Journal of Computer Science and Information Technology
https://jcsitech-upiyptk.org/ojs
2023 Volume 9 Issue 3 Pg 149-153 e-ISSN: 2502-1486

Application of the Weighted Product Method in the Decision Support System for Selecting the Best Teacher Performance

Hidayatullah*, Surmayanti, Syafrika Deni Rizki
Putra Indonesia University YPTK Padang, Jl. Raya Lubuk Begalung Padang, West Sumatra – 25221, Indonesia
* hidayatullah.ajo@gmail .com

Abstract

Teachers are professional educators with the main task of educating, guiding, teaching, directing, assessing, training and evaluating students in early childhood education through formal primary and secondary education channels. Teacher performance assessment is an assessment of each item of the teacher's main task activities in the context of career development, rank and position. Performance assessment is based on several criteria from which the value will be calculated. There are various ways or steps that can be taken to carry out the calculation process during the assessment, one of which is by designing an information system that can present information on the results of recommendations for teacher reward recipients quickly and precisely and has high precision and accuracy values, this system is Decision Support System (DSS) or Decision Support System (DSS). Therefore, a Decision Support System (DSS) using the Weighted Product (WP) method is needed which will determine the best choice and according to the criteria determined by SD Negeri 10 Batang Anai. The Weighted Product Method is a solution method using multiplication to connect attribute ratings, where the rating must first be raised to the power of the weight of the attribute in question. So the process is faster and data management in the form of process results reports can be managed and stored safely and easily. The results obtained which have the highest value are alternative A04 in the name of Tridunia, S.Pd with a value of 0.252.

Keywords: Decision Support Systems , Weighted Product (WP), Accuracy, Rating, Teacher .

1. Introduction

SD Negeri 10 Batang Anai is one of the state elementary schools in Nagari Kasang. This school is located at Korong Koto , Nagari Kasang, Batang Anai District, Padang Pariaman Regency, West Sumatra Province. This school was founded in 1960 and has undergone several renovations due to natural disasters or due to damage to the building over time . The worst damage occurred in 2009. This was caused by the earthquake that struck. There were three classrooms that were badly damaged and could not be used for learning and teaching. In order for the learning and teaching process to continue, emergency classrooms were set up.

Teachers are professional educators with the main task of educating, guiding, teaching, directing, assessing, training and evaluating students in early childhood education through formal primary and secondary education channels. The quality of education and learning standards need to be assessed and improved because education is important for all of us.

In the world of education, one of the most important things is teacher performance or teacher achievement in carrying out tasks based on skill, experience and seriousness as well as the use of time in the teaching and learning process at school. A teacher is said to be effective if he has implemented elements of high involvement in teaching tasks, mastering and developing material, discipline in teaching, and other tasks. The success of a teacher must meet predetermined criteria. If the teacher meets these criteria, it means that the teacher can be said to be successful and has good qualities. On the other hand, if a teacher does not meet the standards of good criteria, then it cannot be said that the teacher has met the standards [1].

Performance assessment is based on several criteria from which the value will be calculated. There are various ways or steps that can be taken to carry out the calculation process during the assessment, one of which is by designing an information system that can present information on the results of recommendations for teacher reward recipients quickly and precisely and has high precision and accuracy values, this system is

A decision support system (DSS) is a system that is able to provide problem solving capabilities and communication capabilities for problems with semi-structured and unstructured conditions. This system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows exactly how the decision should be made [2]. Decision Support System (DSS) or Decision Support System (DSS). There are several method options that can be used in this Decision Support System, one of which is the Weighted Product (WP) method. So

Accepted: 06-10-2023 | Revised: 07-10-2023 | Published: 07-31-2023 | doi: 10.35134/jcsitech.v9i3.79

researchers apply the WP method to help produce information that can be used for decision support in determining the provision of rewards to teachers [3].

The Weighted Product method is a method that is completed by performing multiplication to connect attribute values. The value of each attribute must first be raised to the power of the weight of the attribute concerned [4]. Weighted Product is a solution method using multiplication to connect attribute ratings, where the rating must first be raised to the power of the attribute weight [5]. The Weighted Product method is one of the methods used to complete a decision making system by considering criteria and weights. This research uses the WP method because in making decisions about selecting the worst employees there are no sub-criteria [6].

