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ACHIEVEMENT STUDENT DECISION MAKING SYSTEM USING ANALYTIC HIERARCHY PROCES (AHP) METHOD IN BINA DHARMA PRINGSEWU LKP

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Abstract
Learning achievement is an illustration of the level of success of students in learning. In accordance with the regulations determined by the Bina Dharma Pringsewu Training Course Institution (LKP) to find out outstanding students, criteria are needed to determine who will be selected as the most accomplished students. The purpose of this study is to design a Student Value Information System as a support in decision making and daily operational needs, and to compare the effectiveness and efficiency of processing data processing and the presentation of information between existing systems and information systems that will be proposed. In improving the development process, the writer will develop a Student Information System as a support in making decisions using Visual Basic 6.0 programming language and using the Analytic Hierarchy Process (AHP) method. The AHP (Analytic Hierarchy Proces) method is suitable to be applied by determining the weight value of all criteria for each student so that the school can make a decision to determine the outstanding students. The research carried out in this case is a qualitative descriptive study by conducting a survey of the object of research, namely at the Institute of Training Courses (LKP) Bina Dharma Pringsewu, Pringsewu Regency using data collection techniques namely observation (observation), interview (interview), and library research. The conclusion of this research is that the new system is expected to provide convenience to the parties involved in processing data quickly and accurately and can store data safely so that it helps in the process of service to students and the public.

I. INTRODUCTION

The Institute for Courses and Training are two Non-formal education units as stated in article 26 paragraph (4) of the Law. No. 20 of 2003 concerning the National Education System. In general, Article 26 paragraph (5) explains that Courses and Training are held for people who need knowledge, skills, life skills, and attitudes to develop themselves, develop their profession, work, independent business, and / or continue to pursue higher education. . In addition, it is again

supplemented in article 103 paragraph (1) PP No. 17 of 2010 concerning the management and implementation of education that courses and training are held for the community in order to develop professional personalities and to improve vocational competencies of course students. [1]

Hartati (2017) Decision Support System to determine the ranking of acceptance of new prospective student invitation lines at SMK Bumi Nusantara Wonosobo can help and facilitate schools in selecting quality new students based on predetermined criteria, namely language skills English, extracurricular skills, not color blindness, graduating from junior high school, SKHU / Diploma, age, filling out forms, and achievement certificates [2]. Bosker Sinaga and Hasren Meliani Zebua (2014) Making applications in this case using the Visual Basic 6.0 programming language. This application produces outputs of priority intensity values for each student so that students who have the highest scores are entitled to receive scholarships. Design that is built is: input design consists of random index form, criteria form, sub criteria form, and pair comparison form.[3]

The development of technology is very influential on all aspects of human life both in the fields of education, economics, business, and other organizations, especially in the field of education can not be run by relying on manual methods with human knowledge itself without the support of current technology. Technology is the use of scientific knowledge to improve ways to do things. One of them is the use of computers as a tool to solve work in the field of information technology which is increasingly widespread and developing in all fields, especially in the field of education. Education has a very important role, especially if it is associated with efforts to improve the quality of human resources (HR). Because only with quality human resources can improve human dignity itself (Jamaludin sawaji, 2011)[4]

The selection process carried out for outstanding students at the Bina Dharma Pringsewu Training Course Institution still faces many obstacles regarding the decision-making process. This is because the assessment and recording system carried out by the institution is still manual, making it difficult for Instructors to analyze the condition of students. Apart from that, there is no objective method to decide quickly, based on existing data who is entitled to receive this achievement. This study aims to design a student value information system as a support for decision making in the assessment of student learning achievement Bina Dharma Pringsewu Training Course Institute (LKP) in Pringsewu Regency.

II. RESEARCH METHODS

2.1. Method of Collecting Data

In Resolving the Problems of this Research, there are several methods that can be done including:

a. Observation Method (observation)

The method of observation or observation is human daily activities by using the five senses and assisted by the other five senses. In this observation method the author does not only observe the object of study.

