



Model for evaluating the performance of elementary school teachers using the analytical hierarchy process

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ARTICLE INFO

Article history:

Received Feb 02, 2023

Revised Feb 16, 2023

Accepted Feb 28, 2023

Keywords:

Analytical Hierarchy Process;
Decision Support Model;
Evaluating Performance;
Teacher;

ABSTRACT

The significance of analyzing teacher performance in order to develop future competency, which might lead to rewarding teachers who have been evaluated according to established assessment criteria. Numerous studies have been conducted to aid in the process of evaluating teacher performance, revealing that the problem of evaluating teacher performance involves multi-attribute decision making problems; therefore, this study aims to use the AHP method as a decision support method due to the benefits of AHP in describing the relationship between criteria, attributes, and alternatives via a decision hierarchy structure. The evaluation standards include Discipline (C1), Service Orientation (C2), Integrity (C3), and Cooperation (C4) (C4). The results demonstrated that there are recommendations for decision results, namely determining the priority weight of the criteria so that the value of each alternative can be maximized in each criterion, with assessment techniques tailored to the existing business processes in each school. The determination of objective criteria priority weights can also influence the final ranking results of the evaluation of elementary school teachers' performance.

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1. INTRODUCTION

In formal education, teachers are professional educators whose primary responsibility is to educate, instruct, guide, train, assess, and evaluate pupils in early childhood education, basic education, and secondary school. Teachers are considered professional (SONO, 2020a) if the learning process consists of multiple aspects or components. In the learning process, teachers are evaluated to determine their performance, such as their capacity to solve problems and implement effective teaching strategies in accomplishing educational objectives (Imaduddin et al., 2022; SONO, 2020c).

Teacher performance is the ability of a teacher to carry out learning tasks at school and is responsible for students under his guidance by increasing student learning achievement (Subroto & Kristanti, 2022). For example, the performance of elementary school teachers in learning is the most important part in supporting the creation of an effective educational process in building discipline and student learning outcomes. Good elementary school teacher performance will result in good student learning achievement (Juniardi & Lakawa, 2022; Mustofa, 2019). The implementation of teacher performance appraisal adapts to business processes in each elementary school, usually includes an assessment carried out in one school year, at least carrying out performance appraisal twice, namely at the beginning of the school year and at the end of the school year. This means that every semester the teacher will be assessed for his performance. The value or score that is recorded is not yet in the assessment based on the parameters of the assessment size according to systematic rules, but based on the assumption of mastery of learning and teaching theory from each member of the designated Teacher Performance Assessment team (Cakranegara et al., 2022). Teacher performance appraisal is needed to find out how far a teacher is successful or not at work during a predetermined work period and to provide feedback for the teacher himself to make improvements and review the quality of his performance. (SONO, 2020b).

The importance of assessing teacher performance so that later competence can increase and can lead to giving rewards to teachers who have an assessment that fits the assessment criteria. Some research that discusses teacher assessment with decision support methods by (Hanif et al., 2020) who explained that the assessment by implementing a decision support system can facilitate the process of weighting complex criteria, further research by (Susilowati et al., 2018) which explains the use of decision support systems aimed at producing objective and quick teacher assessments, (Susilowati et al., 2018) explains the decision-making technique needed in evaluating alternative values for each selected criterion so that it makes it easier to process the ranking results.

In general, some of the problems in teacher performance include business processes and document recording, such as when each teacher collects files not simultaneously, the assessment results sheets are not collected together, the supervisor must look for assessment sheets to make reports to the Head Schools, this makes reporting teacher performance scores slow because it takes time to search for files. Many pedagogic competency assessment indicators are needed and the assessment process is still potentially subjective (Idrus et al., 2022). Error during assessment recapitulation. When documents are collected, they are often damaged and confused. This causes the results of the teacher performance appraisal process to be wrong or inaccurate, so a system is needed that can overcome this problem so that it can provide more accurate services and make it easier for supervisors to carry out the teacher performance appraisal process. (Ismaya et al., 2023).

