(2025), 3 (5): 367-373 **Scientica** 3021-8209

Jurnal Ilmiah Sain dan Teknologi

# DESIGN OF DECISIONMAKING SYSTEM FOR SELECTING HIGH-PERFORMANCE TEACHERS BASED ON PERFORMANCE USING TOPSIS ALGORITHM

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***Abstract (English)***

*SMK Negeri 3 Padang currently has 17 teachers. Based on interviews with one of the teachers at SMK Negeri 3 Padang, it was found that there is currently no system in place for selecting the best teacher at the school. This study aims to design a decision support system based on the TOPSIS algorithm to assist SMK Negeri 3 Padang in objectively and accurately selecting the best teacher. This research is expected to provide benefits in improving the efficiency and effectiveness of decision-making related to the selection of the best teacher at SMK Negeri 3 Padang. The system is also expected to enhance the quality of education and the learning experience of students as well as contribute to improving the overall standards of vocational secondary education. How to design a Decision Support System (DSS) for outstanding teacher selection based on performance that is valid, practical, and effective using the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) algorithm. The TOPSIS method has proven effective in assisting the decision-making process for assessing and determining the best teachers based on objective and measurable criteria. The criteria used in evaluating teacher performance include important aspects such as pedagogical competence, professional competence, discipline, innovation in teaching, attendance, and participation in school activities. The TOPSIS calculation process, which involves normalization, weighting, determining positive and negative ideal solutions, and calculating relative closeness, enables transparent and fair final results.*

**Article History**

*Submitted: 19 Juli 2025*

*Accepted: 22 Juli 2025*

*Published: 23 Juli 2025*

**Key Words**

Topsis, Best Teacher, Decision Support System, Waterfall

## I. INTRODUCTION

Education in a nation is a human effort to create high-quality human resources (HR) capable of competing in social life at local, national, and global levels. Essentially, learning within formal education, which includes elementary school (SD), junior high school (SMP), and up to senior high/vocational school (SMA/SMK), is an obligation for individuals in acquiring theoretical knowledge and broad insights (Hidayat, AY., et al., 2022).

Teachers are the most decisive component in the entire education system and must receive central, primary, and utmost attention. Teachers play a key role in the development of education, especially in formal settings conducted in schools (Mashari et al., 2019).

The selection of the best teachers often reflects professional standards outlined in the regulations of school principals or education offices, focusing on the teacher's commitment to developing teaching competencies, improving the quality of learning, and dedicating themselves to the school and community. Teachers with a high level of dedication to their duties and professional development are key factors in creating a conducive and effective learning environment for students. In selecting the best teachers, those who demonstrate strong commitment to education, innovation in teaching, and the development of the school community tend to be prioritized (Putra, 2021).

The selection of outstanding teachers should consider the primary duties of teachers as stipulated in government regulations. Teachers who actively contribute to improving the quality of education through innovation and service have a significant positive impact on the educational standards of schools (Suryani & Pratama, 2020).

According to Article 1, paragraph 2 of Law No. 14 of 2005 on Teachers, a teacher is defined as a professional educator and scientist whose main tasks are to disseminate knowledge, technology, and art through education or teaching, research, and community service. From this article, it can be concluded that a teacher is not only a professional educator in higher education but also a scientist. Furthermore, Article 45 of Law No. 14 of 2005 states that teachers must meet academic qualifications, competencies, educator certification, physical health, and other qualifications required by higher education institutions to create national education.

Law No. 5 of 2014 concerning State Civil Apparatus states that "Every position as referred to in Article 14 is determined according to the competencies required." The competencies teachers must possess include Professional Competence, Pedagogical Competence, Social Competence, and Personal Competence. In Article 21 letter e of Law No. 5 of 2014 on State Civil Apparatus, the Minister of Education and Culture is authorized to set teacher competency standards, which serve as the basis for improving teaching quality in schools.

Teachers play an important role not only as instructors but also as motivators and mentors in shaping student character (Puspitasari et al., 2020). Teachers' active involvement in research or community service has a significant influence on education quality; thus, it is important to include teachers' achievements in research activities, teaching innovations, and social engagement as indicators in career development and teacher performance appraisal (Suryani & Pratama, 2020).

