International Journal of Information System & Technology
Akreditasi No. 36/E/KPT/2019 | Vol. 3, No. 2, (2020), pp. 173-182

Implementation of AHP and WASPAS (Weighted Aggregated Sum Product Assessment) Methods in Ranking Teacher Performance

Mesran[1], Suginam[2], Dito Putro Utomo[3]*

[1,2,3]Departement of Computer Science, STMIK Budi Darma, Medan, Indonesia

[1]mesran.skom.mkom@gmail.com, [2]suginam.icha@gmail.com, [3]ditopuro12@gmail.com

Abstract

The performance of a teacher is an outcome that is demanded by the School Principal in awarding a teacher who is at a formal level of education. In producing effective decisions on performance ratings, it is, of course, necessary to use a computer-based information system, this is known as the Decision Support System. In order for the resulting decisions to be better, using methods that can process existing data so that the method used is able to produce a final report in the form of a decision. At SD IT Al-Munadi Marelan-Medan, so far not using computer applications to help decision-makers to rank teacher performance. Although all this time the needs of the school principal are reports on the performance of teachers in schools. In the research that the authors conducted using a combination of AHP and WASPAS methods which are expected to improve the results of decisions on teacher performance ranking.

Keywords: *AHP, WASPAS, Ranking, Teacher Performance*

1. Introduction

The teacher is a professional educator who has an important role in educating students in a unified scope of formal education. To realize intelligent students, in their assignments and functions in addition to teaching in class, a teacher is also faced with all academic-related processes. For example, having the task of being a homeroom teacher, designing the curriculum of subjects in accordance with the unit of study applicable in school and other assignments, which requires the teacher's role must be maximized, not just being in the classroom, even outside the classroom [1]–[3]. Not infrequently some teachers also have the responsibility in managing an educational unit, such as the Chair of the Department, the Head of the Laboratory and other positions that are assigned to him. All of these types of roles are so numerous, a teacher is required to have a good performance. This will certainly create the quality and quality of a level of education contained in the school.

Teachers who have good performance can certainly guarantee the occurrence of teaching and learning processes that produce good quality. Teachers who get good performance are an asset that is owned by the school, for this reason, it is highly recommended that the school can give awards to teachers who have good performance. The award given is a reward to a teacher and is a motivation for the teacher to be able to maintain his performance as a teacher. This is also a motivation for teachers who have not received an award, so they are motivated to get it [4].

In order for the decision taken by the school principal to award teachers who have a good performance on target, it is necessary to do a ranking in determining the performance of teachers using a computer-based system. So that decisions made by computers are more objective, and not resulted from decisions taken by humans. In the process of ranking the performance of teachers in the school, it can use a decision support

ISSN: 2580-7250 IJISTECH

system. This system can provide better decisions than decisions made by humans. For more effective performance ranking, methods for data processing can be applied. Many data processing methods that support in producing effective decisions, for example, Simple Additive Weighting (SAW), ELECTRE, TOPSIS, Preference Selection Index (PSI) [5]–[8].

Seeing how important an effective decision for the principal in producing a decision on the ranking of the best teacher performance, for this reason, the authors are interested in helping the school in overcoming the problems that occur. The need for teacher performance information at a school is needed by the school, in this case, the Principal. The principal has a very big role in determining the ranking of teacher performance. So that teachers who have the best ratings for performance can be given awards. There are currently no computer-based applications in SD IT Al-Munadi Marelan-Medan, which has resulted in constraints on teacher performance ranking information being constrained.

From the description above, it is deemed necessary to conduct research on the ranking of teacher performance found in Al IT, Al-Munadi Marelan-Medan. This is a very appropriate step that must be taken so that decisions on ranking teacher performance are more effective and efficient.

2. Research Methodology

2.1. Decision Support System

Decision support systems, introduced to the gem times in the early 1970s, by Michael Scott Morton. The concept of a decision support system is a computer-based interactive system that provides assistance to decision-makers by utilizing data in problem-solving both structured and unstructured [9]–[14].

DSS is a system designed to support the stages of decision making, these stages start from the identification of problems, the selection of relevant data, determine the approach used in the decision-making process to the activity of evaluating alternative choices[9].

