



# Teacher Performance Assessment Decision Support System Using Topsis Method

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## ABSTRACT

Decision Support System is a means of assisting in making decisions accurately, and quickly. In the Decision Support System, several methods can be applied including the TOPSIS method. The TOPSIS (Technique For Order Preference by Similarity to Ideal Solution) method is a multi-criteria decision-making method or alternative choice which is the alternative that has the smallest distance from the positive ideal solution and the largest distance from the negative ideal solution from a geometric point of view using Euclidean distance.

The results of the TOPSIS (Technique For Order Preference by Similarity to Ideal Solution) method based on data and criteria determined by the Deli Serdang Education Office, an assessment was made of teacher performance at SD Negeri 105336 Rantau Panjang. So that it can help the Head of SD Negeri 105336 Rantau Panjang in assessing teacher performance.

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## 1. INTRODUCTION

The development of technology is advancing rapidly, so that all matters related to data management are easy and without taking a long time to complete. The establishment of a computerized system to find the best results. This computerized system has been used by various government and educational institutions. The goal is to improve performance and time efficiency (Chintya, 2015).

To determine the level of professionalism of a teacher, an assessment is made of the teacher's ability to carry out the education and teaching process. The assessment is carried out by measuring the work of each teacher in carrying out their duties and obligations according to existing competency standards (Kurnia, Sitio, & Sinaga, 2018)

Teachers are educators and teachers who guide students in realizing class discipline and as a motivator to arouse students' interest in achieving in class. The decision-making system (DSS) is a process of monitoring teacher performance, it will be easier for school principals to carry out evaluation processes related to with teacher performance (Fitri & Nurhadi, 2017).

Decision-Making Systems are tools for managerial decision-making, but decision-making has a variety of different contexts. Decision making does not only satisfy one party but must be satisfactory to all parties (Hidayat & Irviani, 2017).

Teacher performance appraisal is a way of measuring individuals in the agency that is carried out on the organization. The important value of teacher performance appraisal is related to determining the level of individual contribution or performance carried out in completing the tasks

that are the responsibility of the teacher (Riyadi & Mulyapradana, 2017). SD Negeri 105336 Rantau Panjang is located at Kelambir Village, Pantai Labu District, Deli Serdang Regency. This State Elementary School has thirteen teachers, this State Elementary School was established in 1977.

Problems in making a decision Teacher performance appraisal is a long and complicated process because SD Negeri 105336 is still doing it manually, this does not allow teacher performance appraisals to reach the desired standard. So the author will build a computerized system to facilitate the school in making decisions. This system aims to make it easier to manage the data in the SD Negeri easily, quickly, and accurately.

The source of the complexity of decision problems is only due to uncertainty or imperfect information. However, there are still other causes such as factors that influence the existing choices, with the variety of selection criteria and also the weight value of each criterion is a form of solving a very complex problem (Setyaningsih, 2017). At present, multi-criteria problem solving methods have been widely used in various fields. After establishing the objectives of the problem, the criteria by which to measure and possible alternatives, decision makers can use one or more methods to solve their problems. The method that can be used to overcome multi-criteria problems is the Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) method (Surya, 2018).

Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) is a multi-criteria decision-making method or alternative choice which is the alternative that has the smallest distance from the positive ideal solution and the largest distance from the negative ideal solution from a geometric point of view using Euclidean distance. However, the alternative which has the smallest distance from the positive ideal solution, does not necessarily have the largest distance from the negative ideal solution. Therefore, the Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) considers both the distance to the positive ideal solution and the distance to the negative ideal solution simultaneously. The optimal solution in the Technical For Order Preference by Similarity to Ideal Solution (TOPSIS) method is obtained by determining the relative proximity of an alternative to a positive ideal solution. The Technique For Order Preference by Similarity to Ideal Solution (TOPSIS) will rank alternatives based on the priority value of the relative proximity of an alternative to the positive ideal solution. The alternatives that have been ranked are then used as a reference for decision makers to choose the best desired solution (Zhang & Wu, 2006).

## 2. RESEARCH METHOD

### 2.1 Research methods

In this study, the researcher used the Research and Development approach, the research methods were as follows: library research; observation; interview.

### 2.2 Description of TOPSIS

The steps for completing the TOPSIS method are:

a. Create a normalized decision matrix.

