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The Decision Support System in Selecting the Outstanding Students at SMKN 1 Tulang Bawang using Analytical Hierarchy Process

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Abstract

In the era of globalization, many information technology developments in the field of education began to develop administrative systems using information technology, one of which is by using web-based applications. Decision Support system for the selection of the outstanding students in SMKN 1 Tulang Bawang Using Analytical Hierarchy Process Method the system processes the calculation and disbursement of student achievement data with PHP programming language and Php MyAdmin as a tool to help manage databases using XAMPP. The Decision Support System for the selection of outstanding students can provide convenience for the school in monitoring students and students can also obtain all information on facilities and news in the school.

Keywords: Outstanding Student, student achievement, System Support Decision, AHP

1. Introduction

The development of technology today has grown rapidly and brought enormous changes (Yusuf, 2005; Harsani, 2020). With this technology, information can be obtained quickly, accurately and unlimitedly by time and place (Holtgrewe, 2014; Saleh and Dewi, 2020). One sector that is developing in the development of technology is in the field of education which contributes to the distribution of more interactive school information, especially through internet technology (Ula et al., 2021; Risnandar et al., 2019).

This web-based decision support system has considerable potential if managed properly, it will certainly be able to have an impact/multiplier effect on improving the quality of human resources, and the teacher's work system in decision making (Bhargava, 2007). SMKN 1 Tulang Bawang is a public vocational high school on Jl. General Sudirman No. 33. Jagabaya III, Menggala, Tulang Bawang, Lampung 35167. Every year, SMKN 1 Tulang Bawang selects students who are outstanding. So far, the selection for students who have gigher achievements at the school is done manually. The assessment and recording system carried out by the school is still manual, making it difficult for teachers to conduct further analysis of the achievements of their students (Vaidya and Kumar, 2006; Sambas et al., 2019).

This grading system, of course, is not enough. This is certainly not an effective way and takes a long time to determine student achievement (Vidal et al., 2011). This system is expected to facilitate the selection process for outstanding students. However, sometimes there are still many difficulties in the decision-making process. This is because there is no objective method to decide quickly. The method used in making this decision is the Analytic Hierarchy Process (AHP) method (Darko et al., 2019).

Based on the problems and shortcomings above, the authors design a Decision Support System for Selection of Outstanding Students at SMKN 1 Tulang Bawang by using the Analytic Hierarchy Process Method which can help make it easier for teachers to determine outstanding students at SMKN 1 Tulang Bawang. The identified problem is how to build a decision support system for the Selection of Outstanding Students at SMKN 1 Tulang Bawang. To restrict the problem, we limit the scope of the research as follows: 1) the Decision Support System that was built was about recommendations for selecting web-based outstanding students, 2) the system is built using the Analytic Hierarchy Process (AHP) method, and 3) determination of Students with Achievement in Academic and Non-Academic Fields are according to the Criteria. The study aims to produce a Decision Support System for Selection of Outstanding Students at SMKN 1 Tulang Bawang, and applying the Analytic Hierarchy Process (AHP) method as a method of solving problems by making the decision support system.

2. Literature Review

2.1. Decision Support Systems

The concept of decision support systems was first introduced in the early 1970s by Michael S. Scott Morton with the term management decision system (Antoniadi et al., 2021). The concept of decision support is characterized by a computer-based interactive system that helps decision makers utilize data and models to solve unstructured problems. Basically, DSS is designed to support all stages of decision making, from identifying problems, selecting relevant data, determining the approach used in the decision-making process, to evaluating alternative choices. DSS is a system designed to communicate problems and solve problem solving that is done by managers in a semi-specific structure to make a decision (Vydia et al., 2022).

2.2. Characteristics and Limitations of Decision Support Systems

Decision support system is a system aimed at higher management levels, with an emphasis on the following characteristics:

1) Focused on decisions, aimed at top managers and decision makers.
2) Emphasizes flexibility, adaptability, and fast response.
3) Able to support various decision-making styles and individual managers (Harahap and Zahraini, 2021).