2.2. Teacher

The teacher is a professional educator, who has important roles, tasks, and functions to educate the nation's life. A professional teacher is expected to be able to participate in national development in realizing Indonesian people who fear God, excel in science and technology, have an aesthetic, ethical, noble character and personality.

2.3. The Performance

Performance is a unit of the level of success achieved by someone in fulfilling tasks, roles, and responsibilities in carrying out a work process. Another term of Performance is Job Performance, so it can be concluded that performance is the result of an assessment obtained by a person after carrying out a particular work process.

2.4 Analytical Hierarchy Process (AHP) Method

AHP (Analytical Hierarchy Process) is a method of making decisions that the process of working to do a comparison of pairing between choice criteria and also in pairs with options that already exist before. In the study by the author, the application of the AHP method was used specifically to produce weights against the criteria needed in the ranking. The following steps are used in the Analytical Hierarchy Process method, namely:

a) Define the problem, determine the solution, then make a hierarchy of the problems that occur.
b) Determine priorities for elements.
    1) The stages used in determining the priority of elements are to compare pairs according to the criteria given.

2) Pairwise comparison matrices contain numbers that represent the relative importance of an element to other elements.

c) Synthesis

Considerations of pairwise comparisons are synthesized to obtain overall priority. The things done in this step are:

1) Addition of values for each column and row
2) Divide each value from the column by the total column in question to obtain matrix normalization.
3) The sum of the values of each row then divides by the number of elements in getting the average value.

d) Measuring consistency

In making decisions, it is important to know how good the existing concessions are because we do not want decisions based on considerations with low consistency. The things done in this step are:

1) Multiply each value in the first column by the relative priority of the first element, the value in the second column by the relative priority of the second element and so on.
2) Add up each row.
3) The result of the row addition is divided by the relative priority element in question.
4) Add up the quotient above with the number of elements, the result is called lambda max

e) Calculate the Consistency Index (CI) with the formula:

CI=(LAMDA maks-n)/n. (1)

f) Calculate the Consistency Ratio (CR) with the formula:

CR = CI / RC (2)

Where:

CR = Consistency Ratio
CI = Consistency Index
IR = Radom Consistency Index

g) Examining the consistency of the hierarchy, if the value is more than 10%, then the judgment data assessment must be improved. However, if the Hirarky Consistency Ratio (CI / IR) is less than or equal to 0.1, the calculation results are stated correctly.

2.5. Weighted Aggregated Sum Product Assessment (WASPAS) Method

The WASPAS method is a combination of the WP and SAW methods, where the WP and SAW methods require linear normalization and matrix elements. In the study, the authors used the WASPAS method to provide better results on systems based on decision support systems[15][16][17]. Below this is the work step of applying the WASPAS method WASPAS[18][19][15] namely:

a) Prepare a Matrix

$$Xij = \begin{bmatrix} x11 & x12 & \cdots & x1n \\ x21 & x22 & \vdots\vdots & x2n \\ \cdots & \cdots & & \cdots \\ xm1 & xm2 & xm3 & xmn \end{bmatrix} \quad (3)$$

b) Normalize the Rij value with the following formula:

Benefit Criteria

$$r_{ij} = \frac{xij}{MaxiXij} \quad (4)$$

Cost Criteria

$$r_{ij} = \frac{MiniXij}{Xij} \quad (5)$$

c) Calculate the alternative value (Qi) using the following formula:

$$Qi = \sum_{j}^{n} =1 \; RijWj + 0.5 \prod_{j}^{n} = 1(Rij)Wj \quad (6)$$

The best Qi value is the highest value.

3. Result and Discussion

The process of determining the performance of the best teachers at SD IT Al-Munadi, Marelan Medan each alternative teacher within a certain period will be assessed based on the criteria that have been determined. Each alternative will be calculated based on the specified criteria, namely Test Score, Attendance, Leadership, Attitude. Application of the WASPAS method, each of the specified criteria is given a different value and weight according to the priority of the decision-making, thus results will be obtained with an alternative of effective graduation from each participant in the catechism. The results of the research at SD IT Al-Munadi, Marelan Medan obtained a list of teachers whose performance will be calculated. The following is a list of alternatives obtained from Al-Munadi, Marelan Elementary School in Medan and the criteria used in determining graduation.