Alternative performance rating A1 on each normalized C1 criteria

$$X_i] = \sqrt{\sum_{i=1}^m X_{ij}^2}$$

where  $i = 1, 2, \dots, m$  and  $j = 1, 2, \dots, n$

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}}$$

b. Create a weighted normalized decision matrix.

The positive ideal solution and the negative ideal solution can be determined based on the normalized weight rating ( $y$ ):

$$y_{ij} = w_i r_{ij}$$

$$A^+ = (, \dots, y_1^+, y_2^+, \dots, y_n^+)$$

$$A^- = (, \dots, y_1^-, y_2^-, \dots, y_n^-)$$

$$Y_j^+ = \begin{cases} \max_i Y_{ij} \\ \min_i Y_{ij} \end{cases}$$

$$Y_j^- = \begin{cases} \max_i Y_{ij} \\ \min_i Y_{ij} \end{cases}$$

- c. Determine the positive ideal matrix and the negative ideal solution matrix.

$$D_i^+ = \sqrt{\sum_{j=1}^n (y_i^+ - y_{ij})^2}$$

- d. Determine the distance between the value of each alternative with a positive and negative ideal solution matrix.

$$D_i^- = \sqrt{\sum_{j=1}^n (y_{ij} - y_i^-)^2}$$

- e. Determine the preference value for each alternative.

$$V = \frac{D_i^-}{D_i^- + D_i^+}$$

A larger value of  $V$  indicates the chosen alternative is the best

### 3. RESULTS AND DISCUSSIONS

#### 3.1 System Requirements

To design a Teacher Performance Assessment Decision Support System with the Topsis Method, it requires the following hardware and software specifications:

- The hardware used as a support for making applications in this thesis has the following specifications: a minimum core i3 processor; RAM minimum 2 GB; monitor with a minimum size of 11"; keyboard and mouse.
- The software needed to support the activities of a well-developed application program are: Windows XP, Windows 7, Windows 8 and so on; Microsoft Visual Basic 2010; Microsoft Office Access 2007; crystal report 10.

#### 3.2 System implementation

Implementation is a step that is built to operate the system to be built. The following are the results of the implementation of the Teacher Performance Assessment Decision Support System with the Topsis Method.

- Login form Display

The login menu is an initial menu display from the program where the user or admin will fill in the user name and password to be able to enter or login to the next menu, the login form display image can be seen in the image below:

A screenshot of a login form. It features two input fields: 'USER ID' with the text 'admin' and 'PASSWORD' with masked characters '\*\*\*\*\*'. Below the fields are two buttons labeled 'OK' and 'BATAL'. To the right of the form is a yellow padlock icon.

**Figure 1.** Login Form Display

b. Main Menu Display

The main menu is the next display after the user or admin logs in, on the main menu there are several sub menus, the main menu form can be seen in the following picture:



**Figure 2.** Main Menu Display

c. Criteria Data Form Display

Which in this menu contains data from each teacher to be tested. In this menu the user or admin can add new data, delete, and change the existing data on this menu. The image of the teacher data form can be seen in the following image.

The screenshot shows a web application window titled "Data\_guru". It contains a form for entering teacher data with the following fields: NIK (1), NAMA (RAMLI S.Pd), ALAMAT (LUBUK PAKAM), TANGGAL LAHIR (8/23/1970), AGAMA (Islam), JENIS KELAMIN (LAKI-LAKI), and TELEPON (082309873456). There is a "KETIKAN NAMA" field and buttons for "SIMPAN", "UBAH", "BATAL", "HAPUS", and "KELUAR". Below the form is a table of teachers:

| NIK | NAMA                   | ALAMAT          | TANGGAL LAHIR | AG  |
|-----|------------------------|-----------------|---------------|-----|
| 1   | RAMLI S.Pd             | LUBUK PAKAM     | 8/23/1970     | Isl |
| 10  | SELVIANA HUTAJULU S... | LUBUK PAKAM     | 9/1/1970      | Isl |
| 11  | AFRIDAYANTI            | TANJUNG PORA... | 9/2/1970      | Isl |
| 12  | DAHLIA                 | TANJUNG PORA... | 9/3/1970      | Isl |
| 13  | KATARINA SIPAYUNG S... | TANJUNG PORA... | 9/4/1970      | Isl |
| 2   | M.SALEH NAZIR HARAH... | LUBUK PAKAM     | 8/24/1970     | Isl |
| 3   | SUYANTO S.Pd           | LUBUK PAKAM     | 8/25/1970     | Isl |

