Implementation of Simple Additive Weighting Method in Teachers Teaching Assessment Quality

Tonni Limbong[1,3], Lamhot Sitorus[1], Desinta Purba[1] and Janner Simarmata[2]

[1]Faculty of Computer Science, Universitas Katolik Santo Thomas Medan, Medan –Indonesia
[2]Faculty of Economics, Universitas Negeri Medan, Medan –Indonesia
[3]Student of Doctoral Program Education Technology, Universitas Negeri Medan, Medan –Indonesia

Abstract: Activities in improving the quality of education, especially the quality of implementing teacher teaching and learning activities, the level of welfare and teacher education are currently carried out according to views from outside and within the school environment. Too much technical and objective educational wisdom. One of the problems of education is the assessment of the quality of teaching teachers. A principal has not been able to determine exactly who the teacher has good quality in teaching, so the this problem is solved by applying the Simple Additive Weighting (SAW) method in making decisions by making the weight of each alternative choice according to the many criteria. The alternative choice with the greatest weight is an a alternative choice recommended as a quality teacher in teaching. Based on the results of trials and evaluations made able to provide information and decisions that can help in determining the assessment of the quality of teaching teachers.

1 INTRODUCTION

The performance of a teacher can increase if there is a match between work and expertise, as well as in terms of the placement of a teacher must be in accordance with the field. If a teacher is given a task that is not in accordance with the field of expertise, his competence will can reduce teacher performance, and can cause a feeling of dissatisfaction with their performance. Efforts to improve teacher performance such as by accepting the presence of new teachers well at school; giving teaching assignments in accordance with the fields and competencies that are controlled; form a working group of study teachers and teacher meetings of the same field of study, as a medium for teachers in discussing planning and solving problems that occur in class with other teachers, evaluating and reviewing the administration and academics of new teachers as a material for improvement and policy making administrative, academic coaching, as well as teacher career development, open opportunities for new teachers to take part in training both at schools, at the district level, at the provincial level and at the national level and provide rewards to teachers who excel and provides sanction problematic teachers.

As for the formulation of the problem in this study, is about How to determine the criteria in the assessment of teacher teaching quality, How to apply the Simple Additive Weighting (SAW) method on the of teacher teaching quality so that the results of the assessment are optimal and far from mistakes so in determining which teacher who are worthy of getting a reward are not mistaken and can be done easily after getting the values of each criterion that has been agreed and determined (Limbong, 2013a), (Meilina, Rosanti and Astryani, 2017).

2 THEORICAL FOUNDATION

2.1 Decision Support Systems

Decision support is a technique for organizing an information (by involving the use of a database) which is intended to be used in making the right decisions(Limbong et al., 2018). Decision support systems are designed to solve problems for decision maker, but not to replace decisions and make

decisions. Decision Support System as a system that is ready to be developed and expanded so that it can support data analysis and modeling a decision, oriented towards future planning, and used in units of irregular and unplanned time intervals(Simarmata et al., 2018).

2.2 Simple Additive Weighting Method (SAW)

Fuzzy Multiple Attribute Decision Making (FMADM) is a method to find optimal a alternatives from a number of alternatives that exist with certain criteria by determining the weight value on each attribute, then proceed to the ranking process for selecting (Limbong and Limbong, 2018)(Nofriansyah and Defit, 2017). There are 3 (three) approaches looking for attribute weight values, namely with a subjective approach, with an objective approach and with an integrated approach between subjective and objective. With a subjective approach the value of weight is taken based on subjectivity so that several factors the alternative ranking process can be determined freely(Limbong, 2013a). While the objective approach, the weight value is calculated by mathematical formula must ignore the subjectivity of the decision maker.

The Simple Additive Weighting method is also known as the weighted addition method. The concept of the Simple Additive Weighting method is to find a weighted sum of each performance rating on each alternative on all attributes.

$$r_{ij} = \begin{cases} \frac{x_{ij}}{max(ij)} & \text{If } j \text{ is the profit attribute (benefit)} \\ \frac{min(xij)}{x_{ij}} & \text{if } j \text{ is the cost attribute (Cost)} \end{cases} \quad \text{....... (2.1)}$$

Under the condition :

a. The profit attribute if the attribute gives a benefit to the decision maker and the cost attribute is the attribute that provides expenditure if the value increases for decision makers [5].

b. In the form of profit attributes, the value (X_{ij}) of each attribute column is divided by the value MAX (X_{ij}) from each column, while for the cost attribute using the MIN value (X_{ij}) of each attribute column divided by the value (X_{ij}) for each column.

Specifies the Preference value:

$$v_i = \sum_{j=1}^{n} w_j r_{ij} \quad \text{.......................(2.2)}$$

A higher V_i value indicates that the alternative A_i is a better alternative.

2.3. Quality of Teaching Teachers

Teacher quality is the ability possessed by a teacher to be transferred to his students. Important activities that are needed by a teacher in improving the quality

of teaching so that they can continue to support their promotion to the highest level. First, teachers must exchange ideas about matters relating to experience developing a knowledge of subject matter and interaction with students (Limbong, 2013b). This exchange of ideas can be carried out in the teacher in a teacher's work studio, or in seminars related to that (Sudarsana et al., 2018). Scientific activities must always raise the topic of discussion about all that is applicable. That is, each meeting result must be used directly to improve the quality of the teaching and learning process. It should be noted, in a scientific activity such as this, it is better that factors which are of a structural administrative nature must be ignored and not included. For example, it is not necessary and is not mandatory that the head of each meeting must be the principal.