Table 1. Criteria in Determining the Best Performance

Criteria	Description
C_1	Understand the characteristics of students
C_2	Understand with learning theory and principles of learning that educate
C_3	Curriculum development of subjects
C_4	Educating learning activities
C_5	Understand and develop potential
C_6	Communication with students
C_7	Assessment and evaluation
C_8	Acting in accordance with Indonesian religious, legal, social and cultural norms
C_9	A mature and exemplary personality
C_{10}	Having a work ethic, high responsibility, pride in being a teacher
C_{11}	Be inclusive, act objectively, and not discriminate
C_{12}	Communication Ability
C_{13}	Understand with subject matter being taught
C_{14}	Develop professionalism through reflective action

Table 2. List of Alternatives (Teacher)

Teacher Name	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}
Sahirin	Very Good	Good	Very Good	Very Good	Very Good	Good	Good	Very Good	Very Good	Good	Very Good	Good	Good	Good
Khairunisah	Good	Very Good	Good	Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Good	Good	Very Good	Good
Hasanah	Good	Good	Good	Good	Very Good	Very Good	Good	Very Good	Very Good	Good	Good	Very Good	Good	Very Good
Muh. Zaky	Very Good	Good	Very Good	Very Good	Good	Good	Very Good	Good	Good	Good	Very Good	Very Good	Good	Very Good
Yudha	Very Good	Very Good	Very Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Good	Very Good	Very Good
Naimah	Very Good	Very Good	Good	Good	Very Good	Good	Good	Good	Very Good	Good	Good	Very Good	Very Good	Very Good
Satria	Very Good	Good	Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Good	Good	Very Good	Good	Very Good
Budi Santoso	Very Good	Very Good	Very Good	Good	Very Good	Very Good	Very Good	Good	Good	Very Good	Very Good	Good	Very Good	Good
Yoga P	Very Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Good	Very Good	Good	Good	Very Good
Heny Ariza	Good	Good	Good	Very Good	Very Good	Good	Very Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Very Good
Leli Rusman	Good	Very Good	Good	Good	Good	Good	Good	Good	Very Good	Good	Very Good	Good	Good	Good
Rismaniar	Very Good	Good	Very Good	Good	Very Good	Very Good	Good	Very Good	Very Good	Very Good	Good	Good	Very Good	Very Good
Riska	Very Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Very Good	Good	Very Good	Very Good	Good	Very Good	Good
Saadah	Very Good	Good	Very Good	Good	Good	Very Good	Good	Good	Very Good	Very Good	Very Good	Good	Good	Very Good
Rizky Sari	Good	Very Good	Very Good	Very Good	Very Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Good

The weighting of alternative values and criteria using table 3 as follows:

Table 3. Criteria for Weighting Criteria

Description	Weighted
Very Good	4
Good	3
Enough	2
Not Good	1

So that the match rating can be seen in table 4.

Table 4. Alternative Match Ratings

Teacher Name	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}
A1	5	4	5	5	5	4	4	5	5	4	5	4	4	4
A2	4	5	4	4	5	4	5	4	5	5	4	4	5	4
A3	4	4	4	4	5	5	4	5	5	4	4	5	4	5
A4	5	4	5	5	4	4	5	4	4	4	5	5	4	5
A5	5	5	5	4	5	5	5	5	5	5	5	4	5	5
A6	5	5	4	4	5	4	4	4	5	4	4	5	5	5
A7	5	4	4	5	4	5	4	5	5	4	4	5	4	5
A8	5	5	5	4	5	5	5	4	4	5	5	4	5	4
A9	5	4	5	5	5	5	5	5	5	4	5	4	4	5
A10	4	4	4	5	5	4	5	5	4	5	4	5	5	5
A11	4	5	4	4	4	4	4	4	5	4	5	4	4	4
A12	5	4	5	4	5	5	4	5	5	5	4	4	5	5
A13	5	5	4	5	4	5	5	5	4	5	5	4	5	4
A14	5	4	5	4	4	5	4	4	5	5	5	4	4	5
A15	4	5	5	5	5	4	5	5	5	5	5	5	5	4

The initial step must be to calculate weights, according to the priority criteria for teacher performance. At this stage, the AHP method is used to determine the weighting of the criteria used.

