

Decision Support Systems for Selection of Outstanding Teachers with Analytical Hierarchy Process (AHP) and Topsis Methods: Case Study of SMKN 8 Kabupaten Tangerang

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Abstract:

Human resources have the competence and quality in educational institutions especially at SMKN 8 Kabupaten. Tangerang, is the most important thing for an educator, aims to increase the motivation of educators in learning and teaching activities. The headmaster will elect a prospective teacher who has good achievements, the election process is carried out at the school he leads, is a general matter a decision is always determined by the leader, namely the head and his representative. The difficulty of the school to conduct the selection of outstanding teachers, because there is no calculation method in producing alternative decisions, resulting in ineffective if you have to use a long time in the process of selecting outstanding teachers. In this study, there is a system need to be used by the school, the process and results that have not produced an alternative decision will be overcome by existing problems with the decision support system of the Analytical Hierarchy Process and TOPSIS (Technique for Order Preference by Similarity Ideal Solution). Obviously effective if applied in overcoming the difficulty of implementing the selection of outstanding teachers. The results of the study state that the method used shows the decision support system as an efficiency in decision making, as well as providing solutions for school institutions by saving time, costs and energy so as to strengthen the confidence with alternative decisions taken, if applied in solving a problem. In determining the decision as for the criteria and alternatives used, referring to the provisions of the school because according to the need and conditions at school. Based on user acceptance testing that respondents have done, it can be concluded that, the results of all respondents get a value of 89.57% Decision Support Systems determine the achievement teachers can be accepted and get the results of the statement agreed.

Keywords — DSS(Decision Support Systems), AHP, TOPSIS, Outstanding Teacher

1. INTRODUCTION

SMKN 8 Kabupaten. Tangerang, opens educational programs that have the aim of guiding and teaching students in accordance with the program that is followed so that eventually students can have advanced talents, abilities, knowledge, and insights. The teacher is an educator who is competent in educating students and students, in order to be able to educate, give value and give results to the evaluation of their students both at an early age, elementary and secondary [1]. Then the outstanding teacher is someone who has more ability in teaching competence, so that it can have better standards [2]. To improve the quality and competence of teachers in teaching, the school conducts teacher selection in determining that the

school has not applied the method or calculation as a parameter of decision making. But what is used as the parameter of decision making is only certain alternatives that have proximity to leaders or officials who are candidates for outstanding teachers. And what makes the school difficult to determine the candidate is because the determination of the achievement teacher is not yet known the process or the results of the calculation so that it is long enough to determine the alternative decision. The existence of these problems requires a decision support system that is able to take into account the supporting criteria for decision making that is useful as a provider of information for the organization in decision making [3]. The method that will be used aims to select teachers who excel using the AHP method is a simpler calculation

method and a comparison of one with the other comparisons of decisions taken [4]. Whereas for the TOPSIS method (Technique for Order Preference by Similarity Ideal Solution) a method in decision-making information systems, TOPSIS has characteristics in a statement that a criterion has a high value then this method will be chosen [5].

A good mission is to make vocational secondary education institutions, by building the image of the school able to be trusted by the community and the environment in improving the quality of education. The examples in journals that can be used as references in this study are decision support systems to determine outstanding students who are worthy of being exemplary students. The results of the research they did were that the system had a better impact on the use of decision support systems that had been done so that they could be automated from the manual to digital, can be shown in detail the points that become judgments and more transparency in the selection of exemplary students [6]. Then the research on SPK Purchasing Computer Devices With the Topsis Method, this study produces a system that is able to display the best PC recommendations with criteria that have been determined [7]. Proposed by many researchers in measuring performance and alternative decisions. In this study, the AHP method (Analytical Hierarchy Process) which was implemented into a decision-making system and the TOPSIS method (Technique for Order Preference by Similarity Ideal Solution) to determine the best alternative solution so as to avoid the emergence of subjective in the agency. From the background of the journal references that have been presented, this study discusses the problem in a thesis report with the title "Decision Support Systems for Selection of Outstanding Teachers with Analytical Hierarchy Process (AHP) and Topsis Methods: Case Study SMKN 8 Kabupaten Tangerang".

2. THEORY BASIS

2.1. System

System is a unit or entity that has more than one component, for sub-systems that are smaller systems that are connected and related in carrying out a particular goal [8]. Next according to [9] system is a unit consisting of elements that are interrelated with each other that cannot be separated.