SMK Negeri 3 Padang currently has 17 teachers. Based on interviews with one of the teachers at SMK Negeri 3 Padang, it was found that there is currently no system for selecting the best teachers in the school. This study aims to design a decision support system based on the TOPSIS algorithm to assist SMK Negeri 3 Padang in selecting the best teachers objectively and accurately. This study is expected to provide benefits in improving the efficiency and effectiveness of decision-making regarding the selection of the best teachers at SMK Negeri 3 Padang. This system is also expected to improve the quality of education and students' learning experiences while contributing to the enhancement of vocational secondary education standards as a whole

## II. THEORETICAL BASIS

### A. Decision Making System

Decision Support System (DSS) is a system that produces information that aims to solve a particular problem that must be solved by managers and is also something that cannot be separated from the organization (Paramban1, 2023). The idea is that humans have limitations in solving problems at once. Thus, the need for computerized problem solving is needed to shorten time, cost and energy. To produce quality information that will be processed into new information.

### B. TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)

The TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) algorithm is a multi-criteria decision-making method used to evaluate and select the best solution from a number of alternatives (Yoon & Hwang, 1981). The principle of the method of the best selected alternative not only has the longest distance from the positive ideal solution, but also has the shortest distance from the negative ideal solution (R. A. Hutasoit et.al, 2018). The positive ideal solution can be interpreted as the sum of all the best values that can be achieved with the specified attributes. Conversely, the negative ideal solution consists of all the worst values achieved for each attribute.

### C. Teacher

Educators are teachers who are qualified as teachers, teachers, trainers, tutors, widyaiswara, tutors, inspectors, trainers and other names, participating in the implementation of education (Law No. 20/2003, Article 1, Paragraph 5) Pokja: 2005). Educators are people who teach and

provide information to one or more people. Educators are also implementers and are responsible for educational activities in educational situations.

**D. Unified Modeling Language (UML)**

Unified Modeling Language (UML) is a complete notation for creating visualizations of a system model. As stated by Chonoles in Prabowo Pudjo Widodo and Herlawati (2011: 8) "Before UML existed, object-oriented programming language developers had difficulty communicating with each other". UML is a general syntax for creating a logical model of a system and is used to describe the system so that it can be understood during the analysis and design phases. As explained by Chonoles in Prabowo Pudjo Widodo and Herlawati (2011: 6) "UML stands for Unified Modeling Language which means standard modeling language".

**E. Waterfall Method**

The Waterfall method is a classic model that has a sequential nature in software design. The waterfall method is a method that describes a systematic and sequential approach (step by step) in software development. The stages with user requirements specifications are then continued through the design stage, namely planning, modeling, system development and system delivery to users, support for the software produced in full. The waterfall method is often referred to as the classic life cycle. The name of this model is actually "Sequential Linear Model" which describes a systematic and sequential approach in software development, starting with determining user needs and then continuing through the planning stage. (planning), modeling (modeling), development (building), and delivery of the system to users (deployment), ending with support for the finished software produced (Wahid Abdul, 2020).