The following are the steps for applying the AHP method.

a) Create a pairwise comparison matrix based on the Saaty table

Table 5. Paired value comparison scale of intensity of interest

1	Both elements are equally important
3	One element is slightly more important than the other elements
5	An element is more important than other elements
7	An absolute important element compared to other elements
9	An absolutely clear element is more important than the other elements
2, 4,6.8	The value of comparison between elements is very close

Table 6. Criteria Comparison Matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	1	1	1	1	1	3	3	3	3	5	5	5	7	7
C2	1.00	1	1	1	3	3	3	5	5	5	5	7	7	9
C3	1.00	1.00	1	1	1	1	1	3	3	3	5	5	5	7
C4	1.00	1.00	1.00	1	1	1	3	3	3	5	5	5	7	7
C5	1.00	0.33	1.00	1.00	1	1	1	1	3	2	2	4	4	4
C6	0.33	0.33	1.00	1.00	1.00	1	1	2	2	2	4	4	4	6
C7	0.33	0.33	1.00	0.33	1.00	1.00	1	1	1	1	3	3	3	3
C8	0.33	0.20	0.33	0.33	1.00	0.50	1.00	1	1	2	2	3	3	5
C9	0.33	0.20	0.33	0.33	0.33	0.50	1.00	1.00	1	2	2	2	4	4
C10	0.20	0.20	0.33	0.20	0.50	0.50	1.00	0.50	0.50	1	2	3	3	5
C11	0.20	0.20	0.20	0.20	0.50	0.25	0.33	0.50	0.50	0.50	1	3	3	5
C12	0.20	0.14	0.20	0.20	0.25	0.25	0.33	0.33	0.50	0.33	0.33	1	2	2
C13	0.14	0.14	0.20	0.14	0.25	0.25	0.33	0.33	0.25	0.33	0.33	0.50	1	4
C14	0.14	0.11	0.14	0.14	0.25	0.17	0.33	0.20	0.25	0.20	0.20	0.50	0.25	1
Total	7.22	6.20	8.74	7.89	12.08	13.42	17.33	21.87	24.00	29.37	36.87	46.00	53.25	69.00

b) Make a matrix for normalized criteria

Table 7. Normalization of the criteria matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	0.14	0.16	0.11	0.13	0.08	0.22	0.17	0.14	0.13	0.17	0.14	0.11	0.13	0.10
C2	0.14	0.16	0.11	0.13	0.25	0.22	0.17	0.23	0.21	0.17	0.14	0.15	0.13	0.13
C3	0.14	0.16	0.11	0.13	0.08	0.07	0.06	0.14	0.13	0.10	0.14	0.11	0.09	0.10
C4	0.14	0.16	0.11	0.13	0.08	0.07	0.17	0.14	0.13	0.17	0.14	0.11	0.13	0.10
C5	0.14	0.05	0.11	0.13	0.08	0.07	0.06	0.05	0.13	0.07	0.05	0.09	0.08	0.06
C6	0.05	0.05	0.11	0.13	0.08	0.07	0.06	0.09	0.08	0.07	0.11	0.09	0.08	0.09
C7	0.05	0.05	0.11	0.04	0.08	0.07	0.06	0.05	0.04	0.03	0.08	0.07	0.06	0.04
C8	0.05	0.03	0.04	0.04	0.08	0.04	0.06	0.05	0.04	0.07	0.05	0.07	0.06	0.07
C9	0.05	0.03	0.04	0.04	0.03	0.04	0.06	0.05	0.04	0.07	0.05	0.04	0.08	0.06
C10	0.03	0.03	0.04	0.03	0.04	0.04	0.06	0.02	0.02	0.03	0.05	0.07	0.06	0.07
C11	0.03	0.03	0.02	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.03	0.07	0.06	0.07
C12	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.04	0.03
C13	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.06
C14	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01