Many problems in determining teacher performance are solved using the Multi Attribute Decision Making (MADM) method. An example is the Analytical Hierarchy Process (AHP) method which is a decision support method for multi-criteria problems, in several related studies applying the AHP method, namely by (Hariri & Diana, 2021) who carried out a combination of the AHP-TOPSIS method in determining teacher assessment decisions, the AHP method was proven to be able to produce objective decisions on the problem of determining the best teacher (Aminuddin et al., 2022; Pramana et al., 2022). In conducting research comparisons, of course the difference in current research is the model of assessment that can be carried out on teacher performance appraisal problems. Prior research has demonstrated that decision-making techniques can be applied to teacher performance appraisal problems in order to generate objective decisions. This study focuses on an assessment model that can aid the teacher performance appraisal team in calculating performance evaluations by utilizing the hierarchical structure of AHP in describing problems, criteria, assessment techniques, and alternatives. Yet the

fact that each criterion is contradictory and significant can be solved with AHP pairwise comparison techniques.

This study aims to use the AHP method as a decision support method due to the advantages of AHP in describing the relationship between criteria, attributes and alternatives through structure. decision hierarchy. Each criterion and alternative conflict can be carried out based on the pairwise comparison matrix so that it is not based on the subjectivity of the decision maker, and there is a calculation of the consistency of each pairwise comparison which has a predetermined value. With a simple assessment model, it will certainly make it easier for complex decision makers, due to the understanding of decision makers in determining the weight of the criteria (Dewantara et al., 2022). Focusing on the subject of teacher performance evaluation, the research employs multicriteria decision-making procedures with the AHP method and Likert scale assessment to make it simpler for decision makers to comprehend. The purpose of the assessment model with the AHP technique is to support the decision-making process for evaluating teacher performance so that objective decisions may be made to promote the improvement of teacher performance using a performance evaluation model with appropriate assessment parameters.

2. RESEARCH METHOD

2.1 Decision Process

The capability of decision makers to choose among alternatives based on a number of factors is an integral part of the decision-making process. Making decisions is something that can be done in many different areas, including schooling (Fakeeh, 2015). The ability of decision support systems to solve semi-structured and unstructured problems can support decision makers who have no experience (Haerani & Titop, 2021; Mahrani & Alwi, 2022; Sudipa et al., 2020) in determining priority criteria and criteria weights so that they can produce objective and transparent decisions (Hajar & Mahrani, 2021; Meiryani et al., 2020; Titop et al., 2022).

2.2 Analytical Hierarchy Process Method

The Analytical Hierarchy Process (AHP) method combines qualitative and quantitative analysis (Mauko et al., 2018; Sugiartawan & Hartati, 2018). Quantitative evaluations are based on the Saaty scale, while qualitative criteria can be used to select assessment criteria. In the AHP technique, the degree of relevance of each criterion can be assessed using pairwise comparisons. Decision makers use the AHP approach to determine the total weight. The AHP technique can improve and simplify the identification process by examining the relative importance of criteria and alternatives. The AHP technique permits the insertion of logic for qualitative data, experience, insight, and intuition and is algorithm-implementable (& ., 2018). Thus, it enables decision-makers to determine the relative importance of each criterion and the level of comparison between options. The phases of AHP-based problem resolution are as follows (Bhadra et al., 2022; Sudipa et al., 2022):

1. Hierarchical structure

A hierarchical structure provides a perspective for identifying issues and solutions. Establishment of a hierarchical framework.

2. Create a comparison matrix

The comparison matrix is a square matrix $A = (a_{ij})_{n \times n}$ which over: $a_{ij} > 0$, $a_{ij} = 1/a_{ji}$ and $a_{ii} = a_{jj} = 1$. Value a_{ij} is a comparison of the importance of the criteria to i and with criteria to j .

3. Calculate the product of each element in each row M_i , according to the equation.

$$M_i = \prod_{j=1}^n a_{ij}, \text{ with } j=1,2,3, \dots, n \quad (1)$$

4. according to the equation M_i according to the equation.

$$\lambda_{\max} = \frac{\sum_{i=1}^n \sum_{j=1}^n a_{ij} W_j}{\sum_{j=1}^n a_{ij} W_j} \quad (2)$$

$$\text{value of } \bar{W}_j = \sqrt[n]{M_i} \quad (3)$$

5. Normalization to obtain a normalized weight vector, for the normalization process can be seen in the following equation.

