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The Decision Support System for Selecting the Best Teacher for Birull Walidaini Using the SAW Method

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Abstract: *Birull Walidaini Kindergarten is a learning place for children aged 4 years. In selecting the best teacher at the Birull Walidaini Kindergarten, Sragen there are still several obstacles such as the assessment of each teacher is still done manually, namely the principal must fill out the assessment instrument form for each teacher that has been provided, which causes the assessment process to be inaccurate and inefficient. In addition, to obtain or find out information on the results of selecting the best teacher, it takes quite a long time, because the administration section has to re-enter each teacher's grades into Microsoft Excel and make pranks on teacher grades manually. Data collection methods used are interviews, observation and literature study. The decision-making method used by the author is SAW, while the system development method used is the SDLC method with design tools UML. Implementation of the program using the PHP programming language with MySQL database. Decision support systems can be used to make it easier for schools to manage data, present information, generate reports and reduce errors in calculating grades and get accurate teacher ranking results and the application of the SAW method can improve the quality of decision making in selecting the best teachers. Based on the results of research conducted at the Birull Walidaini Kindergarten, Sragen, the best teacher score was according to the ranking, namely teacher Theresia Luan with a score of 1.00.*

Keywords: *Decision Support System, Selecting, Best Teacher, SAW*

1. INTRODUCTION

Teachers as one of the determining pillars of the nation's success have a very important role in advancing education. One of the tasks that must be properly carried out by the teacher is to encourage students to be active and active in learning. For this reason, the performance of a teacher in teaching determines the success of a student in awakening their willingness to be active and active in learning. Teacher performance appraisal is currently considered important, because information from this teacher performance assessment will be an important input in determining what program the teacher will carry out in the next year, for example what teaching program will be implemented in teaching in class, how performance and how to teach teachers to students in the future. In addition, teacher performance appraisal can also be used as a reference for determining exemplary teachers, where exemplary teachers are teachers who are able to motivate students to study hard and set an example to their students. So that with the presence of model teachers, teachers are more motivated to further improve their performance. In the assessment or selection of the best teachers at Birull Walidaini Kindergarten there are still several obstacles or problems such as the assessment of each teacher is still done manually, namely the principal must fill out an assessment instrument form for each teacher who been provided, which causes the assessment process to be less accurate and inefficient. If an error occurs in filling in the scores for each teacher, the principal must re-fill the assessment form. This resulted in the assessment process for each teacher being hampered, ineffective and less than optimal. Seeing these obstacles or problems, it is necessary to apply the best teacher selection using the Simple Additive Weighting (SAW) method which can assist schools in carrying out the process of selecting the best teachers objectively, accurately and effectively, making it easier to make the right and correct decisions in choosing the best teachers. , minimizing errors and improving the quality of decision making, so that it will produce the best or outstanding teachers according to predetermined criteria that can motivate other teachers. Therefore, the author made the title (topic) of the thesis "Application of the Simple Additive Weighting Method in the Decision Support System for Selection of the Best Web-Based Teacher at Birull Walidaini Kindergarten, Sragen.

2. METHOD

2.1 Decision Support System

DSS is a system designed for communicating problems and solving problem solving by managers is semi-specific structure to take a decision[1].

2.2 Simple Additive Weighting

The SAW (Simple Additive Weighting) method is also common known as the weighted sum method. The basic concept of the SAW method is searching the weighted sum of the performance ratings on each alternative on all attributes

The SAW method requires a matrix normalization process decision (X) to a scale that can be compared to all alternative ratings there is.[2]

The steps of the SAW method are:

a. Determine the criteria that will be used reference in decision making, namely C
b. Determine the suitability rating of each alternative on every criterion.
c. Create a decision matrix based on criteria (C), then normalize the matrix based on the adjusted equation the type of attribute (attribute profit or attribute costs) so that the normalized matrix R is obtained.
d. The final result is obtained from the ranking process, namely the sum of the normalized matrix multiplication R with the weight vector so that the value is obtained the largest chosen as the best alternative (A) as a solution The formula for normalizing is:

$$r_{ij} = \begin{cases} \frac{\times_{ij}}{\mathrm{Max}_i \times_{ij}} \\ \frac{\mathrm{MIN}_i \times_{ij}}{\times_{ij}} \end{cases} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

rij = Normalized performance rating Max
ij = Maximum value of each row and column Min
ij = Minimum value of each row and column X
ij = Rows and columns of the matrix

Where rij is the normalized performance rating of alternative Ai on Cj attribute; i =1,2,.. m and j = 1,2,..n.