2.3. Understanding Students

Students are seen as "student subjects" in which the value of humanity as individuals, as social beings who have a moral identity, must be developed to achieve optimal levels and the criteria of life as human citizens are expected. A student is anyone who is officially registered to take lessons in the world of education.

2.4. Definition of Achievement

Achievement is the success achieved by a student after attending a teaching program in a certain amount of time in accordance with the intended purpose. Achievement is the value which is the final formulation that can be given by the teacher regarding the progress or achievement of students during a certain period.

2.5. Analytical Hierarchy Process (AHP)

Basically, AHP is a method of decision making by breaking a complex and unstructured problem into groups and organizing them into a hierarchy (Aziz and Aman, 2019). The approach taken in AHP is the analysis of multiple criteria decision problems through the principles of decomposition, comparative analysis, and synthesis priority.

2.6. Advantage of Analytical Hierarchy Process (AHP)

Various priorities exist because many methods can be successfully applied in AHP, and here are the advantages and disadvantages of the analysis system (Wang et al., 2021):

1) Unity. AHP makes broad and unstructured problems into a flexible and easy-to-understand model.
2) Complexity. AHP solves complex problems through a systems approach and deductive integration.
3) Interdependence. AHP can be used on system elements that are independent of each other and do not require a linear relationship.
4) Hierarchy Structure. AHP represents natural thinking that tends to group system elements into different levels from each level containing similar elements.
5) Measurement. AHP provides measurement scales and methods for obtaining priorities.
6) Consistency. AHP considers logical consistency in the assessments used to determine priorities.
7) Synthesis. AHP refers to an overall estimate of how desirable each alternative is.
8) Trade Off. AHP considers the relative priority of the factors in the system so that people are able to choose the best alternative based on their goals.
9) Judgment and Consensus. AHP does not require a consensus, but combines the results of different assessments.
10) Process Repetition. AHP is able to make people filter the definition of a problems and develop their judgment and understanding through the iterative process.

2.7. Understanding Website

Website is a collection of pages related to other interrelated files. On a website there is a page known as the homepage. Homepage is a page that is first seen when someone visits a website. A website is a collection of interconnected web pages and their interrelated files. The web consists of a page or pages, and a collection of pages called the homepage. Homepage is at the top with related pages be under it. The page below the homepage is called a child page which contains hyperlinks to other pages on the web. A website is a collection of documents published via the internet or intranet so that it can be accessed by users via a web browser (Sembiring et al., 2022). So, the website is a collection of interconnected electronic pages that can be accessed using the internet.

2.8. Hypertext Preprocessor (PHP)

Hypertext Preprocessor (PHP) is a Hypertext Markup Language (HTML) page that has server-side scripts that are placed on the server and processed by the web server before being sent to the user's browser (Srinivas et al., 2013). Server-side scripts are executed when the browser requests a file.php from the server. PHP is called by the webserver, where the command script process on a page is executed from start to finish in the Hypertext Preprocessor (PHP) engine.

2.9. XAMPP

XAMPP (windows/linux) Apache MySQL PHP and Perl are the most popular PHP web server and MySQL database packages among web developers using PHP and MySQL as databases (Mahendradhata et al., 2017).

2.10. Database

A database is an integrated collection of computer data, organized and stored in a manner that facilitates retrieval. The database can be interpreted as a collection of data about an object or event that are interconnected with each other. While data is a fact that represents an object such as humans, animals, events, concepts, circumstances, and so on that can be recorded and have an implicit meaning.

3. Materials and Methods

3.1 Data Collection Method

The data collection methods used in the preparation of this report are:

1) Observation. The author observes the object directly the processes that are running. Observations were made on the current decision-making system at SMKN 1 Tulang Bawang.
2) Interview. The method of collecting data by asking directly to the student section at SMKN 1 Tulang Bawang.
3) Literature review. It is a way of collecting data by studying library sources including research results, journals, papers, reference books, and readings that are related to the research title, it is the decision support system for selecting outstanding students at SMKN 1 Tulang Bawang'.