2.2. Decision

Decision to make a process based on knowledge and information with the aim of getting the results of a decision process, as for the information formed a number data that has special

meaning and is compiled and processed with the support of management information systems [10].

2.3. The Concept and Framework of Decision Making Support Systems

[11] states, the Concept and Framework of the SPK consists of three main elements, namely:

1. Optimize the criteria for designing a system.
2. In building a total design.
3. The process of designing a system in detail.

According to [12] the design process of a system above is oriented towards participatory decisions. This is related to the application of system science to planning and controlling programs that require the participation of its members. Linkages and structure of the system approach to decision support.

2.4. AHP Method (Analytical Hierarchy Process)

The AHP method is a method that is useful in determining a decision, other than that according to [23], The steps that need to be taken are:

1. Determining the desired solution of the problem that has been defined then arranging the hierarchy of difficulties encountered .
2. Determine priority elements.
 - a. Make a comparison of elements in pairs according to the specified criteria.
 - b. Pairwise comparison matrices are filled with the most important numbers aimed at representing the relative importance of an element with other elements.

Seen in Table 1 which is used to assess the comparison of pairs as follows: [13]

Table 1: Prioritizing Elements with Pairwise Comparisons

Intensity of Interest	Information
1	Both elements are equally important
3	One element is a little more important than the other elements
5	One element is more important than the other elements
7	One element is clearly more important than the other elements
9	One element is absolutely important than the other elements
2,4,6,8	The values between two consideration values are close together
The opposite	If for activity i get one number compared with activity j, then j has the opposite value compared to i

3. Synthesis

- In this step what you need to done is:
- Summing the value of each column matrix.
 - Divide the column value with the total column in question to obtain the normalization of the matrix.
 - The values in the existing row are added together and divided by the number of elements of the average value.
- Consistency measurement
The purpose of this is to find out how well there is consistency. The purpose of this measurement is to get the result in the form of a value called λ_{max} = eigenvalue maximum.
 - Calculate the value of the Consistency Index (CI) = $\frac{(\lambda_{max} - n)}{n-1}$
n = number of criteria
 - Calculating Consistency Ratio (CR), with the formula: CR = CI/IR where, IR = Indeks Random Consistency
 - Check the consistency of hierarchy if the value is more than 10%, then the assessment of data judgment must be corrected. But if the results of Consistency Ratio have less than (0.1), the results are declared correct. The IR value is the Random Index issued by Oarkridge Laboratory in the form of table 2 below:

Table 2: Indeks Random Konsistensi

Matrix Size	1	2	3	4	5	6	7	8	9	10
IR Value	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.51

2.5. TOPSIS Method (Technique for Order Preference by Similary Ideal Solution)

TOPSIS is a method in multicriteria decision making, TOPSIS also uses a principle that the chosen alternative must have the closest distance from the positive ideal solution and the farthest from the negative ideal.

The TOPSIS method is based on the concept that an selected alternative is the best. Method stages:

- Making a normalized decision matrix.
- Create a weighted normalized decision matrix
- Determine the positive and negative ideal matrix.
- Determining the distance from the value of each alternative with a matrix of positive and negative ideal solutions

- Determine the preference value for each alternative.

According to [14] TOPSIS requires a performance rating of each alternative A_i on each criteria C_i normalized. The stages of the TOPSIS method are:

- Determining the normalization of the decision matrix. The normalized value r_{ij} is calculated by the formula:

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

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

- Determines the results of the normalized weight Y_{ij} as follows:

$$Y_{ij} = w_{ij} r_{ij}$$

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

- The alternative distance A_i with a positive ideal solution is formulated as:

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

Description: $i = 1, 2, \dots, m$.

- Distance A_i with negative ideal solutions formulated as:

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

With $i = 1, 2, \dots, m$.

- Preference values for each alternative (V_i) given as a higher value indicates that the alternative A_i is preferred.

$$V_i = \frac{D_i^-}{D_i^- + D_i^+}; i = 1, 2, \dots, m.$$

a V_i large value indicates that the alternative A_i is preferred.

2.6. System Development Method

In the conceptual framework SDLC (System Development Life Cycle), is used in project management which explains the stage flow of how information system development is carried out [15]. There are also systems development used in the development cycle, namely: (1) investigation, (2) analysis, (3) design, (4) implementation, and (5) maintenance.