Table 8. Priority Results

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	0.14	0.16	0.11	0.13	0.08	0.22	0.17	0.14	0.13	0.17	0.14	0.11	0.13	0.10
C2	0.14	0.16	0.11	0.13	0.25	0.22	0.17	0.23	0.21	0.17	0.14	0.15	0.13	0.13
C3	0.14	0.16	0.11	0.13	0.08	0.07	0.06	0.14	0.13	0.10	0.14	0.11	0.09	0.10
C4	0.14	0.16	0.11	0.13	0.08	0.07	0.17	0.14	0.13	0.17	0.14	0.11	0.13	0.10
C5	0.14	0.05	0.11	0.13	0.08	0.07	0.06	0.05	0.13	0.07	0.05	0.09	0.08	0.06
C6	0.05	0.05	0.11	0.13	0.08	0.07	0.06	0.09	0.08	0.07	0.11	0.09	0.08	0.09
C7	0.05	0.05	0.11	0.04	0.08	0.07	0.06	0.05	0.04	0.03	0.08	0.07	0.06	0.04
C8	0.05	0.03	0.04	0.04	0.08	0.04	0.06	0.05	0.04	0.07	0.05	0.07	0.06	0.07
C9	0.05	0.03	0.04	0.04	0.03	0.04	0.06	0.05	0.04	0.07	0.05	0.04	0.08	0.06
C10	0.03	0.03	0.04	0.03	0.04	0.04	0.06	0.02	0.02	0.03	0.05	0.07	0.06	0.07
C11	0.03	0.03	0.02	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.03	0.07	0.06	0.07
C12	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.04	0.03
C13	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.06
C14	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01
	1	1	1	1	1	1	1	1	1	1	1	1	1	1

∑row	Priority
1.930	0.138
2.343	0.167
1.560	0.111
1.781	0.127
1.162	0.083
1.157	0.083
0.839	0.060
0.740	0.053
0.668	0.048
0.586	0.042
0.469	0.034
0.302	0.022
0.276	0.020
0.186	0.013
	1

c) Calculating the maximum value:

The maximum value is obtained by multiplying the total value ∑ by the priority value or by using the formula as follows:

$$W_i = \sum_{i=1}^{i=n} \text{Total}_i * \text{Prioritas}_i \quad (6)$$

W_i= (7.22*0.138)+(6.20*0.167)+(8.74*0.111)+(7.89*0.127)+
(12.08*0.083)+(13.42*0.083)+(17.33*0.060)+(21.87*0.053)+
(24*0.048)+(29.37*0.042)+(36.87*0.034)+(46*0.022)+
(53.25*0.020)+(69*0.013)

= 14,888

$$CI = \frac{W_i - \text{Total of Criteria}}{\text{Total of Criteria} - 1}$$

$$CI = \frac{w_i - n}{n} = \frac{14.888 - 14}{14 - 1} = 0.068$$

To test the consistency of the criteria above, proof is made whether the consistency value is equal to 0.1 or less than 0.

$$CR = \frac{CI}{RI} = \frac{0.058}{1.57} = 0.043$$

Then it can be concluded that the resulting consistency value meets the provisions

Table 9. Criteria Weight Value

Criteria	Weighted	Type
C1	0.138	Benefit
C2	0.167	Benefit
C3	0.111	Benefit
C4	0.127	Benefit
C5	0.083	Benefit
C6	0.083	Benefit
C7	0.060	Benefit
C8	0.053	Benefit
C9	0.048	Benefit
C10	0.042	Benefit
C11	0.034	Benefit
C12	0.022	Benefit
C13	0.020	Benefit
C14	0.013	Benefit

From the results of AHP implementation, the final weighting of each criterion is obtained as shown in table 9 above.

After the weights are determined, the next steps in calculating the Teacher's performance by applying the WASPAS method:

1) Prepare a decision matrix

The Xij Matrix, namely:

Xij=

5	4	5	5	5	4	4	5	5	4	5	4	4	4
4	5	4	4	5	4	5	4	5	5	4	4	5	4
4	4	4	4	5	5	4	5	5	4	4	5	4	5
5	4	5	5	4	4	5	4	4	4	5	5	4	5
5	5	5	4	5	5	5	5	5	5	5	4	5	5
5	5	4	4	5	4	4	4	5	4	4	5	5	5
5	4	4	5	4	5	4	5	5	4	4	5	4	5
5	5	5	4	5	5	5	4	4	5	5	4	5	4
5	4	5	5	5	5	5	5	5	4	5	4	4	5
4	4	4	5	5	4	5	5	4	5	4	5	5	5
4	5	4	4	4	4	4	4	5	4	5	4	4	4
5	4	5	4	5	5	4	5	5	5	4	4	5	5
5	5	4	5	4	5	5	5	4	5	5	4	5	4
5	4	5	4	4	5	4	4	5	5	5	4	4	5
4	5	5	5	5	4	5	5	5	5	5	5	5	4