In this method researchers observe the object of study and directly and observe the object of research. but also note the things contained in the object. Besides that this method the author uses to get prospective students to participate in the universal LKP Bina Dharma Pringsewu from the object of research that is worthy of being called a student performing.

b. Interview Method

Interview / interview method is the process of obtaining information for the purpose of research by way of question and answer while face to face, in using this method the researcher holds a question and answer to find out everything that is a problem / problem that is often in LKP Bina Dharma Pringsewu

c. Library Study Method

Literature study, or literature review, is part of a scientific paper that contains discussions of previous research and scientific references related to the research described by the author in the paper. In this research phase, the author also uses the keputakaan method or literature study in the form of referrals from previous journals. In this case the researcher seeks, studies and summarizes various kinds of literature or references related journals.[5]

2.2 Procedure in Using the AHP Method

1. Arrange a hierarchy of problems faced. Hierarchical arrangement is to determine the goals that are the overall system target at the top level. The next level consists of criteria to assess or consider alternatives and determine alternatives. Each criterion can have sub-criteria below it and each criterion can have the value of each intensity.
2. Determine priority elements with the following steps:
   a. Make pairwise comparisons. The first step in determining element priority is to make a paired comparison, which is to compare elements in pairs according to the given criteria. For pairwise comparisons the matrix form is used. The matrix is simple, strong in position that offers a framework for checking consistency, obtaining additional information by making all possible comparisons and analyzing overall priority sensitivity to change considerations. To start the pairwise comparison process, starting from the top level of the hierarchy, choose criteria, for example C, then from the level below the elements that will be compared are taken, e.g., A1, A2, A3, A4, then the arrangement of elements in a matrix such as Table 1.

Table 1. Pairwise comparison matrix

C	A1	A2	A3	A4
A1	1			
A2		1		
A3			1	
A4				1

   b. Fill in the participating matrix in pairs
   To fill in the paired comparison matrix, it uses numbers to represent the relative importance of one element to the other elements in the form of a scale from 1 to 9. This scale defines and explains values 1 to 9 for consideration in pairwise comparisons of elements at each level of the hierarchy against a criterion at a higher level. If an element is in a metric and compared to itself, then it is given a value of 1. If i compared j gets a certain value, then j versus I is the opposite. Table 2 provides definitions and explanations of quantitative scales 1 to 9 to assess the importance of an element with other elements.

Table 2. Quantitative scales in decision support systems

Intensity of interest	Definition	Explanation
1	Both elements are equally important	Two elements have the same effect on goals
3	One element is slightly more important than the other elements	Experience and judgment support a single element rather than the other
5	One element is more important than the other elements	Experience and assessment strongly support one element compared to the other
7	One element is clearly more important than the other elements	One strong and dominant element is seen in practice
9	One element is absolutely important than the other elements	Evidence that supports one element against another element has the highest degree of affirmation that might strengthen
2, 4, 6, 8	Values between 2 consideration values are close together	This value is given if there are two compromises between 2 choices
The opposite	If activity I gets one number compared to activity j, then j has an inverse value compared to i	

   c. Synthesis
   Considerations for pairwise comparisons are synthesized to obtain overall priorities with the following steps:
   - Add the values of each column to the matrix.
   - Divide each value from the column by the corresponding column to obtain the normalization of the matrix.

- Add the values of each matrix and divide them by the number of elements to get the average value.
- Measuring consistency

  In decision makers, it is important to know how well consistency exists, because we do not want decisions based on considerations with low consistency. Because with low consistency, consideration will appear as something random and inaccurate. Consistency is important to get valid results in the real world. AHP measures consistency of consideration with a consistency ratio. Consistency values ratios must be less than 5% for 3x3 matrices, 9% for 4x4 and 10% matrices for larger matrices. If more than the ratio of this limit, the value of the matrix comparison is done again. Steps to calculate consistency ratio values, i.e.:

  a) Multiplying the value in the first column with the relative priority of the first element, the value in the second column with the relative priority of the second element, and so on.
  b) Add up each row.
  c) The results of the sum of rows are divided by the relative priority elements concerned.
  d) Dividing the results above with many elements, the result is called eigen value (λmax).
  e) Calculates consistency index by formula:
     CI = (λmax n)/
     Where CI : Consistency Index
     λmax: Eigen Value
     n : Many Elements
  f) Calculates the consistency of the ratio (CR) with the formula.
     CR=CI/RC
     Where: CR: Consistency *Ratio*
     CI : *Consistency Index*
     RC: *Random Consistency*