3.2. System Development Method

In this system development method, the researcher uses the waterfall method. Waterfall is one of the methods in the SDLC which has a characteristic that each phase in the waterfall must be completed before moving on to the next phase. This means that the focus on each phase can be maximized because there is no parallel work.

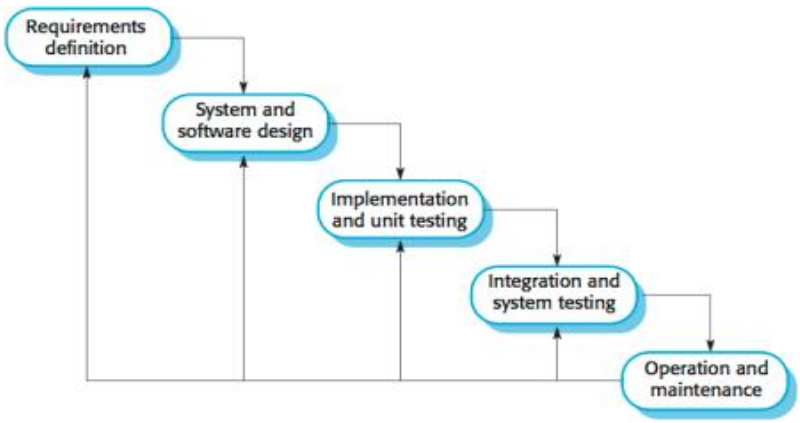

Figure 1. Waterfall Model Somerville.

4. Results and Discussion

4.1. Hardware

The hardware specifications used by the author for the Decision Support System (SPK) for the Selection of the Best Students at SMKN 1 Tulang Bawang using the Analytical Hierarchy Process Method are as follows:
1) Laptop or PC with Intel(R) Core i5 Processor, RAM 4.00 GB, and 500GB hard drive.
2) Keyboard and mouse.

4.2. Software

The software specifications used to develop the Decision Support System (SPK) for the Selection of the Best Students at SMKN 1 Tulang Bawang using the Analytical Hierarchy Process Method are as XAMPP, PHP and MySQL, Operating System: Win7, Browser: Mozilla Firefox/Google Chrome, Notepad++, and Macromedia Dreamweaver. Software specifications or software used to develop a Decision Support System (SPK) for the Selection of the Best Students at SMKN 1 Tulang Bawang

4.3. Brainware

The recommended brainware specifications for running the Best Student Selection Decision Support System at SMKN 1 Tulang Bawang are as follows:
1) Mastering programming languages and databases, and
2) Mastering basic computers.