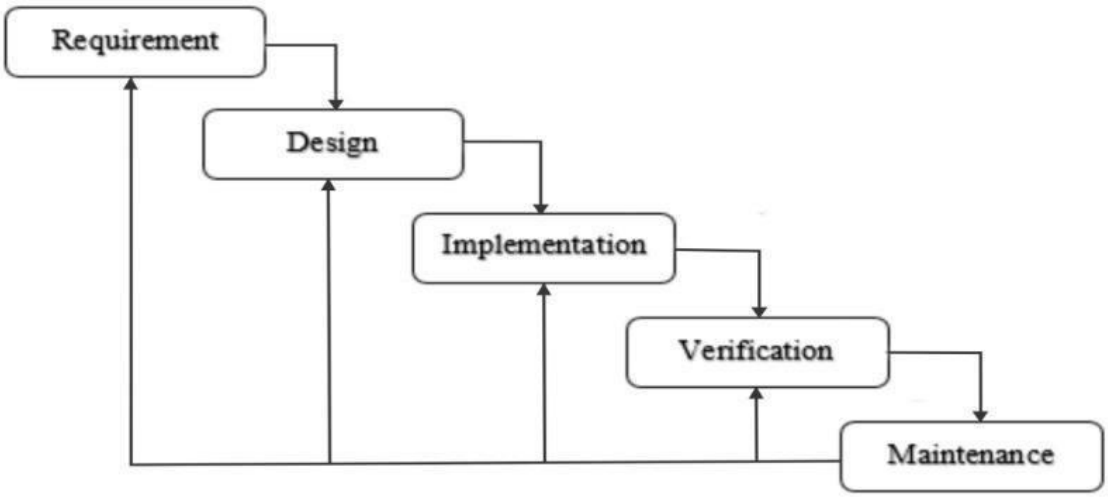


**Fig.1 Waterfall flow**

## III. RESULTS AND DISCUSSION

### A. Application Implementation

1. Login page

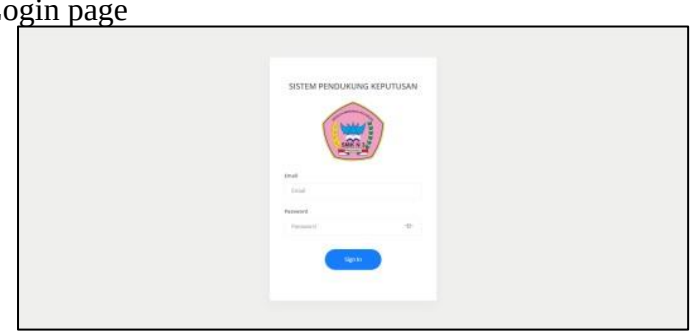


Fig. 2 Login Page

2. Dashboard Page

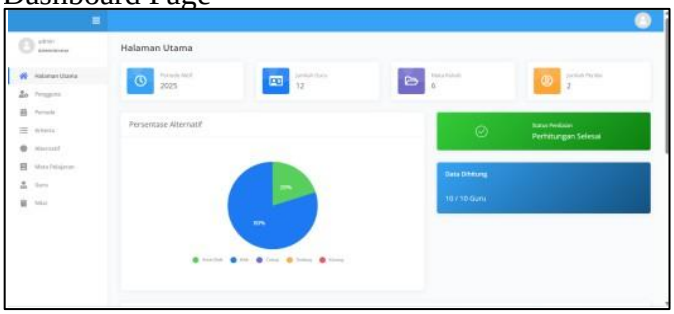


Fig. 3 Dashboard Page

3. Criteria Page

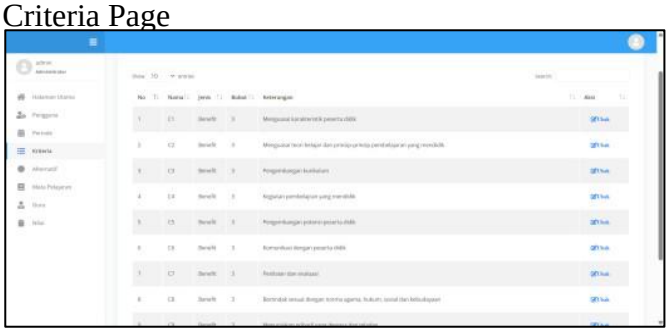

Fig. 4 Criteria Page

4. Alternative Page

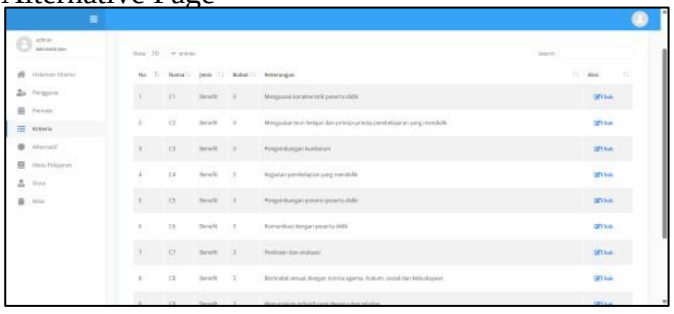

Fig . 5 Alternative Page

B.Verification

Table 1. Blackbox Testing

| No | Feature Tested | Input | Output Test | Result | Status |
|---|---|---|---|---|---|
| 1 | Admin Login | Valid username and password | Successfully navigates to the admin dashboard page | As Expected | Passed |
| 2 | Add Teacher Data | Input name, NIP, position, and criteria data | Teacher data is saved into the database | As Expected | Passed |
| 3 | Input Criteria | Criteria values according to assessment weights | Criteria values are saved and displayed | As Expected | Passed |
| 4 | TOPSIS Calculation Process | Click the “Process Assessment” button | The system performs ranking and displays the TOPSIS results | As Expected | Passed |
| 5 | Selection Results Report | Click the “Report” button | The system prints and displays the ranking results | As Expected | Passed |
| 6 | Logout | Click logout | The system returns to the login page | As Expected | Passed |

