actual data of the UPT Puskesmas Bandung Baru. An alternative was determined, namely 10 stunted toddlers, the following are the alternatives in this study:

Table.1 Alternatives

No	Code	Initial news	Age (Month)	Gender
1	A1	AA	17	L
2	A2	KZ	16	P
3	A3	GC	29	P
4	A4	GND	49	P
5	A5	AFT	31	L
6	A6	RA	46	P
7	A7	AKP	13	L
8	A8	AAS	17	L
9	A9	AAB	17	P
10	A10	ON	30	L

Source: UPT Puskesmas Bandung Baru

3.0. RESULTS

Results Matrix

The Decision Matrix is obtained from the scale of assessment of each alternative based on field data and criteria that have been determined and changed in a numerical format. The following is presented a table of results of the Decision matrix based on five criteria:

Table. 2 Results matrix

No	Alternative	Criterion				
		C1	C2	C3	C4	C5
1	A1	2	4	5	3	4
2	A2	2	2	5	3	4
3	A3	2	2	5	4	4
4	A4	2	2	5	5	4
5	A5	1	1	5	4	1
6	A6	1	2	5	5	4
7	A7	2	4	5	3	4
8	A8	2	4	5	3	4
9	A9	1	1	5	3	4
10	A10	2	2	5	4	4

The table above is the result of each alternative that has been evaluated using five criteria based on the results of observations and interviews, then converted using the assessment scale that has been set. Since each criterion has a different range of values, a normalization process is needed to equalize the scale between the criteria before proceeding with the calculation.

Determining the value of vector S Weighted Product (WP) Method

The first step in the calculation of the WP is to determine the Decision matrix. Next, calculate the S Vector Value by multiplying the value of each criterion on each alternative, where each value is ranked by the weight of the associated criteria. The following are the results of calculating the vector value:

Table. 3 was the blue vector

No	Alternative	The Value of Si
1	A1	0,41
2	A2	0,48
3	A3	0,46
4	A4	0,45
5	A5	0,59
6	A6	0,55
7	A7	0,41
8	A8	0,41
9	A9	0,71
10	A10	0,46

The results of the calculation of the vector value S were obtained from the total initial preference value for each alternative calculated by the weighted multiplication method. The value of vector S cannot be used as a ranking yet, so the next step is normalized to obtain the final value in the form of Vector V.

Normalization to V Vector and Rating

After obtaining the results, then normalize the value of the vector to get vector V. By dividing each value S by the total of all Si values of all alternatives. The following calculation results are presented in the table:

Table. 4 Nilai vector V

No	Alternative	Value V	Ranking
1	A1	0,08	8
2	A2	0,10	4
3	A3	0,09	5
4	A4	0,09	7
5	A5	0,12	2

6	A6	0,11	3
7	A7	0,08	8
8	A8	0,08	8
9	A9	0,14	1
10	A10	0,09	5

The results of the calculation using the *Weighted product* (WP) method are calculations showing that the A9 alternative is also ranked first with a value of 0.14. This means that the A9 alternative is an alternative with the highest priority level of stunting treatment based on the criteria used.

4.0. CONCLUSION

As the final result of a series of analysis processes of the *Weighted Product* method in the context of the priority handling of stunted toddlers, it can be concluded that this study uses the *Weighted Product* (WP) Method with the aim of determining the priority of handling stunted toddlers. Assessments were carried out on 10 alternatives based on 5 criteria such as: nutritional status (BB/U), physical growth (TB/U), age, vitamin A intake, and upper arm circumference (LiLA). Based on the final results and sensitivity analysis, the *Weighted Product* (WP) method is recommended as the superior method in this study. This is based on the WSB's excellence in maintaining overall rating stability and its resilience to weight variations, which is crucial in the context of implementing decision support systems (SPKs) in the changing real world.

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