Previous research on decision support systems using the WP method has been widely used, such as a combination of the WP and death methods in selecting web-based export quality orchid plants[7], the selection process for prospective oil palm employees[8], selecting new students[9], selecting scholarship recipients. students[10], and many others.

2. Research methodology

The research framework is the stages of activities that will be carried out in conducting research. Each stage is a part that determines the next stage and is interconnected with one another. So that the steps taken by the author in this design do not deviate from the main discussion and are easy to understand, the author has formed a research framework as shown in Figure 2 below:

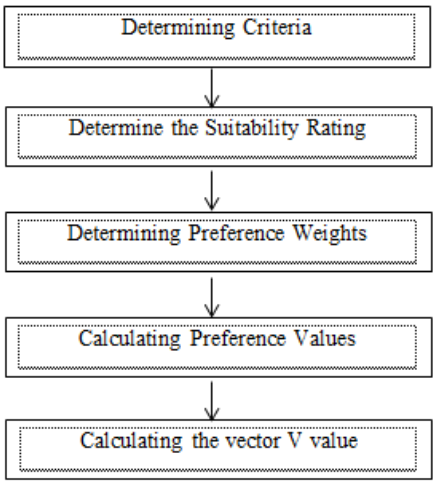

Figure 1. Research Framework

The Weighted Product method is a method for determining a decision by multiplying to connect attribute ratings, where the rating of each attribute must first be raised to the power of the weight of the attribute in question. This process is the same as the normalization process. The steps in the Weighted Product method include:

1. Determine the criteria that will be used as a reference in decision making.
2. Determine the suitability rating of each alternative for each criterion.
3. Determine the preference weight for each criterion.
4. Multiplying all the attributes for an alternative with a weight as a positive power for the benefit attribute and a weight as a negative power for the cost attribute.

The formula for calculating the preference value for alternatives (Ai) is as follows

$$W_j = \frac{W_J}{\sum W_J} \qquad (1)$$

Where W_j is the weight value that has been determined and $\sum W_j$is the total of the weight values.

5. The results of these multiplications are added up to produce a vector value V for each alternative. The vector V value can be calculated using the formula:

$$V_i = \frac{S_i}{\sum S_i} \qquad (3)$$

6. Look for alternative values by carrying out the same steps as in step one, only using the highest value for each benefit attribute and the lowest value for the cost attribute.
7. Divide the V value for each attribute by the standard value.
8. Looking for ideal alternative values is by ranking vector V values, as well as making conclusions as the final stage.

3. Results and Discussion

3.1 System and Data Analysis

System Analysis is information that is described into parts. System analysis is an activity to look at a system that is already running, see which parts are good or need to be improved, and then document the needs that will be met in the new system. The analysis and design processes often go together, so during analysis activities, design activities are also carried out.

Based on observations made in the process of selecting the best teacher performance carried out at SD NEGERI 10 BATANG ANAI, the problem that is currently being experienced is that when carrying out an assessment in selecting teachers with the best performance to find outstanding teachers, those who lack objectivity tend not to be on target. Therefore, to overcome these problems, several policies were created which the author proposes to overcome the above problems, namely creating a system that can assist in decision making.

3.2 Data Analysis Using the Weighted Product Method

The data analysis stage is the most important stage in developing a system. Data analysis aims to limit the subjects and objects to be studied so that it becomes information that is more systematic and easy to understand. To obtain data or information in this research, the author first carried out data collection activities that were useful as support for determining the research object. The following are the stages that must be gone through in solving a problem using the WP (Weighted Product) method.

1. Determining Criteria and Criteria Weights

Where for each of the criteria below, sub-criteria will be created that are attached to each of these criteria. The criteria that have been set in this research can be seen in table 3.1 below.

Table 1 Criterion Data

Criteria	Information	Value Weight
C1	Presence	4
C2	Level of education	3
C3	Teaching Ability	5
C4	Long Service	2
C5	Discipline	3

In these criteria, a level of importance of the criteria is determined based on the predetermined weight values which are represented by sub-criteria. So that each of the criteria has the following sub-criteria:

Table 2. Criteria Weight Value

Criteria	**Subcriteria**	**Weight/value**
Presence	Very Good	3
	Enough	2
	Low	1
Level of education	S-2	3
	S-1	2
	SENIOR HIGH SCHOOL	1
Teaching Ability	Very good	3
	Enough	2
	Low	1
Long Service	>=10 Years	3
	5-9 Years	2
	1-5 Year	1
Discipline	Very Disciplined	3
	Just be disciplined	2
	Lack of Discipline	1

The next stage is carrying out the calculation process for Alternatives or several sample data of teacher data that will be calculated or assessed. Below are several rice samples that will be analyzed.