4.4. Program Results

4.4.1. Best Student SPK Main Form

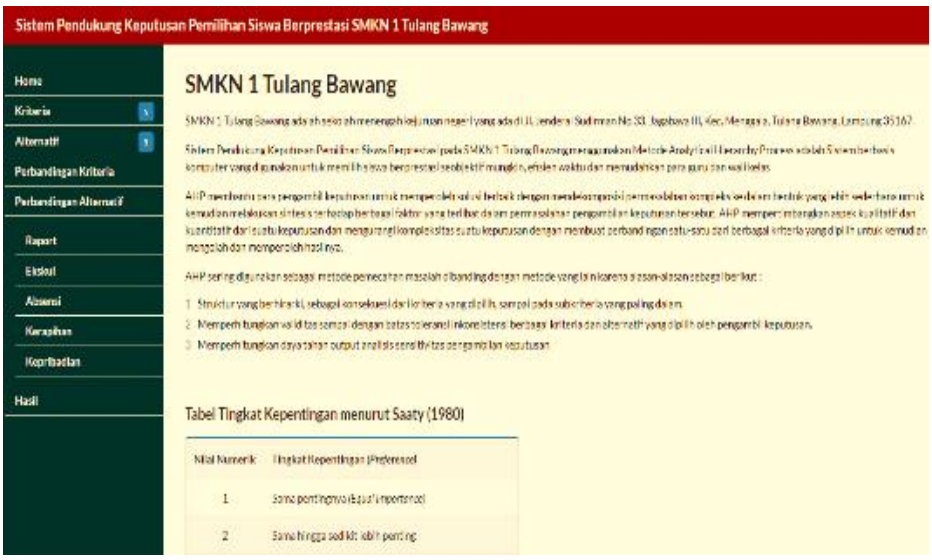

Figure 2. Best Student SPK Main Form

The Best Student SPK Main Form is the main page of the best student selection decision support system at SMKN 1 Tulang Bawang using the analytical hierarchy process method, on this page there is menu, criteria, alternatives, comparison of criteria, comparison of alternatives, criteria, and analysis results

4.4.2. Criteria Form

Figure 3. Criteria Form

The SPK Criteria Form is a page to enter the criteria that will be used in selecting the best students. The existing criteria can be added, modified, and deleted.

4.4.3. Alternative Form

Figure 4. Alternative Form

The SPK alternative form is a page to enter alternatives or students who will be analyzed using this system. Existing alternatives can be added, modified, and removed.

4.4.4. Criteria Comparison Form

Figure 5. Criteria comparison form

The SPK criteria comparison form is a page to provide comparison values between criteria. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

4.4.5. Comparison of Alternative Report Forms

The SPK report comparison form is a page to provide comparison values between each alternative in terms of report cards scores. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

Figure 6. Comparison of Alternative Report Forms

4.4.6. Alternative Extracurricular Comparison Form

Figure 7. Comparison of Extracurricular Alternatives

The SPK personality comparison form is a page to provide comparison values between each alternative in terms of personality values. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

4.4.7 Alternative Attendance Comparison Form

Figure 8. Comparison of alternative attendance forms

The SPK extracurricular comparison form is a page to provide comparison values between each alternative in terms of extracurricular values. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

4.4.8 Alternative Personality Comparison Form

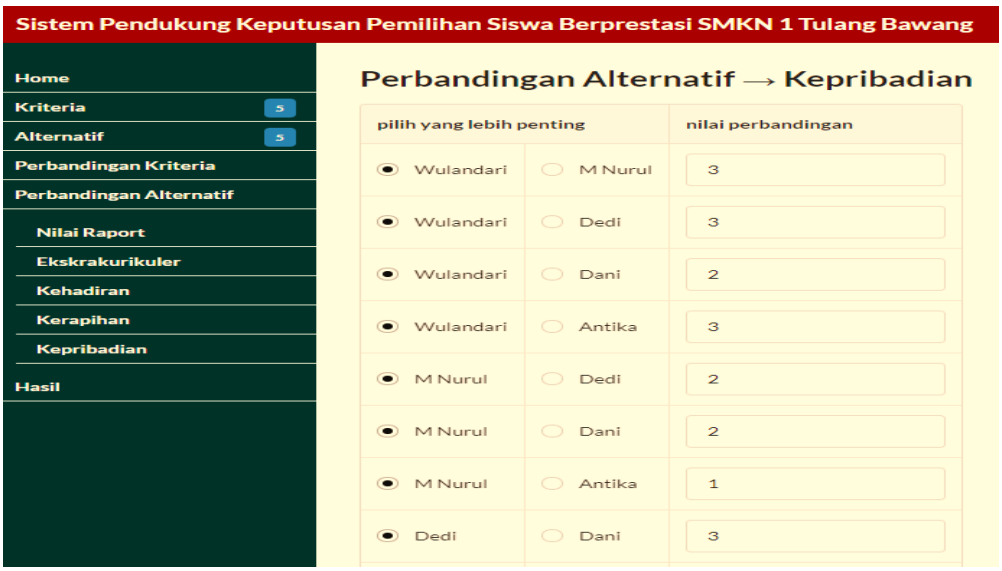

Figure 9. Alternative personality comparison form

The SPK attendance comparison form is a page to provide a comparison value between each alternative in terms of Attendance value. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