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^n \bar{W}_i} \quad \text{within } i=1,2,3,\dots,n. \quad (4)$$

2.3. Decision Making Hierarchy Model

The model proposed in this study uses the hierarchical structure of the AHP method, the goal is to make it easier to describe the objectives of the problem at the top of the hierarchy, then the assessment criteria, to the alternative at the bottom of the hierarchy. The image of the hierarchical model can be seen in Figure 1 below.

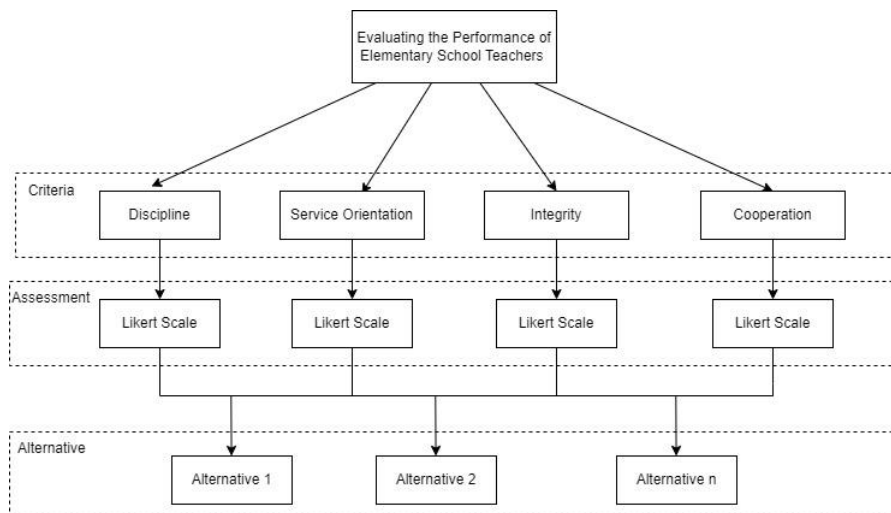


Figure 1. Decision Making Hierarchy

In Figure 1 it can be explained that the decision-making process begins with determining the purpose of the problem at the top of the hierarchy, namely the evaluation of elementary school teacher performance assessments, then at the middle hierarchical level there are the assessment criteria proposed in this study consisting of Discipline criteria (C1), Service Orientation (C2), Integrity (C3) and Cooperation (C4), these criteria are determined based on the parameters in various existing literature and then adjusted to the assessment of elementary school teachers. An alternative scoring technique for each criterion uses a Likert scale, namely a value of 1 to 5 to make it easier to score a value that describes the score from the worst to the best value (Emerson, 2017). At the lowest level of the hierarchy, there are alternatives that are adjusted in number according to the assessment process.

3. RESULTS AND DISCUSSIONS

Assessment Criteria Weight Analysis

The assessment model proposed in this study uses assessment criteria which consists of Discipline (C1), Service Orientation (C2), Integrity (C3) and Cooperation (C4) criteria, these criteria are determined based on the parameters in various existing literature and

then adjusted to the assessment of elementary school teachers. Based on the ability of the AHP method to determine the value of the priority weight of the criteria, then the value of the pairwise comparison matrix is determined for each criterion C1 to criterion C5. The pairwise comparison matrices are determined by providing a time scale value from 1 to 9, but to avoid a gap in values that is too large which will result in inconsistent conditions, that is, if the total priority weight value is < 1 then the value of the pairwise comparison matrix is determined which can be seen in Table 1 below. .

Table 1. Criteria Weight Calculation

Criteria	C1	C2	C3	C4	Priority Weight
C1	1	2	2	5	0.425799
C2	0.5	1	2	5	0.301085
C3	0.5	0.5	1	5	0.212899
C4	0.2	0.2	0.2	1	0.060217
	Total				1
λ_{max}	4.1213				
CI	0.0404				
RI	0.9				
CR	0.0044				

In Table 1 it can be seen that the value of the priority weight (W_j) is 1 and the CR value is $0.0044 < 1$ so that it can be said that the results of calculating the priority weight of the criteria are consistent, so that it can be used to determine the final value of alternative ranking.

Attribute Assessment Analysis

In making it easier for decision makers to provide an assessment of each alternative based on criteria, a Likert scale is used. The purpose of using a Likert scale is to provide a choice of values from 1 to 5 to decision makers, which can be scored as a value statement. An evaluation evaluation will certainly greatly affect the ability of decision makers to carry out objective assessments, so that an alternative assessment scoring process is needed. In table 2 there is a description of the rating scale.