The preference value for each alternative (Vi) is given

$$\mathrm{V}i = \sum \eta\, j{=}1\ WjRij \ \ldots\ldots\ldots\ldots\ (2)$$

W = Criteria Weight
R = Value of each Participant from each criterion
A larger Vi value indicates that
alternative Ai is preferred.

3. RESULTS AND DISCUSSION

3.1 Data Collection Techniques

Data collection methods used for obtain accurate data and information so that the results of the research are also accurate and can be be held accountable. As for the collection technique the data used by the author as follows:

a. Interview

The author conducts interviews directly with the Principal, namely Mrs. Ancilla Dewi R. MM Saint Andrew Jakarta. The interview was conducted on January 18, 2021 at the Santo Andreas Kindergarten, Jakarta. As for the questions asked about the procedure or the process of selecting or evaluating the best teacher is currently running, the constraints or weaknesses are found in the best teacher selection system, criteria used as an indication in the teacher's assessment best, the weight of each criterion, which method used in calculations or judgments as well the number of teachers who entered the assessment category.

b. Observation

The author makes direct observations at the Birull Walidaini Kindergarten which is located at the Majid At-Taqwa Pagerjo Complex, Krikilan, Kalijambe, Sragen. The author makes observations for obtain valid data and information directly about the selection or assessment of the best teacher which is taking place at the Birull Walidaini Kindergarten, so that the data or information obtained the time of observation will be used by the author in making research reports on teacher selection best.

c. Study of literature

The author conducted a literature study from the research results related to the research being conducted Writers, like books, compare journals (research) of a kind, and scientific papers that contain about the best teacher selection system as a reference writing thesis so that the data used is more accurate and proven to be true, so the author

Find out what things haven't been done in previous research, avoid mistakes in previous research.

The SAW method is usually referred to as a weighted addition method. Basically the SAW method is a method that aims to search for a weighted sum of performance that has an alternative ranking in all of its attributes. This method has the requirement that the decision matrix (X) is normalized to a scale that can be compared to all available alternative ratings.

The SAW method is a very well-known method and is widely used to deal with various situations such as problems from the MADM (Multiple Attribute Decision Making) method and also a method called Fuzzy Multiple Attribute Decision Making.

Multiple Attribute Decision Making is a method used to search for optimal alternatives from various alternatives that have certain criteria. The SAW method recommends that the creator of the decision can determine the weight for each attribute.

This method requires a necessity in making decisions to determine the weights for all the attributes. By adding up all the results of the multiplication between rankings, it will produce a value for the total score.

Steps in the method

a. Selecting the criteria that will be used as a reference in the selection of decision making (decision making).
b. Examples of several criteria such as:
c. Price (cost).
d. Ram (benefits).
e. Memory (benefits)
f. Processors (benefits)
g. camera (benefit)
h. The example above is the criteria used to make the selection to purchase a smartphone.
i. Determine the level of suitability for each alternative for each criterion.
j. Make a decision matrix based on criteria, then normalize the matrix based on equations that can be adjusted according to the type of attribute so that a matrix that has been normalized R is produced.

The results obtained from the rating process are the sum of the normalized matrix multiplication R which has a weight vector so that it can obtain the largest value which will be chosen as the best alternative to be used as a solution.

The advantages of the SAW method
If you already know about the SAW method, surely you don't know about its advantages over other methods. according to Harjoko, Wardoyo, and Kusumadewi who explain the advantages of this method is the ability of this method itself because it can perform calculations very precisely, because it is based on values for preference weights and criteria values that have been determined from the start.

This kind of ranking system can be expected that the assessment will be more accurate because the values for the criteria and weights have been predetermined which will produce more accurate values, besides that the SAW method can also select the best alternative from several available alternatives. , due to the process of rating or ranking after assigning weights to each attribute.