Figure 3. Teacher Data Form Display

d. Appraisal Data Form Display

This form is to enter Assessment data to determine Teacher Performance. This form will appear when the data sub menu is selected and the admin can fill in the data that has been listed. The form can be seen in the following image:

The screenshot shows a web application window titled "Form\_Penilaian". It contains a form for entering appraisal data with the following fields: Kode (1), Nama (RAMLI S.Pd), and buttons for "PROSES" and "Keluar". Below the form are four sections for entering appraisal data: Kompetensi Pedagogik, Kompetensi Kepribadian, Kompetensi Sosial, and Kompetensi Profesional. Each section has a list of criteria with checkboxes. Below these sections are four input fields for "Nilai K1", "Nilai K2", "Nilai K3", and "Nilai K4" with values 4, 2, 3, and 2 respectively. There are buttons for "Simpan", "Ubah", "Hapus", and "Batal". Below the form is a table of appraisal results:

| Kode | Nama                   | K1 | K2 | K3 |
|------|------------------------|----|----|----|
| 1    | RAMLI S.Pd             | 1  | 2  | 4  |
| 10   | SELVIANA HUTAJULU S... | 1  | 5  | 2  |
| 11   | AFRIDAYANTI            | 1  | 4  | 3  |
| 12   | DAHLIA                 | 1  | 3  | 2  |
| 13   | KATARINA SIPAYUNG S... | 1  | 5  | 4  |
| 2    | M.SALEH NAZIR HARAH... | 1  | 3  | 3  |
| 3    | SUYANTO S.Pd           | 1  | 5  | 4  |

Figure 4. Appraisal Data Form Display

e. Display of Calculation Result Form

This form is used to calculate the feasibility of the teacher's performance. The form can be seen in the following picture:

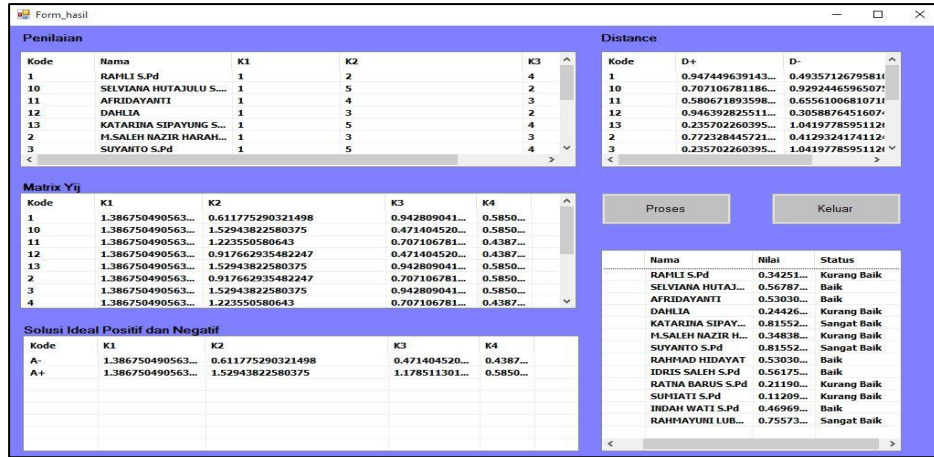


Figure 5. Display of Calculation Result form

f. Report Form Display

The report form is a form to display the data from the calculation process where the data is usually printed out in the form of a report.