Table 2. Description of the Rating Scale

Scale	Information
5	Very good
4	Good
3	Enough
2	Not enough
1	Very less

Alternative Value Analysis

After the weight of the criteria is determined using the AHP method, as well as the technique of giving scores to alternatives using a Likert scale, then there are 5 alternatives that are used in the simulation calculation model for determining the evaluation decisions of elementary school teachers. Alternatives 1 to Alternative 5 are alternative examples of each individual elementary school teacher whose value has been determined using the scale values in Table 2 for each criterion. Alternative values for each criterion can be seen in Table 3 below.

Table 3. Alternative values for each criterion

Alternatives	Criteria			
	C1	C2	C3	C4
A1	5	4	5	4
A2	4	4	4	5

A3	4	5	4	4
A4	5	3	5	4
A5	4	4	3	5

Alternative Final Value Calculation

The alternative final score calculation process is calculated by multiplying the alternative values for each criterion in Table 3 with the priority weight value of the criteria in Table 1.

Alternative value	A1	=	(5*0.425799)	+	(4*0.301085)	+	(5*0.212899)	+	(4*0.060217)	=4.638698
Alternative value	A2	=	(4*0.425799)	+	(4*0.301085)	+	(4*0.212899)	+	(5*0.060217)	=4.060217
Alternative value	A3	=	(4*0.425799)	+	(5*0.301085)	+	(4*0.212899)	+	(4*0.060217)	=4.301085
Alternative value	A4	=	(5*0.425799)	+	(3*0.301085)	+	(5*0.212899)	+	(5*0.060217)	=4.337613
Alternative value	A5	=	(4*0.425799)	+	(4*0.301085)	+	(3*0.212899)	+	(5*0.060217)	=3.847318

From the calculation of the alternative final score, the alternative ranking results for the evaluation of elementary school teacher evaluations are obtained. Can be seen in Table 4, as follows

Table 4. Alternative Ranking Results

Alternative	Value	ranking
A1	4.64	1
A4	4.34	2
A3	4.30	3
A2	4.06	4
A5	3.85	5

Based on the results in table 4, it can be explained that the performance evaluation process shows alternative A1 as the best alternative with a value of 4.64. The results of calculations on the elementary school teacher assessment decision assessment model used in this study were greatly influenced by the criterion weight values generated by the AHP method. The priority weight of the criteria is a form of conflict between each assessment criterion so that the weight determines the final score, for example the weight of the most priority criterion C1, namely 0.425799, where the value alternative A1 and alternative A4 which obtained the largest scale value, namely 5, when the process of calculating the final value was carried out, alternatives A1 and A4 became 2 alternatives with the largest final value, namely A1 sequence 1 and A4 sequence 2. So that from the results of this study it can be recommended an assessment model elementary school teacher performance by determining the priority weight of the criteria so that the value of each alternative can be maximized on each criterion, with an assessment technique that is adapted to the existing business processes in each school, determining the priority weight of objective criteria can also affect the final results of the ranking of school teacher performance evaluations base.

4. CONCLUSION

The conclusion of the research that is The importance of assessing teacher performance so that competence can later be increased and can lead to giving rewards to teachers who have an assessment that is in accordance with predetermined assessment criteria, based

on the study literature shows that common problems in the problem of determining teacher evaluation decisions are evaluation mechanisms, assessment techniques, how to record and the most important thing is to be able to produce objective decisions so that a decision support method is needed in the assessment process. From the results of this study by applying the AHP method then The model proposed in this study uses the hierarchical structure of the AHP method, the aim is to make it easier to describe problem objectives, assessments and alternatives. In making it easier for decision makers to provide an assessment of each alternative based on criteria, a Likert scale is used. There are recommendations for decision results, namely by determining the priority weight of the criteria so that the value of each alternative can be maximized on each criterion, with an assessment technique that is adapted to the existing business processes in each school, determining the priority weight of objective criteria can also affect the final results of the ranking of teacher performance evaluations. elementary school. Suggestions for further research are to apply the method of determining priority weights combined with modeling the assessment attributes of teacher evaluation performance, so as to add to the complexity of the assessment in terms of criteria and assessment attributes to produce an objective assessment of elementary school teachers.

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