2) Normalizing the matrix

The results of the calculation of the normalized matrix are as follows:

$$
Rij = \begin{vmatrix}
1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 & 1.00 & 1.00 \\
0.80 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 1.00 \\
0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 1.00 & 0.80 \\
1.00 & 0.80 & 1.00 & 1.00 & 1.00 & 1.00 & 0.80 & 1.00 & 1.00 & 1.00 & 0.80 & 0.80 & 1.00 & 0.80 \\
1.00 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 0.80 \\
1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 1.00 & 1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 \\
1.00 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 1.00 & 0.80 \\
1.00 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 \\
1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 & 1.00 & 0.80 \\
0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 0.80 \\
0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 1.00 & 1.00 & 1.00 & 0.80 & 1.00 & 0.80 & 1.00 & 1.00 & 1.00 \\
1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 \\
1.00 & 1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 0.80 & 0.80 & 1.00 & 0.80 & 1.00 \\
1.00 & 0.80 & 1.00 & 0.80 & 1.00 & 0.80 & 1.00 & 1.00 & 0.80 & 0.80 & 0.80 & 1.00 & 1.00 & 0.80 \\
0.80 & 1.00 & 1.00 & 1.00 & 0.80 & 1.00 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 0.80 & 1.00
\end{vmatrix}
$$

3) Calculating Preferences

The results of the preferences can be seen in table 10.

Table 10. Preferences Value

Alternative	Teacher Name	Qi Value
A1	Sahirin	0.921
A2	Khairunisah	0.872
A3	Hasanah	0.830
A4	Muhammad Zaky	0.939
A5	Yudha	0.885
A6	Naimah	0.913
A7	Satria	0.898
A8	Budi Santoso	0.908
A9	Yoga P	0.890
A10	Heny Ariza	0.856
A11	Leli Rusman	0.906
A12	Rismaniar	0.871
A13	Riska	0.917
A14	Saadah	0.895
A15	Rizky Sari	0.898

4) Rangking

At the end of the calculation, the ranking of the teacher's performance is carried out.

Table 11. Rangking

No	Alternative	Teacher Name	Performance Value	Description
1	A4	Muhammad Zaky	0.939	Very Good
2	A1	Sahirin	0.921	Very Good
3	A13	Riska	0.917	Very Good
4	A6	Naimah	0.913	Very Good
5	A8	Budi Santoso	0.908	Very Good
6	A11	Leli Rusman	0.906	Very Good
7	A15	Rizky Sari	0.898	Good
8	A7	Satria	0.898	Good
9	A14	Saadah	0.895	Good
10	A9	Yoga P	0.89	Good
11	A5	Yudha	0.885	Good
12	A2	Khairunisah	0.872	Good
13	A12	Rismaniar	0.871	Good
14	A10	Heny Ariza	0.856	Good
15	A3	Hasanah	0.83	Enough

From the results of table 11 it was determined that the results of participants below 0.8500 were stated to have sufficient performance, so from the list above it could be said that there were 14 teachers who had a good and very good performance.

4. Conclusion

Based on the results of research at SD IT Al-Munadi Marelan Medan obtained conclusions, namely:

a) The procedure for calculating values still uses a manual process, because it has not used a computer-based information system.
b) The application of AHP and WASPAS methods in determining Teacher Performance can produce good and effective decisions.
c) The decision support system is expected to be able to help Al-Munadi Marelan Medan Elementary School in determining teacher performance effectively and efficiently.