Table 2. Questionnaire Results

| Aspect Evaluated | Average Score | Description |
|---|---|---|
| Ease of Use | 4.6 | Very Good |
| System Access Speed | 4.3 | Good |
| Calculation Accuracy | 4.7 | Very Good |
| User Interface Appearance | 4.2 | Good |
| Overall Satisfaction | 4.5 | Very Good |

C. Maintenance

Table 3. Blackbox Testing Evaluation Results

| No | Issue Found | Corrective Action Taken |
|---|---|---|
| 1 | The teacher input form does not display a notification when saving fails | Added a pop-up notification if the data saving process fails |
| 2 | The Logout button does not provide a confirmation prompt | Added a confirmation prompt before exiting the system |

Table 4. Evaluation from User Questionnaire

| No | User Feedback | Corrective Action Taken |
|---|---|---|
| 1 | The user interface looks too plain | Improved by adding visual elements (icons, colors, and card layout) |
| 2 | Calculation results cannot be exported | Added a feature to export calculation results to PDF |

The results of the black-box testing process and user validation serve as the basis for performing system maintenance, which includes functional improvements (input validation, error notifications), usability enhancements (confirmation prompts, UI/UX visuals), and the addition of minor features (data export).

D. Discussion

In developing a decision support system for evaluating the performance of outstanding teachers at *Sekolah Menengah Kejuruan (SMK) Negeri 3 Padang*, the TOPSIS method was

implemented using the CodeIgniter framework. Several stages of work were carried out in accordance with the selected design methodology, namely Personal Extreme Programming (PXP).

The system development process began with the requirements phase, in which data collection was conducted to gather all necessary information as the foundation for building the decision support system. Based on the collected data and information, the process continued to the prototyping phase, where the design and planning of how the decision support system would be built were determined, including the selection of technologies and supporting systems to be used. This was followed by the customer testing phase, involving the creation of prototypes and drafts of the decision support system to ensure alignment with user needs and expectations.

The implementation of the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method in evaluating teacher performance at SMK Negeri 3 Padang enabled objective and measurable assessment. The system incorporates criteria such as pedagogical competence, professional competence, discipline, innovation in teaching, attendance, and participation in school activities. Through the stages of normalization, weighting, determination of positive and negative ideal solutions, and calculation of relative closeness, the system produces rankings that are transparent, accurate, and fair.

This approach has proven effective in facilitating the selection process for outstanding teachers and supports school administrators in making well-informed decisions regarding teacher recognition, coaching, and professional development.

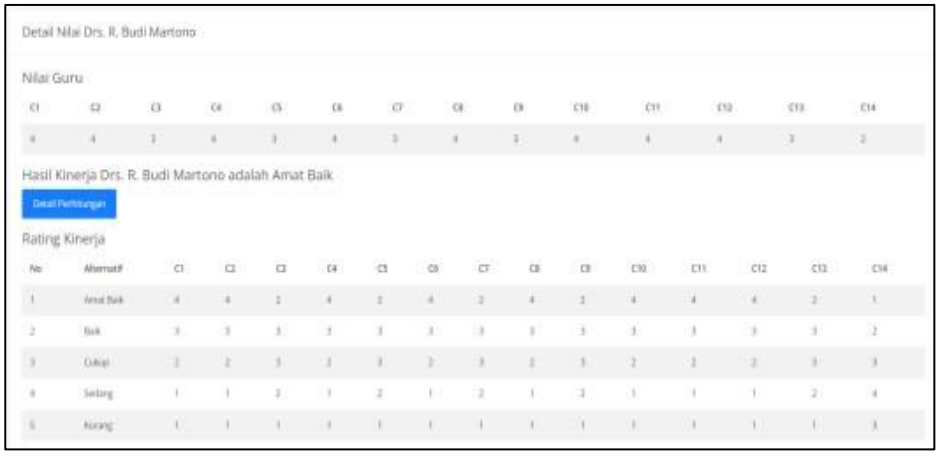


Fig. 6 TOPSIS Method Calculation

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