To be able to use the system development process starting from analysis, design, to implementation. In this study using UML (Unified Modeling Language) which is a standard language for visualization, specification, construction and documentation of artifacts of a software [16].

Software testing is done to measure the guarantee of a software quality from specifications, the process of executing a program with the aim of finding errors [17]. For testing techniques carried out using a black box (Blackbox testing), to find errors in each function.

In this study, using User Acceptance Testing with the TAM method variable approach (Technological Acceptance Model), carried out by the user whether the system is running in operation [18]. The TAM method is an adaptation of the Theory of Reasoned Action (TRA) model that has specifically been adapted to the information system model by the user [19]. According to [20], the TAM model developed from psychological theory, describes a computer user behavior that is based on beliefs, attitudes, desires, and behavioral interactions between users. The model aims to provide an explanation of the attitude of a user to the acceptance of the use of technology with two variables, namely:

First ease of use (ease of use) and second usefulness.

3. METHODOLOGY AND DESIGN

3.1. Methods

In research on determining the outstanding teachers used quantitative descriptive method where in this study analyze data based on the place of research when the data was collected which included several factors to solve problems and test the research hypothesis, because quantitative research develops and uses a mathematical model of theories and hypothesis testing, the method is the AHP and TOPSIS methods which are uses as determinants of teacher achievement decisions. This stage is the stage of system testing carried out using user acceptance testing and BlackBox Testing which aims to determine whether the system is built to be able to be accepted by the user.

3.2. Sample Selection Method

Of selection is taken from the total population of teachers who are still actively working, in conducting teaching in the agency. To be able to represent the population in the selection of samples using a non probability sampling procedure that is purposive sampling technique, is a sampling technique for selected respondents in accordance with the specific characteristics of the respondents [21]. In addition, Purposive sampling is used to determine the research sample with certain considerations so that the data obtained is more representative.

3.3. Questionnaire

The questionnaire in this study was carried out to selected expert respondents to make comparisons of criteria and determine potential alternative decisions. In this research, the data is used as input material in the application of predetermined methods to produce an objective decision in determining the achievement teacher especially done in SMKN 8 Kab. Tangerang. In testing the user acceptance of the system that was built, it was used steps to give the questions and written answers to the respondent to answer.

3.4. Instrumentation

The instruments used to collect data include: researcher, user or object and interview questions.

1. In this study to obtain valid data, namely by conducting interviews, and giving questionnaires to the parties who are experts in their fields such as: principals, vice principals and teachers, related to the selection of outstanding teachers.
2. In the literature study method, this literature study instrument is a researcher who studies literature related to research systems or topics.
3. Instrument for observing research objects
Instruments used for observing research objects include hardware and software.

3.5. System Design Techniques

The technique is carried out in the design, namely:

1. The static structure of a program or system specification is modeled with a Class Diagram.
2. The design of the user interface is done so that the appearance of the system can be easily understood and can be used by the user.
3. Database design for the system used.
4. Architecture Design (hardware, software)

4. DISCUSSION OF RESEARCH RESULTS

4.1. Grouping and Analysis of Data

The process of doing system analysis aims to describe the system in meeting the user's information needs, with a system built. System analysis will provide answers to the questions what the system does, and who will use the system created, then where and when the system will be used.

In the research conducted at SMKN 8 Kab. Tangerang complete data is needed so that the results of the research can produce an alternative problem solving appropriately according to the intended goals which will be focused on the

selection of outstanding teachers and the decision-making system can be done quickly and accurately.

4.1.1. Selection of Criteria for Determining Outstanding Teachers

The criteria used in the selection of an outstanding teacher in table 3 are the results of interviews with the principal and vice principal, namely:

Table3:Criteria for Outstanding Teachers

	Abbreviation	Description
Criteria	JJM	Number of teaching hours
	MK	Working Period
	ADMG	Administration of Teachers
	KP	Competence
	KD	Presence
	PDDK	Education
	SKP	Attitude
	INF	Initiative

4.1.2. Alternative Determination of Achieving Teachers

The alternative used by principals is outstanding teacher candidates, who have good qualifications in carrying out their profession.