References

[1] A. P. Windarto, D. Hartama, and S. Solikhun, "Sistem Pendukung Keputusan Pemilihan Guru Terbaik Pada SMK," no. April 2017, 2016.
[2] T. Mufizar, Susanto, and N. Nurjayanti, "Sistem Pendukung Keputusan Penilaian Kinerja Guru di SDN Mohammad Toha Menggunakan Metode Analytical Hierarchy Process (AHP)," *Konf. Nas. Sist. Inform. - STMIK STIKOM Bali*, no. October 2015, pp. 581–586, 2015.
[3] A. Paramita, F. A. Mustika, and N. Farkhatin, "Aplikasi Sistem Pendukung Keputusan Guru Terbaik Berdasarkan Kinerja dengan Metode Analytical Hierarchy Process (AHP)," *Teknosi*, vol. 03, no. 01, pp. 9–18, 2017.
[4] K. R. Prasetyowati and T. Sutojo, "Sistem Pendukung Keputusan Penilai Kinerja Guru (PKG) Menggunakan Metode Simple Additive Weighting (SAW) (Studi Kasus sma Negeri 9 Semarang," pp. 1–5, 2009.
[5] I. Saputra, S. I. Sari, and Mesran, "Penerapan Elimination And Choice Translation Reality (ELECTRE) Dalam Penentuan Kulkas Terbaik," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. I, pp. 295–305, 2017.
[6] S. H. Sahir, R. Rosmawati, and K. Minan, "Simple Additive Weighting Method to Determining Employee Salary Increase Rate," *Int. J. Sci. Res. Sci. Technol.*, vol. 3, no. 8, pp. 42–48, 2017.
[7] G. Ginting, Fadlina, Mesran, A. P. U. Siahaan, and R. Rahim, "Technical Approach of TOPSIS in Decision Making," *Int. J. Recent Trends Eng. Res.*, vol. 3, no. 8, pp. 58–64, 2017.
[8] S. H. Sahir *et al.*, "The Preference Selection Index Method in Determining the Location of Used Laptop Marketing," *Int. J. Eng. Technol.*, vol. 7, pp. 260–263, 2018.
[9] D. Nofriansyah and S. Defit, *Multi Criteria Decision Making (MCDM) pada Sistem Pendukung Keputusan*. 2018.
[10] S. Kusumadewi, S. Hartati, A. Harjoko, and Retantyo Wardoyo, *Fuzzy Multi-Attribute Decision Making (FUZZY MADM)*. 2006.
[11] D. Nofriansyah, *Konsep Data Mining Vs Sistem Pendukung Keputusan*. 2015.
[12] Kusrini, *Konsep Dan Aplikasi Pemdukung Keputusan*. Yogyakarta: Andi, 2007.
[13] G.-H. Tzeng and J.-J. Huang, *Multiple Attribute Decision Making Method And Applications*. CRC Press, 2011.
[14] T. Limbong *et al.*, *Sistem Pendukung Keputusan: Metode & Implementasi*. Medan: Yayasan Kita Menulis, 2020.
[15] S. Chakraborty and E. K. Zavadskas, "Applications of WASPAS Method in Manufacturing Decision Making," *Informatica*, vol. 25, no. 1, pp. 1–20, 2014.
[16] P. Simanjuntak, I. Irma, N. Kurniasih, M. Mesran, and J. Simarmata, "Penentuan Kayu Terbaik Untuk Bahan Gitar Dengan Metode Weighted Aggregated Sum

Product Assessment (WASPAS)," *J. Ris. Komput.*, vol. 5, no. 1, pp. 36–42, 2018.
[17] E. D. Marbun, L. A. Sinaga, E. R. Simanjuntak, D. Siregar, and J. Afriany, "Penerapan Metode Weighted Aggregated Sum Product Assessment Dalam Menentukan Tepung Terbaik Untuk Memproduksi Bihun," vol. 5, no. 1, pp. 24–28, 2018.
[18] E. K. Zavadskas, J. Antucheviciene, J. Saparauskas, and Z. Turskis, "MCDM methods WASPAS and MULTIMOORA: Verification of robustness of methods when assessing alternative solutions," *Econ. Comput. Econ. Cybern. Stud. Res.*, vol. 47, no. 2, 2013.
[19] D. O. Madić, M., Gecevska, V., Radovanović, M., Petković, "Multi-criteria economic analysis of machining processes using the waspas method," *J. Prod. Eng.*, vol. 17, no. 2, pp. 79–82, 2014.

Authors

1st Author
Mesran
Departement of Computer Science, STMIK Budi Darma, Medan, Indonesia

2nd Author
Suginam
Departement of Computer Science, STMIK Budi Darma, Medan, Indonesia

3rd Author
Dito Putro Utomo
Departement of Computer Science, STMIK Budi Darma, Medan, Indonesia