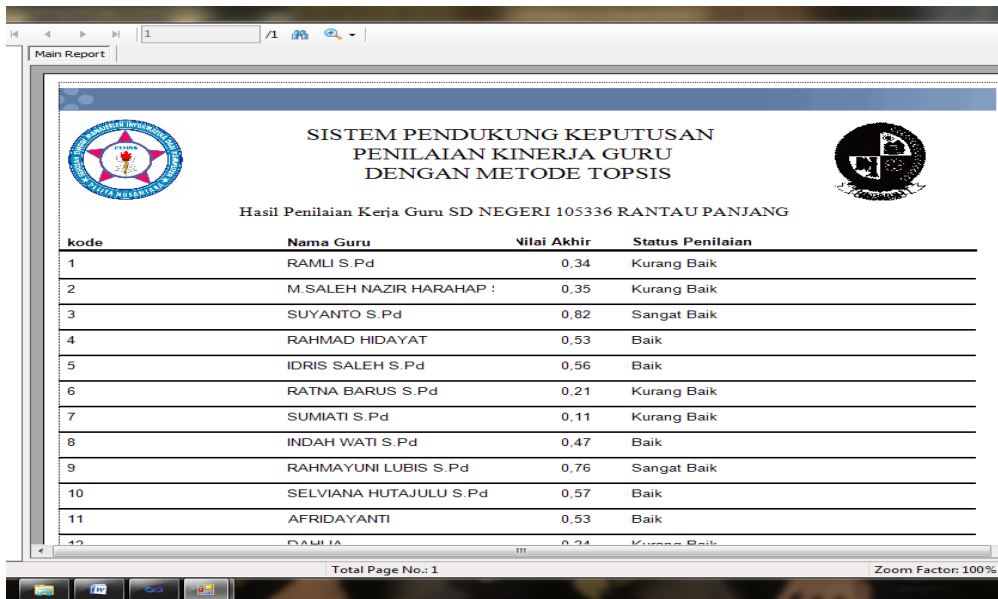


Figure 6. Classification data page

After carrying out the implementation process, the next process is a trial with the aim of finding out that the application that has been made is in accordance with the needs. The forms of system testing are as follows:

| teacher name           | N_final           | Status    |
|------------------------|-------------------|-----------|
| RAMLI S.Pd             | 0.342514994422111 | Not good  |
| SELVIANA HUTAJULU S.Pd | 0.567875968731552 | Good      |
| AFRIDAYANTI            | 0.530307881547039 | Good      |
| DAHLIA                 | 0.244264485731827 | Not good  |
| KATARINA SIPAYUNG S.Pd | 0.815523262260108 | Very good |

| teacher name               | N_final           | Status    |
|----------------------------|-------------------|-----------|
| M. SALEH NAZIR HARAHA S.Pd | 0.348389481383805 | Not good  |
| SUYANTO S.Pd               | 0.815523262260108 | Very good |
| RAHMAD HIDAYAT             | 0.530307881547039 | Good      |
| IDRIS SALEH S.Pd           | 0.561755389506892 | Good      |
| RATNA NEWS S.Pd            | 0.211902137298812 | Not good  |
| SUMIATI S.Pd               | 0.112094120645131 | Not good  |
| INDAH WATI S.Pd            | 0.469692118452961 | Good      |
| RAHMAYUNI LUBIS S.Pd       | 0.755735514268173 | Very good |

**Figure 9.** Classification data page

### 3.3 System Weaknesses and Strengths

The advantages and disadvantages of the Teacher Performance Assessment Decision Support System with the Topsis Method are.

1. System Advantages
  - a. The system designed is easy to understand so as to facilitate the work in calculating the teacher's performance.
  - b. With this system, it can make it easier for school principals who want to do an analysis in knowing teacher performance appraisals.
2. System Weaknesses
  - a. If the admin wants to input data on all computers, it must be done on every computer because this program is not connected from one computer to another.
  - b. This system does not have security in accessing data.
  - c. This system only serves as a decision support for the principal in assessing teacher performance, not as an absolute decision.

## 4. CONCLUSION

The implementation of the TOPSIS method on the Teacher Performance Assessment Decision Support System that has been completed, several conclusions can be drawn including Problems that occur with regard to Teacher Performance Assessment can be solved by applying the Topsis (Technique For Others Reference by Similarity to Ideal Solution) method. Application of the Topsis (Technique For Others Reference by Similarity to Ideal Solution) Method for Teacher Performance Assessment by adjusting the criteria and using weights so that they can be used with the algorithm. Applications that adopt the Topsis (Technique For Others Reference by Similarity to Ideal Solution) Method can be used for Teacher Performance Assessment. Testing the system that has been designed for Teacher Performance Assessment by inputting Activity data and criteria and then carrying out the calculation process.

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