Table 3 Alternatives to be assessed

No	Code	Alternative
1	A01	Desi Putri, S.Pd
2	A02	Nasrul, S.Pd.Sd
3	A03	Ernawati D, S.Pd
4	A04	Triwarni, S.Pd
5	A05	Laila Yumiarti, S.Pd

Alternative data selection

Several alternatives that will be selected using the Weighted Product method can be seen below:

Table 4 Criteria to be assessed

No	Alternative	Criteria				
		C1	C2	C3	C4	C5
1	A01	Enough	S1	Low	1-5	Just be disciplined
2	A02	Very good	S1	Enough	5-9	Just be disciplined
3	A03	Very good	S1	Enough	1-5	Just be disciplined
3	A04	Very good	S1	Very good	>=10	Very Disciplined
4	A05	Very good	S1	Very good	1-5	Very Disciplined

Alternative data is laptop data that will be selected to be used as data in finding the best laptop.

Determining Alternative Weights

Previously alternative data was weighted against the criteria attached to it before calculations were carried out. The following are alternative weights which can be seen in Table 5 below:

Table 5 Alternative Weights

No	Alternative	Criteria				
		C1	C2	C3	C4	C5
1	A01	2	2	1	1	2
2	A02	3	2	2	2	1
3	A03	3	2	2	1	2
3	A04	3	2	3	3	3
4	A05	3	2	3	1	3

Criteria Weight Improvements

After getting the weight value for each criterion, the weight is corrected from the initial weight value .

$$W_1 = \frac{4}{4+3+5+2+3} = \frac{4}{17} = 0.24$$

$$W_2 = \frac{3}{4+3+5+2+3} = \frac{3}{17} = 0.18$$

$$W_3 = \frac{5}{4+3+5+2+3} = \frac{5}{17} = 0.29$$

$$W_4 = \frac{2}{4+3+5+2+3} = \frac{4}{17} = 0.12$$

$$W_5 = \frac{3}{4+3+5+2+3} = \frac{3}{17} = 0.18$$

Table 6 Results of Criteria Weight Improvement

Criteria	Improvement of Weight Value
W1	0.24
W2	0.18
W3	0.29
W4	0.12
W5	0.18

This is the result of improving the weights for each criterion from W1 to W5.

Vector Value Calculation (S)

After correcting the weights, the vector value (S) is calculated by squaring and multiplying the value of each criterion by the previously corrected weights.

$$S_i = X_{ij} * W_j \qquad (2)$$

$$S_1 = (2 * 0.24) + (2 * 0.18) + (1 * 0.29) + (1 * 0.12) + (2 * 0.18) = 1.61$$

$$S_2 = (3 * 0.24) + (2 * 0.18) + (2 * 0.29) + (2 * 0.12) + (1 * 0.18) = 2.08$$

$$S_3 = (3 * 0.24) + (2 * 0.18) + (2 * 0.29) + (1 * 0.12) + (2 * 0.18) = 2.14$$

$$S_4 = (3 * 0.24) + (2 * 0.18) + (3 * 0.29) + (3 * 0.12) + (3 * 0.18) = 2.85$$

$$S_5 = (3 * 0.24) + (2 * 0.18) + (3 * 0.29) + (1 * 0.12) + (3 * 0.18) = 2.61$$

Table 7 Vector S Value Results

Alternative	Vector S Value
A01	1.61
A02	2.08
A03	2.14
A04	2.85
A05	2.61
Total	11.29

Vector Value Calculation (V)

After getting the vector value (S), the next step is to determine the vector value (V), namely, dividing the preferences for each alternative by the total number of vector S.

$$V_1 = \frac{1.61}{11.29} = 0.142$$

$$V_2 = \frac{2.08}{11.29} = 0.184$$

$$V_3 = \frac{2.14}{11.29} = 0.189$$

$$V_4 = \frac{2.85}{11.29} = 0.252$$

$$V_5 = \frac{2.61}{11.29} = 0.231$$

Table 8 Result of Vector V Values

Alternative	Vector Value V
A01	0.142
A02	0.184
A03	0.189
A04	0.252
A05	0.231

From the results of calculating Vector V from alternative data A 0 1 to A 05 , a ranking is made, namely:

Table 9 Ranking Results

Alternative	Vector Value V	Ranking
A04	0.252	1
A05	0.231	2
A03	0.189	3
A02	0.184	4
A01	0.142	5

This is the ranking result of the calculation of the vector value V, so that the alternative data ranking sequence from 1st to 5th is obtained, namely: Triwarni, Laila Yumiarti, Ernawati, Nasrul, Desi Putri

4. Conclusion _

This expert system makes it easier for rabbit owners to carry out consultations by implementing a web-based system which is implemented using forward chaining and certainty factor methods by selecting the symptoms experienced according to the rabbit's condition so that a diagnosis of disease can be produced in rabbits, making it easier for rabbit owners to check for disease. suffered by their pet rabbits effectively and efficiently. To handle the dangerous phase, the system will issue an output containing a recommendation to immediately send the rabbit to the UPTD of the West Sumatra Animal Hospital.

References

[1] Rusvinasari, D. (2022). APPLICATION OF THE SIMPLE ADDITIVE WEIGHTING AND WEIGHTED PRODUCT METHOD AS DECISION SUPPORT FOR TEACHER PERFORMANCE ASSESSMENT. Journal of Data Science Theory and Application, 1(1), 35-43. https://doi.org/10.32639/jasta.v1i1.39

[2] Ningsih, E., Dedih, D., & Supriyadi, S. (2017). Decision Support System for Determining Appropriate Food Business Opportunities Using Web-Based Weighted Product (Wp). ILKOM Scientific Journal, 9(3), 244-254. https://doi.org/10.33096/ilkom.v9i3.150.244-254

[3] Warnars, HLHS, & Adyana, L. (2021). Decision Support System for Determining Teacher Reward Recipients Using the Weighted Product (WP) Method. https://doi.org/10.33322/petir.v14i2.899

[4] Siburian, R.M., Hutabarat, M., & Waruwu, J. (2022). DECISION SUPPORT SYSTEM TO DETERMINE ACCEPTANCE OF POOR RICE (RASKIN) USING THE WEIGHTED PRODUCT METHOD (CASE STUDY OF HILIWETO VILLAGE, ONOHAZUMBA DISTRICT). ISTP Journal of Science and Technology, 17(2), 130-137. https://doi.org/10.59637/jsti.v17i2.152

[5] Hidayat, T., & Komariah, S. (2019). Selection of Outstanding Students Using the Weighted Product (WP) Method. Case Study of SMP-Al Fitroh Tangerang. Jutis (Journal of Informatics Engineering), 7(2), 159-163. https://doi.org/10.33592/jutis.v7i2.398

[6] Suendri, S., Harahap, AM, Nasution, AB, & Kartika, S. (2022). Analysis of the Decision Support System for Determining the Best Graduates Using Five Algorithms in the Information Systems Study Program at UIN North Sumatra Medan. AL ULUM: JOURNAL OF SCIENCE AND TECHNOLOGY, 7(1). http://dx.doi.org/10.31602/ajst.v7i1.5839

[7] Ramadhani, P., Suendri, S., & Irawan, MD (2022). Combination of WP and MAUT Methods in WEB-Based Selection of Export Quality Orchid Plants. Decision Support Systems with Applications, 1(1), 1-11. https://doi.org/10.55537/spk.v1i1.35

[8] Sapruwan, M. (2020). APPLICATION OF THE WEIGHTED PRODUCT METHOD IN THE SELECTION PROCESS OF PROSPECTIVE EMPLOYEES IN PALM PALM PLANTATION COMPANIES. ECOMABIS: Journal of Business Management Economics, 1(01), 15-26. https://doi.org/10.37366/ekomabis.v1i01.3

[9] Purba, AT, & Siregar, VMM (2020). Web-Based New Student Selection System Using the Weighted Product Method. Tekinkom Journal (Information and Computer Engineering), 3(1), 1-8. https://doi.org/10.33557/jtekno.v17i2.1078

[10] Roni, R., Sumijan, S., & Santony, J. (2019). Weighted Product Method in Selecting Scholarship Recipients for Students. RESTI Journal (Information Systems Engineering and Technology), 3(1), 87-93. https://doi.org/10.29207/resti.v3i1.834