The SAW method has many functions in its implementation in human life which focuses on the world of offices, schools, and others. This method is included in the mathematical model method that can be used to determine decisions. (Fauzan)

Shows alternative data and determines the suitability rating of each alternative (Ai) for each criterion (Cj) as shown in the following table:

Table 1. Alternative Assessment

No.	Kode	Nama Guru	Kriteria				
			C1	C2	C3	C4	C5
1.	A1	Maria Ari	5	4	4	5	3
2.	A2	Rolina Pandiangan	2	4	4	5	5
3.	A3	Theresia Luan	5	5	5	5	5
4.	A4	Lestari Juliani	4	1	3	4	5

The value from the match table above is formed by the X decision matrix as follows:

$$X=\begin{Bmatrix} 5 & 4 & 4 & 5 & 3 \\ 2 & 4 & 4 & 5 & 5 \\ 5 & 5 & 5 & 5 & 5 \\ 4 & 1 & 3 & 4 & 5 \end{Bmatrix}$$

Make a decision matrix based on criteria (Ci), then normalize the matrix based on the equation adjusted for the type of attribute (attributes of profit and attributes of cost) so that a normalized matrix R is obtained.

Table 2. Classification of Criteria

No.	Kode	Kriteria	Benefit	Cost
1.	C1	Cara Mengajar	✓	
2.	C2	Kehadiran	✓	
3.	C3	Kedisiplinan	✓	
4.	C4	Tanggung Jawab	✓	
5.	C5	Penguasaan Materi	✓	

Normalizing the X matrix to R Matrix Normalizing the X matrix to R Matrix based on the equation in the SAW method, namely: Criteria for how to teach, including the attributes of advantage (benefits)

$$R1.1 = \frac{5}{Max\{5;2;5;4\}} = \frac{5}{5} = 1$$
$$R1.2 = \frac{2}{Max\{5;2;5;4\}} = \frac{2}{5} = 0.4$$
$$R1.3 = \frac{5}{Max\{5;2;5;4\}} = \frac{5}{5} = 1$$
$$R1.4 = \frac{4}{Max\{5;2;5;4\}} = \frac{4}{5} = 0.8$$

Attendance criteria, including advantage attributes (benefits)

$$R2.1 = \frac{4}{Max\{4;4;5;1\}} = \frac{4}{5} = 0.8$$
$$R2.2 = \frac{4}{Max\{4;4;5;1\}} = \frac{4}{5} = 0.8$$
$$R2.3 = \frac{5}{Max\{4;4;5;1\}} = \frac{5}{5} = 1$$
$$R2.4 = \frac{1}{Max\{4;4;5;1\}} = \frac{1}{5} = 0.2$$

Discipline criteria, including profit attributes (benefits)

$$R3.1 = \frac{4}{Max\{4;4;5;4\}} = \frac{4}{5} = 0.8$$
$$R3.2 = \frac{4}{Max\{4;4;5;4\}} = \frac{4}{5} = 0.8$$
$$R3.3 = \frac{5}{Max\{4;4;5;4\}} = \frac{5}{5} = 1$$
$$R3.4 = \frac{3}{Max\{4;4;5;4\}} = \frac{3}{5} = 0.6$$

After the alternative value in each criterion normalized, then a matrix will be created Wj x r and the sum of the multiplication results for get the best alternative by doing the largest value ranking as follows:

$V_1 =$ (0.20)(1) + (0.20)(0.8) + (0.20)(0.8) + (0.20)(1) + (0.20)(0.6) = 0.84

$V_2 =$ (0.20)(0.4) + (0.20)(0.8) + (0.20)(0.8) + (0.20)(1) + (0.20)(1) = 0.80

$V_3 =$ (0.20)(1) + (0.20)(1) + (0.20)(1) + (0.20)(1) + (0.20)(1) = 1.00

$V_4 =$ (0.20)(0.8) + (0.20)(0.2) + (0.20)(0.6) + (0.20)(0.8) + (0.20)(1) = 0.68

3.4 Application Testing Design

In decision support system research assessment of the best teacher with the graphic rating method these scales, the author explains how the process test plan on the system that will run. For this reason, it is necessary to test the so-called system user interface (UI) testing. This test aims to know the function of the elements or menus contained in the support system the decision of the best teacher's assessment is whether it works well or not.