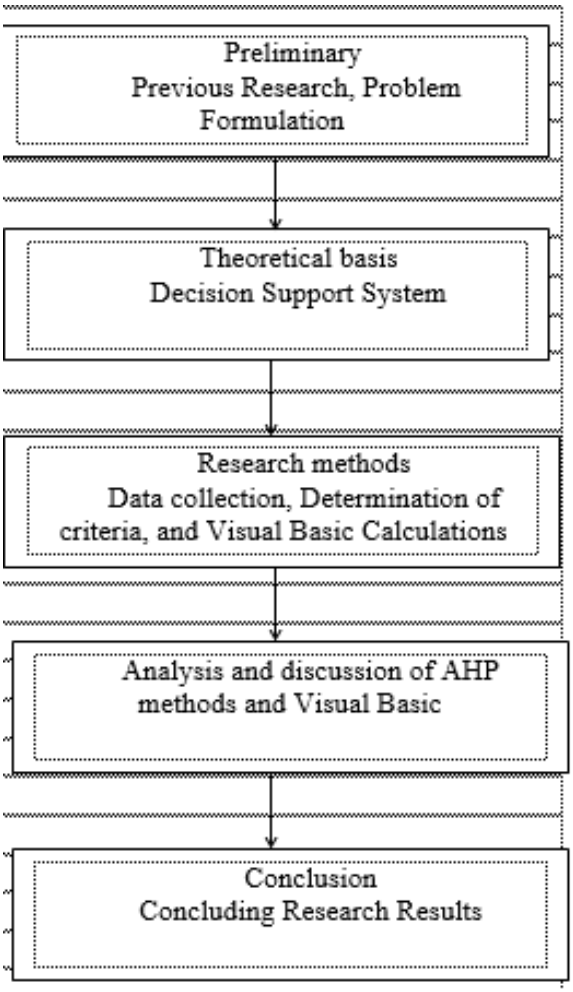
     Random matrix with a rating scale of 1 to 9 along with the inverse as random consistency (RC).

     Based on current calculations using 500 samples, if the consideration chooses random from a scale of 1/9, 1/8, ..., 1, 2, ..., 9 will be obtained the average consistency for different matrices such as Table 3.

Table 3. Value of average consistency

Matrix Size	Random consistency
1	0,00
2	0,00
3	0,58
4	0,90
5	1,12
6	1,24
7	1,32
8	1,41
9	1,45
10	1,49

2.3. Reseach Framework



2.4. Procedure for Selecting Student Achievement Using the AHP Method

The decision support system for the selection of high achieving students at Bina Dharma Pringsewu LKP used four criteria: Achievement, Attendance, Attitude and Talent.

The steps in the AHP method are :

1. Define the problem and determine the desired solution.
2. Make a hierarchical structure that starts with general objectives, criteria assessed and alternatives or prospective students achievers

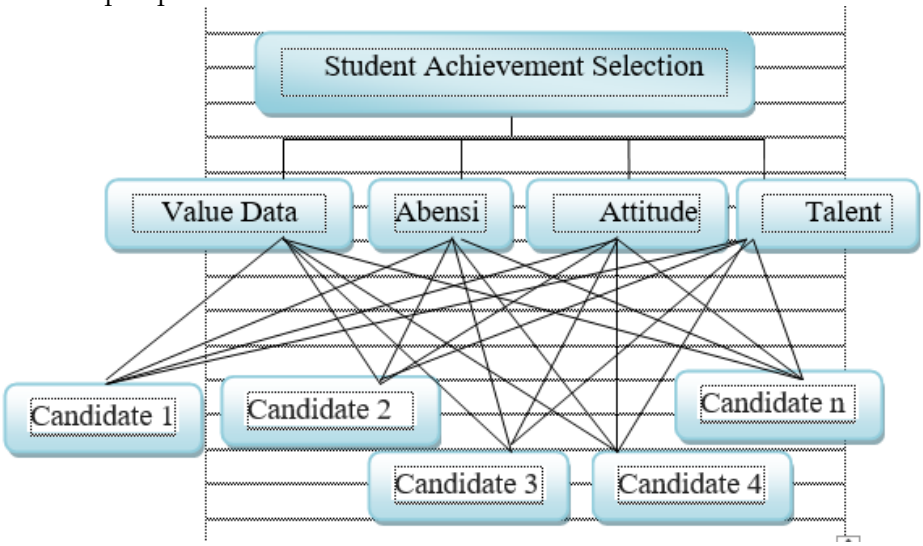


Figure 1. AHP Hierarchy Structure

III. RESULT

3.1 System Panning

After making hierarchical structures AHP, then the stage of making this application is to calculate the alternative weighting done by compiling a paired matrix for alternatives for each criterion.