4.4.9. Comparison of Neatness Alternatives

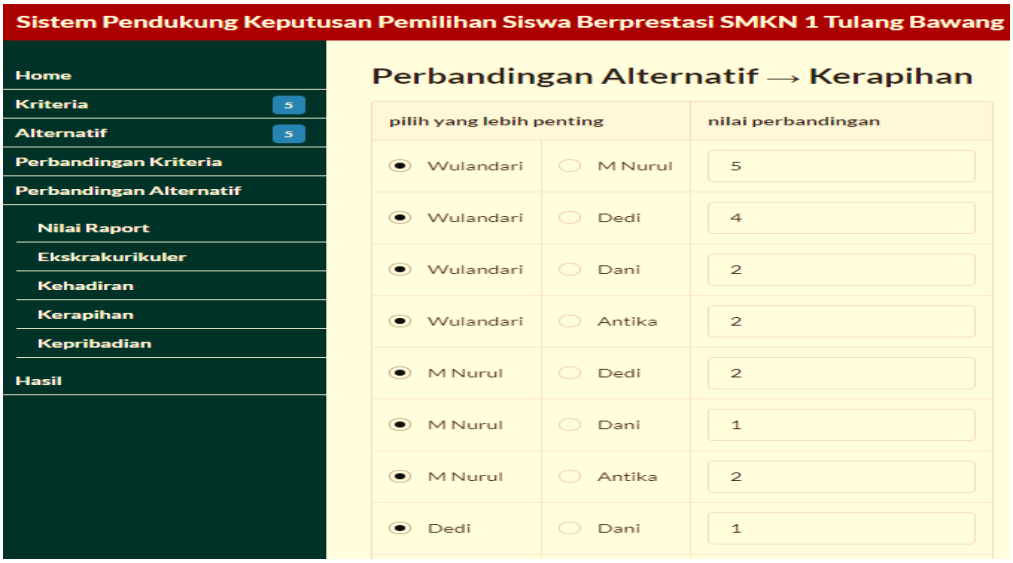

Figure 10. Comparison of neatness alternatives

The SPK attendance comparison form is a page to provide comparison values between each alternative in terms of neatness scores. The values that can be given are starting from 1 to 9 with different levels of importance. The more criteria, of course, the more will be compared.

4.4.10 Best Student Selection Results Form

Figure 11. Best student selection results form

The SPK best student selection results form is a page to see the results of calculations that have been carried out based on the method used.

4.5. System Testing

Testing of the best student decision support system was carried out using the Blackbox method, namely functional testing of the system that had been created.

4.6. System Advantages and Disadvantages

1) System Advantages

The advantages of the decision support system for the selection of the best students at SMKN 1 Tulang Bawang using the analytical hierarchy process method that has been made include that this decision support system can help determine the best students at SMKN 1 Tulang Bawang, and this decision support system can help in streamlining the time in the process of selecting the best students at SMKN 1 Tulang Bawang.

2) Disadvantages

Every system that is built certainly has shortcomings; the disadvantages of this system are that this application is not online, and there is no guidance in using the application. The application can only be run on the installed computer and is not a client server.

5. Conclusion

Based on the results of trials and discussions that have been carried out, it can be concluded that Decision Support System (DSS). The analytical hierarchy process method can help determine outstanding students at SMKN 1 Tulang Bawang, and this decision support system can assist in the selection process for outstanding students at SMKN 1 Tulang Bawang so that it is more efficient.

The suggestions for this research are that the Decision Support System (DSS) which will be developed next can be completed with guidance in using the application, and the system that is created should then be able to compare the AHP method with other methods to determine the level of accuracy in the calculation process.

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