3.5 Application Screen Display

a. Login View

Figure 1. Login View

b. Admin Main Menu Display

Figure 2. Manu Display

c. Master Menu Display

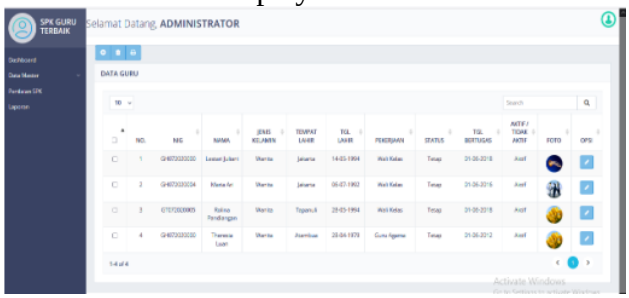

Figure 3. Display of the Teacher Menu

d. Criteria Menu Display

Figure 4. Criteria Menu Display

e. Sub Criteria Menu Display

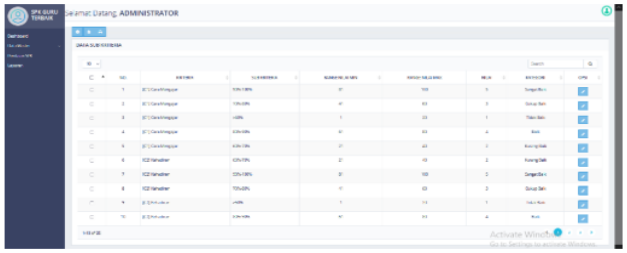

Figure 5. Display of the Sub Criteria Menu

f. Display Preference Weight Menu

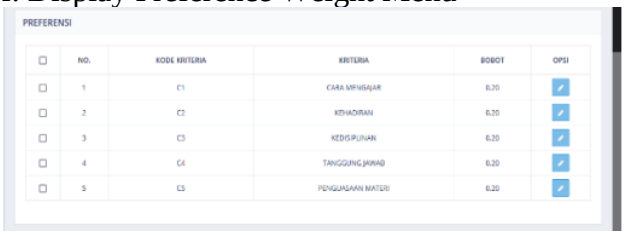

Figure 6. Display of Preference Weights

g. Assessment Data Display

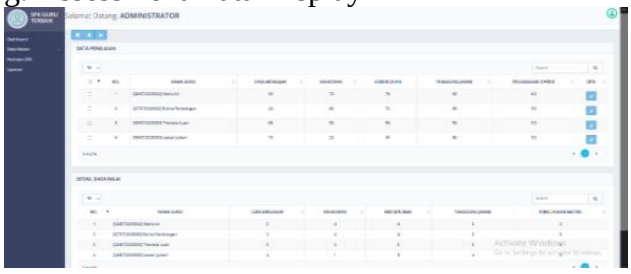

Figure 7. Appraisal Data Display

h. Teacher Rank Display

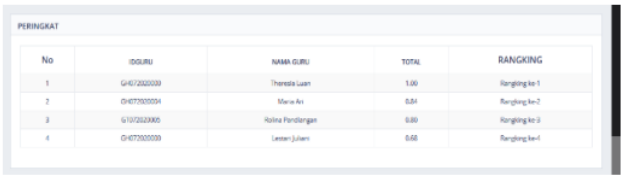

Figure 8. Display of teacher rankings

4. CONCLUSION

Based on the results of research that has been done, regarding the Election Decision Support System The Best Teacher in Kindergarten Birull Walidaini Uses The Simple Additive Weighting method can be concluded that, the assessment process for each teacher is still being carried out manually, namely the principal must fill out the form the assessment instrument for each teacher that has been provided, which causes the assessment process to be less inaccurate and inefficient. then on the support system the best teacher assessment decisions are determined by criteria which is based on Law No.14 of the year 2005. On teacher assessment decision support systems The best method is applied Simple Additive Weighting which makes it easier to make an assessment and get accurate results.

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