3 RESULT AND DISCUSSION

3.1. Problem analysis

Assessing the quality of teaching teachers in schools is not a simple matter. There needs to be good ability in making a standard of assessment. The standard for evaluating the quality of teaching good teachers does not just appear. Need agreement from the party that will assess (the principal) and the teacher to be assessed. Thus the process of assessing the quality of teaching teachers is achieved, not to find fault but to improve quality so that learning activities in the school can run better, and how the school can help teachers better in conducting learning in the classroom.

Table 1: Percentage values for criteria

No	Criteria	Percentage
1	Timeliness of starting lessons	15%
2	Ability and skill in mastering the Material	30%
3	Repeats a material	10%
4	Fair and objective	20%
5	Mastery of the use of Learning Teaching tools	25%

In this study the alternative teachers assessed were marked with A1 to A4, with descriptions as follows:

Table 2: Alternative Teacher Data

Alternative	Teacher Names
A1	Teacher A
A2	Teacher B
A3	Teacher C
A4	Teacher D

As an example of a calculation on Simple Additive Weighting (SAW), after a performance assessment is obtained the value of teacher performance as in table 3. The following:

Table 3: Alternative Options and Value Tables

No	Alternative	C1	C2	C3	C4	C5
1	A1	75	80	65	79	65
2	A2	87	75	82	85	76
3	A3	69	84	78	88	80
4	A4	85	72	55	92	70

3.2. Application of the SAW Method

In this case the variable C is identified as an identity to determine the terms or conditions for evaluating the teaching and learning process. The criteria for consideration in the following assessment of the teaching learning process.

a. Provides Weight Criteria
To determine the weight of the teacher criteria is shown in table 4. below:

Table 4: Weight for criteria

Criteria	Weight	Value
(C1) Timeliness of starting lesson	15%	0.15
(C2) Ability and mastery skills Material	30%	0.30
(C3) Repeates a material	10%	0.10
(C4) Fair and Objectivest	20%	0.20
(C5) Mastery of the use of Learning Props	25%	0.25

From table 5, weights (W) are obtained with data
W = [0.15 0.30 0.10 0.20 0.25]

b. Calculating Normalization
To calculate normalization benefit using formula, with the following:
$$r_{ij} = \frac{x_{ij}}{\max(x_{ij})} \quad \text{..............} (3.1)$$

Table 5: Alternative Value Data of by Criteria

Alternative	C1	C2	C3	C4	C5
A1	75	80	65	79	65
A2	87	75	82	85	76
A3	69	84	78	88	80
A4	85	72	55	92	70

Retrieving Maximal Values on each criterion (Column)
a. Column C1 = 87
b. Column C2 = 84
c. Column C3 = 82
d. Column C4 = 92
e. Column C5 = 80
Application of the formula:

Table 6: Calculation of Normalization

A₁	75/87	80/84	65/82	79/92	65/80
A₂	87/87	75/84	82/82	85/92	76/80
A₃	69/87	84/84	78/82	88/92	80/80
A₄	85/87	72/84	55/82	92/92	70/80

Table 7: Normalization Calculation Results

A₁	0.86206897	0.95238095	0.79268293	0.85869565	0.8125
A₂	1	0.89285714	1	0.92391304	0.95
A₃	0.79310345	1	0.95121951	0.95652174	1
A₄	0.97701149	0.85714286	0.67073171	1	0.875

c. Preferences Calculating (Ranking)
From the calculation rank process using the following formula:
$$v_i = \sum_{j=1}^{n} w_j r_{ij} \quad \text{.............} (3.2)$$

Where is weights W = [0.15 0.30 0.10 0.20 0.25]
Then all data in table 7 are multiplied by the weight value W.

Table 8: Results of Multiplication of R with W

A₁	0.15	0.3	0.1	0.2	0.25	0.869157
A₂	0.12931	0.28571	0.07927	0.17174	0.20313	0.94014
A₃	0.15	0.26786	0.1	0.18478	0.2375	**0.955392**
A₄	0.11897	0.3	0.09512	0.1913	0.25	0.889518

So obtained the results as above, the ranking process is carried out, that the best value is obtained with by the largest value, as in table 9 below:

Table 9: Ranking Results

Alternative (Teacher)	CRITERIA					Ranking Results
	C1	C2	C3	C4	C5	
A_3 (Teacher C)	0.15	0.26786	0.1	0.18478	0.2375	0.955392
A_2 (Teacher B)	0.12931	0.28571	0.07927	0.17174	0.20313	0.94014
A_4 (Teacher D)	0.11897	0.3	0.09512	0.1913	0.25	0.889518
A_1 (Teacher A)	0.15	0.3	0.1	0.2	0.25	0.869157

The biggest value is A3, so the A3 alternative is a recommendation for the quality of teaching teachers with the highest value, namely Teacher C.

4 CONCLUSIONS

The conclusions obtained from the this research is:
1. The process of calculating the SAW method in this decision-making system is based on the weight value of each specified criterion.
2. Procedure for evaluating teacher teaching quality is seen from the timeliness of starting lessons, Ability and Skills mastery of Materials, Repeating material, Objective and Fair, Mastery of the use of Learning Teaching tools. With the percentage weight of each criterion 15%, 30%, 10%, 20%, and 25%.
3. The decision-making system using the SAW method can be done by using other methods in the process of calculating the criteria weight value.
4. Decision Support Systems for assessing the quality of teaching teachers using the SAW method can be further developed by adding other criteria that can support decision making.

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