1. Alternative weighting for Achievement criteria

Enter data on the names of prospective students who are recommended in the form of paired matrices

Tabel 4. Matriks perbandingan berpasangan

ACHIEVEMENT	C1	C 2	C 3	C 4
CANDIDATE 1	1/1	1/2	4/1	1/3
CANDIDATE 2	2/1	1/1	3/1	2/1
CANDIDATE 3	1/2	3/1	1/1	4/1
CANDIDATE 4	4/1	2/1	1/3	1/1

*C = Candidate

Data The above matrix is changed from fraction to decimal.

Table 5. Interim Results of Alternative Weighting Pairings for Achievement Criteria

ACHIEVEMENT	C1	C 2	C 3	C 4
CANDIDATE 1	1,00	0,50	4,00	0,33
CANDIDATE 2	2,00	1,00	3,00	2,00
CANDIDATE 3	0,50	3,00	1,00	4,00
CANDIDATE 4	4,00	2,00	0,33	1,00
∑ weight	**7,50**	**6,50**	**8,33**	**7,33**

*C = Candidate

After determining the number of temporary values / weights, each of the above cells is divided by the number of each column, for example to fill the second column of the second row (C 1: ∑ weight C1) → (1.00: 7.50) = 0.1333 (use the same method to fill in the other columns) so that results are obtained as in table 6.

Table 6. Alternative Weighting Paired Results for Achievement Criteria

ACHIEVEMENT	C1	C 2	C 3	C 4	TOTAL
C 1	0,1333	0,0769	0,4801	0,0450	0,7353
C 2	0,2667	0,1538	0,3601	0,2728	10,534
C 3	0,0667	0,4615	0,1200	0,5457	11,939
C 4	0,5333	0,3076	0,0396	0,1364	10,169

*C = Candidate

After knowing the results of the number of each row, then calculate the alternative priority value for the achievement criteria with the formula. The number of results of the comparison is divided by the number of candidates. Example to fill the Prospective Criteria Priority 1 is (∑ comparison results: ∑ candidate) → (0.7353 / 4) = 0.1838 (use the same method to fill in the other columns) so that results are found in table 7.

Table 7. Priority Results Student Criteria Achieve Based on Achievement

ACHIEVEMENT	CRITERIA PRIORITY	RANK
CANDIDATE 1	0,1838	IV
CANDIDATE 2	0,2633	II
CANDIDATE 3	0,2984	I
CANDIDATE 4	0,2542	III

2. Alternative weighting for Attendance criteria
   Calculating alternative weighting for attendance criteria the method used is the same as how to calculate alternative weighting for achievement criteria. The results will appear as below:

Table 8. Priority Results Student Criteria Achieve Based on Attendance

ACHIEVEMENT	CRITERIA PRIORITY	RANK
CANDIDATE 1	0,2228	III
CANDIDATE 2	0,1991	IV
CANDIDATE 3	0,2546	II
CANDIDATE 4	0,3227	I

3. Alternative weighting for Attitude criteria
   Calculate alternative weighting for criteria The attitude of the method used is the same as how to calculate alternative weighting for the achievement criteria. The results will appear as below :

Table 9. Priority Results Criteria for Student Achievement Based on Attitude

ACHIEVEMENT	CRITERIA PRIORITY	RANK
CANDIDATE 1	0,1885	IV
CANDIDATE 2	0,2413	III
CANDIDATE 3	0,2676	I
CANDIDATE 4	0,2674	II

4. Alternative weighting for Talent criteria
   Calculating alternative weighting for Talent criteria the method used is the same as how to calculate alternative weighting for performance criteria. The results will appear as below:

Table 10. Priority Results Student Achievement Criteria Based on Talent

ACHIEVEMENT	CRITERIA PRIORITY	RANK
CANDIDATE 1	0,1877	IV
CANDIDATE 2	0,1999	III
CANDIDATE 3	0,2765	I
CANDIDATE 4	0,2533	II

From the alternative weighting of each of the above criteria, a temporary Global priority table can be created which contains all alternative priority data based on the respective criteria as shown below.:

Table 11. Temporary Student Global Priority Data Achievement

GLOBAL	VALUE DATA	ABSENCE	ATTITUDE	TALENT	TOTAL
C 1	0,1838	0,2228	0,1885	0,1877	0,7828
C 2	0,2633	0,1991	0,2413	0,1999	0,9036
C 3	0,2984	0,2546	0,2676	0,2765	1,0971
C 4	0,2542	0,3227	0,2674	0,2533	1,0976

Having known the temporary priority data of each candidate, then calculate the value of global priority with the formula:
Example ∑ candidate 1 : 4)→0,7828 : 4 = 0,1957

Table 12. Students' Achieving Global Priority Results

ACHIEVEMENT	CRITERIA PRIORITY	RANK
CANDIDATE 1	0,1957	IV
CANDIDATE 2	0,2259	III
CANDIDATE 3	0,2742	II
CANDIDATE 4	0,2744	I

From the results of the calculation of the global priorities above, it can be generated ranking from the four outstanding student candidates, namely candidate 4 ranks first with prior value 0.2744. The second order with priority value 0.2742 is occupied by candidate 3, then for the third order is occupied by candidate 2 with priority value 0.2259, and for fourth place occupied by candidate 1 with priority value 0.1957.

3.2. Implementation

a. Main Menu Form

This login form is the beginning of opening a program, from this login form it will enter the Main Menu. Like Figure 2 below:

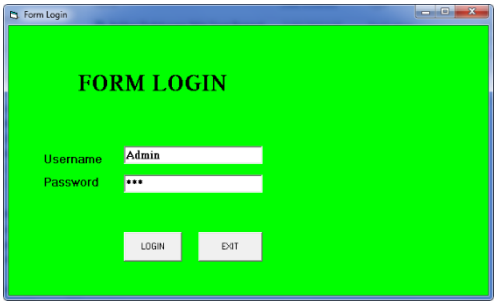


Figure 2. Main Menu

b. Student Data Input Form

This form is used to process the entry of data for outstanding selection participants, such as Figure 3 below :

Figure 3. Selection Participant Data Input Form

c. Calculation Form and form Calculation results Based on Criteria
This form is used to calculate the form as well as the calculation results of the selection criteria for high achieving students, such as data on grades, absences, attitudes and talents, such as figure 4 below:

Figure 4. Form Calculation and Results Calculation

IV. CONCLUSION

The conclusions from the results of the above research are as follows :

1. From the results of the testing of the system developed using the AHP model it can be concluded that the system has been running correctly, so that this system can be used to help the school in carrying out the selection of high achieving students..
2. Student Decision Making System Achieves on Bina Dharma Pringsewu LKP using AHP method, in this method uses 4 criteria factors, namely data on values, absences, attitudes and talents. Use of these 4 criteria because students are not only capable of learning, but students have absences, attitudes and talents that can be justified.

REFERENCES

[1] I. Francés, L. Bufona, M. Clara, R. Del, I. O. Del, and P. El Barranquillo, "https://lenterakecil.com/lembaga-kursus-dan-lembaga-pelatihan/," 1976.

[2] S. H. A.D.Susanti,M.Muslihudin, "Sistem Pendukung Keputusan Perankingan Calon Siswa Baru Jalur Undangan Menggunakan Simple Additive Weighting (Studi Kasus : Smk Bumi Nusantara Wonosobo)," *Semin. Nas. Teknol. Inf. dan Multimed. 20017*, pp. 1–7, 2017.

[3] B. Sinaga and H. M. Zabua, "Sistem Pendukung Keputusan Siswa Berprestasi Menggunakan Metode Analytic Hierarchy Process (AHP) Pada SMK Singosari Delitua," *J. Mantik Penusa*, vol. 16, no. 2, pp. 1–11, 2014.

[4] J. Sawaji, D. Hamzah, and I. Taba, "Pengambilan Keputusan Mahasiswa Dalam Memilih Perguruan Tinggi Swasta di Sulawesi Selatan," no. 4, pp. 1–22, 2010.

[5] L. R. M.N ksi Siswa Berprestasi Pada Sekolah Menenga nggunakan Metode AHP," no. 64, pp. 1–8, 1

[6] R. R. A.A uhammadiyah Pringsewu Sebagai Penunjar enggunakan Visual Basic 6.0," pp.

1–7.
[7] D. I. W.B.Wijinarko, “E-Government Pada Pekon Pagelaran,” no. 9, pp. 1–6.