4.1.3. AHP (Analytical Hierarchy Process) Calculation Stage

In pairwise comparisons between criteria, obtained from interviews and questionnaires that have been carried out by respondents to determine the comparison of criteria, and get the results of the assessment and addition. The next step is to find the weights from the paired comparison matrix shown in table 4, the results of this weight value will be used with the TOPSIS method.

Table 4: Calculation of the weight of the paired comparison matrix

Kriteria	JJM	MK	ADMG	KP	KD	PDDK	SKP	INF	F	Bobot
JJM	1	0,5	0,5	0,2	0,5	0,333	0,333	0,333	0,418	0,04281248
MK	2	1	0,333	0,5	0,333	0,5	2	0,333	0,662	0,067893451
ADMG	2	3	1	0,333	0,333	3	3	0,333	1,081	0,111783346
KP	5	2	3	1	3	3	3	0,5	2,118	0,217110204
KD	2	3	3	0,333	1	3	2	0,333	1,364	0,1398447
PDDK	3	2	0,333	0,333	0,333	1	0,333	0,2	0,391	0,06054599
SKP	3	0,5	0,333	0,333	0,5	3	1	0,2	0,688	0,070488717
INF	3	3	3	2	3	5	5	1	2,824	0,28952111
Jumlah	21	15	11,5	5,033	9	18,833	16,667	3,2333	9,756	1

After getting the weight value, the next step is to measure the maximum Eigen value, then the result is represented by the maximum eigenvalue λ max whose calculation is as below:

$$\lambda \max = (21 \times 0,04281248) + (15 \times 0,067893451) + (11,5 \times 0,111783346) + (5,033 \times 0,217110204) + (9 \times 0,1398447) + (18,833 \times 0,06054599) + (16,667 \times 0,070488717) + (3,2333 \times$$

$$0,28952111) = (0,899062084 + 1,018401771 + 1,285508484 + 1,092788026 + 1,258602304 + 1,140282814 + 1,74811956 + 0,936118256) = 8,805575696$$

Continued to calculate the Consistency Index (CI) to find out the consistency value of the data obtained.

$$CI = \frac{(\lambda \max - n)}{(n-1)}$$

$$= \frac{(8,805575696 - 8)}{(8 - 1)}$$

$$= 0,115082242$$

After getting the CI value, it is continued by calculating the value (Costincency Ratio) CR obtained by dividing (Consistency Index) CI and (Random Index) RI, i.e. the RI value found in the Saaty table, RI for the 8th ratio comparison matrix which is 1.41.

$$CR = \frac{CI}{RI}$$

$$= \frac{0,115082242}{1,41}$$

$$= 0,081618612$$

Then obtained the CR value is 0.081618612 or $\leq 0,1$ then the results data are declared consistent.

4.1.4. The Calculating TOPSIS (Phase Tecnique For Order Preference by Similarity to Ideal Solution)

After calculating with the AHP method and obtaining the weight value, the next step will be to calculate using the TOPSIS method. The level of alternative importance of the criteria is determined by giving a score of 1 to 5 aiming to get a match ranking from alternative decisions which can be seen in Table 5 below:

Table 5: Provisions for alternative values

NO	Description	Value
1	Less	1
2	Enough	2
3	Well	3
4	Very good	4
5	Best	5

1. Compile the candidate data table in the selection of outstanding teachers, the calculation uses the TOPSIS method with the data as shown in Table 6 below:

Table 6: Prospective teacher selection data

	Calon 1	Calon 2	Calon 3	Calon 4	Calon 5
Number of Teaching Hours	3	3	3	3	3
Working Period	3	3	5	4	3
Administration of Teachers	4	4	4	4	4
Competency	4	4	4	4	3
Presence	5	5	5	5	5
Education	4	4	4	3	4
Attitude	4	5	4	3	3
Initiative	3	3	3	3	3

2. Calculating the normalized decision matrix in table 7 is the result of calculations below:

Table 7: Normalized decision matrix

	JJM	MK	ADMC	KP	KD	PDDK	SKP	INF
Calon.1	0,447213395	0,363803488	0,447213395	0,468164389	0,447213395	0,468164389	0,461880215	0,447213395
Calon.2	0,447213395	0,363803488	0,447213395	0,468164389	0,447213395	0,468164389	0,377339269	0,447213395
Calon.3	0,447213395	0,606339063	0,447213395	0,468164389	0,447213395	0,468164389	0,461880215	0,447213395
Calon.4	0,447213395	0,48307125	0,447213395	0,468164389	0,447213395	0,351123442	0,346410162	0,447213395
Calon.5	0,447213395	0,363803488	0,447213395	0,35112344	0,447213395	0,468164389	0,346410162	0,447213395

3. matrices Calculating weighted normalized matrices

In table 8 shows the results of weighted normalized decision matrices obtained from the calculation of the multiplication of each column of the decision matrix element with the preference weight which is the value eigen vector from the pairwise comparison calculation.

Table 8: Weighted normalized matrix

	JJM	MK	ADMC	KP	KD	PDDK	SKP	INF
C1	0,019146328	0,024699871	0,049991082	0,101643309	0,062540451	0,028345489	0,032557344	0,129477777
C2	0,019146328	0,024699871	0,049991082	0,101643309	0,062540451	0,028345489	0,040696668	0,129477777
C3	0,019146328	0,041166452	0,049991082	0,101643309	0,062540451	0,028345489	0,032557344	0,129477777
C4	0,019146328	0,032933161	0,049991082	0,101643309	0,062540451	0,021239116	0,024418008	0,129477777
C5	0,019146328	0,024699871	0,049991082	0,076232482	0,062540451	0,028345489	0,024418008	0,129477777

4. Identifying positive ideal and negative ideal solutions, namely by finding the maximum value of all alternatives of each criterion in the weighted normalized matrix, if the criteria have a value of benefit, the greatest value is the best value. For a negative ideal by finding a minimum value of all alternative values for each of the criteria in a weighted normalized matrix, if the criteria have a profit value where the smallest value is the best value
5. Perform distance calculation of alternative values between positive and negative ideal matrices.
6. The process of determining the value of each alternative from the ideal solution (preference value) shows that the greater value is the value that is chosen as the alternative.

4.2. System testing

In testing the system in this case using the method Blackbox Testing and Testing user acceptance with the TAM variable approach.

4.2.1 BlackBox Testing

In table 9 the results of the Blackbox testing test that has been done, is a test method that is used whether the system is able to run in accordance with its function, and whether the input and output received are appropriate.

Table 9: Test results for BlackBox

No	Test	Result	Scenario	Description
1	Admin Login	Access admin login	Can enter the beginning of the system	Be accepted
2	Input Teacher data	Admin can fill in teacher data	Teacher data can be generated on the page of AHP and TOPSIS calculations	Be accepted
3	Criteria Value Input	Admin can fill in the criteria value	Criteria values can be generated on the page of AHP and TOPSIS calculations	Be accepted
4	Report Menu	Admin chooses report page	The report page can display the calculation results	Be accepted

4.2.2 Acceptance User

Testing Testing is done with several questions on the respondent using a questionnaire, asking the following questions in table 10 and table 11 for the level of answers chosen:

Table 10: acceptance testing questions user[22]

Variable	Question / Statement	Response				
		A	B	C	D	E
System Interface Design	As needed	5	5			
Perception of user usability	Increase effectiveness	3	7			
	Improve the performance	5	5			
	Increase productivity	5	5			
	Very useful	6	4			
Perception of user convenience	Easy to use	5	5			
	The design is easy to understand	7	3			
	Easy to understand interactions	8	2			
Attitudes towards the application of the system	Real application	5	5			
	Real use	6	4			
Intention to use the system behavior	Intend to use	5	5			
	Intend to use more often	3	5	2		
Actual usage of	Use often	4	3	3		

the system	Happy to use	5	5			
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Table 11: Answers to user acceptance testing

Value	Description	Weight (%)
5	Strongly agree	100%
4	Agree	80%
3	Enough	60%
2	Disagree	40%
1	Strongly Disagree	20%

The summary in table 12 is in the form of a summary of the acceptance test user.

Table 12: Summary of acceptance testing user

No	Question/ statement	Value					quantity	Average value	Percentage%
		Ax5	Bx4	Cx3	Dx2	Ex1			
1	As needed	25	20	0	0	0	45	4.5	90%
2	Increase effectiveness	15	28	0	0	0	43	4.3	86%
	Improve the performance	25	20	0	0	0	45	4.5	90%
	Increase productivity	25	20	0	0	0	45	4.5	90%
	Veryuseful	30	16	0	0	0	46	4.6	92%
3	Easy to use	25	20	0	0	0	45	4.5	90%
	The design is easy to understand	35	12	0	0	0	47	4.7	94%
	Easy to understand interactions	40	8	0	0	0	48	4.8	96%
4	Real application	25	20	0	0	0	45	4.5	90%
	Realuse	30	16	0	0	0	46	4.6	92%
5	Intend to use	25	20	0	0	0	45	4.5	90%
	Intend to use more often	15	20	6	0	0	41	4.1	82%
6	Use often	20	12	9	0	0	41	4.1	82%
	Happy to use	25	20	0	0	0	45	4.5	90%
Total							627	62.7	89.57%

Question analysis:

- 1 From the number of respondents starting with the first question that is 45 the average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$
- 2 The average value is $43/10 = 4.3$ percentage value which is $4.3 / 5 \times 100 = 86\%$
- 3 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$
- 4 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$

- 5 The average value is $46/10 = 4.6$ percentage value, which is $4.6 / 5 \times 100 = 92\%$
- 6 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$
- 7 The average value is $47/10 = 4.7$ percentage value which is $4.7 / 5 \times 100 = 94\%$
- 8 The average value is $48/10 = 4.8$ the percentage value is $4.8 / 5 \times 100 = 96\%$
- 9 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$
- 10 The average value is $46/10 = 4.6$ percentage value, which is $4.6 / 5 \times 100 = 92\%$
- 11 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$
- 12 The average value is $41/10 = 4.1$ the percentage value is $4.1 / 5 \times 100 = 82\%$
- 13 The average value is $41/10 = 4.1$ the percentage value is $4.1 / 5 \times 100 = 82\%$
- 14 The average value is $45/10 = 4.5$ percentage value which is $4.5 / 5 \times 100 = 90\%$

From this test the number of 627 from the ideal score is the highest value of 700. Actual score = (actual score * 100%) / ideal score, then $(627 * 100\%) / 700 = 89.57\%$ based on the summary of the results, a decision to determine outstanding teachers is able to be accepted and get the results agreed.

4.3. Implementation Results

In this study implementing the system that was built, contains the appearance of the method used as shown in Figure 1 below.



Figure 1: Input teacher value

Display AHP report in figure 2 admin and principal can access the final results of AHP calculation and can print the results of the report.

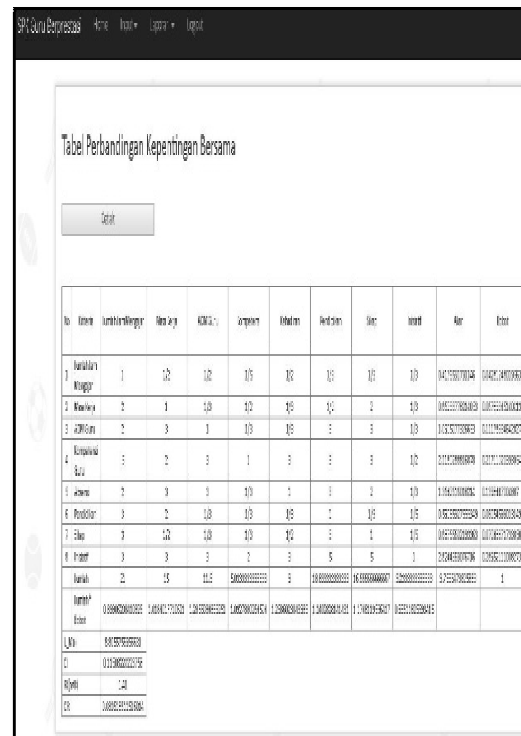


Figure 2: AHP calculation report

The display in Figure 3 shows the results of the calculation of the preference value report from the selected alternative.



Figure 3: preference value

5. CLOSING

5.1. Conclusion

From the results of the analysis carried out and tested based on the research that has been done, the conclusions obtained are as follows:

1. Decision support systems using the AHP and TOPSIS methods can be implemented to help facilitate the school in selecting outstanding teacher candidates.
2. The existence of a decision support system with the AHP and TOPSIS methods of the school can be more clear in the process and results in the process of determining an alternative decision.

5.2. Suggestion

For further development, it is necessary to pay attention to the following suggestions:

1. For now the SPK in its implementation must be supported by all parties, so that the existing teachers can be motivated and excel in school.
2. For further research on SPK, the AHP and TOPSIS methods can be developed for all schools in Indonesia.

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