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Implementation of Analytic Network Process Method on Decision Support System of Determination of Scholarship Recipient at House of Lazis Charity UNNES

Primana Oky Rahmanda[1], Riza Arifudin[2], and Much Aziz Muslim[3]

[1,2,3]Department of Computer Science, FMIPA, Universitas Negeri Semarang, Indonesia
Email: [1]primanaoky93@gmail.com, [2]rizaarifudin@gmail.com, [3]a212muslim@yahoo.com

Abstract

The scholarship is one of the forms of giving/ rewarding funds to individuals or students to use for sustainability during their education. Scholarships are awarded as government or institutional efforts to ease the burden of students in meeting the need for increasingly expensive education costs. The mechanism for selecting scholarship recipients, the selection team of UNNES Charity House of Lazis still use the scoring of the scholarship scores manually based on the total sum of criteria assessment without considering the priority weighted value of each criterion. So that cause the disbursement of scholarship funds that are not on target. To solve the problem, it is necessary to apply a decision support system to help provide consideration of the award of the scholarship recipient. Decision support system used requires data as a guidance assessment in the form of data criteria and alternative data by implementing Analytic Network Process method. The ANP method is used to determine the criteria and alternate priority weight values and the results are rankings. The purpose of this research is to build and implement ANP method in decision support system of awarding of scholarship recipients. The criteria used include the work of parents, parent income, the amount/ grade of Single Tuition, grade point average cumulative. The results of this study indicate that the use of ANP method implementation can determine the scholarship recipients who declared feasible or not to receive the scholarship based on the ranking results of the priority weight of the alternative.

Keywords: Scholarship, Analytic Network Process Method, Decision Support System, Ranking

1. INTRODUCTION

The scholarship is one of the forms of giving and reward in the form of financial aid given to the students to be used for the sake of continuity during their education. In providing scholarships to outstanding students who come from families are not economically able to be done by UNNES Charitable House of God each year. One of the reasons for the need for a scholarship program is because of the high tuition fees that affect the continuity of the learning activities in universities. This scholarship should also take into account in the determination of scholarship recipients with reference to certain criteria before being awarded to the student concerned [1]. Scholarships can be interpreted as a form of appreciation given to individuals in order to continue their education to a higher level [2].

The awarding of scholarships is done by the selection process to determine the grantee accurately and accurately [3]. In the issue the government has also tried to reduce the drop out rate for outstanding students and the difficulty of paying high tuition fees on the grounds of the economics of poor families. Scholarship education institutions are provided to underprivileged and accomplished students to meet student obligations during the study period on campus. The high tuition fees for some underprivileged students become one of the obstacles to continuing education in college. This may result in students often applying for academic or dropout leave [4].

Scholarships should be given to eligible and appropriate recipients to obtain them [4]. The detailed criteria set by the UNNES Charity House beneficiaries to the scholarship recipients are parent's job, parent's income, the tuition fee / single tuition fee, and the cumulative grade point value. In the assessment each criterion has a score with a range of 1 to 5. The results of interviews of researchers with the management of UNNES Charity House Lazis, informed that there is still a distribution of scholarships that are not on target. There are scholarships reserved for economically disadvantaged students, but sometimes there are still relatively wealthy students who also receive scholarships. This is one of them caused by still manual selection process scholarships conducted by the management of Charity House Lazis UNNES. So far, the selection of scholarships is done at the faculty level by collecting data of prospective scholarship recipients based on specified criteria. Scholarship applicants collect the scholarship registration application file. From the file, the scholarship selection officer compares the informant's information among scholarship applicants manually. Once selected, the selected student data is separated and incorporated into a special scholarship data storage application. In general, the scholarship selection process that has been implemented is less effective and less valid to determine the scholarship recipients.

Therefore, required a system that can help the selection process scholarships at the House of Charity Lazis UNNES. In this research, a decision support system is implemented. Application of decision support system is widely used to provide solutions to a problem in decision making [5]. The problem that often occurs in decision-making is due to the inaccuracies and ignorance of decision makers [6]. Decision support system can give priority consideration to certain scholarship recipients. Decision support system takes into account all the criteria that support decision making to assist, accelerate, and simplify the decision-making process. Decision support system in this research using Analytic Network Process (ANP) method. The ANP method is chosen because it is a decision support model where the equipment of the camel is a functional network structure with the main input of human perception, ie in this case the person who is expert in the scholarship problem or the one who understands the scholarship problem. It is hoped that the results of the decision support system for determining scholarship recipients using ANP method can assist in selecting the recipients of the UNNES Charitable Funds at the Charity House.

2. METHODS

There are several stages performed systematically in this study, starting from the preparation stage, then processing the data, and make a comparison of criteria and alternatives as prospective scholarship recipients using the ANP method with the Waterfall model. Waterfall model is a classical model that is systematic, sequential in building software. Waterfall is a software development methodology that proposes an approach to systematic and sequential software that begins at the system advance level throughout analysis, design, code, testing and maintenance [7]. This model is often used by system analysts in general [8]. The stage in the waterfall is the needs analysis, design, implementation and testing [9].

a. The requirement analysis phase is defining the entire software format, identifying all the needs and outlines of the system to be created [10]. This stage is to determine the specifications or conditions that must be met in a study, which considers the various needs that relate among various stakeholders [11].
b. The design stage is to design the application includes the interface design, and the design of the databse structure [12]. To create an interesting and interactive web-based application program, it must first be designed so that the results are achieved in accordance with predetermined objectives [13].
c. Implementation stage is designing software which is then realized as a series of program or program unit [14].
d. The testing phase is to test whether the system is ready and feasible to use. The tester can define the set of input conditions and perform testing on functional specifications of the program [15].

2.1 Stage of preparation

The preparatory phase begins with a literature study that supports the success of the research. In addition, at this stage is also conducted search data needed for this study, namely by taking data at the House of Charity Lazis UNNES to obtain student data receiving scholars and criteria required to obtain variable data in 2017.

2.2 Data Processing

After getting the required data, the next stage of data obtained then processed. This needs to be done so that the secondary data obtained can be entered into the system using the ANP method. In addition, a standard is required that is used to process the data, in this case related to the determination of the type of data and also the determination of the priority weight value based on the intensity of interest value on the ANP method. The data of the number of students receiving the scholarship and the criteria variables used in this study are 10 student data of 2015 prospective scholarship recipients in 2017. From the data obtained then processed using ANP method.

2.3 ANP Method

The ANP method is a method that uses a comprehensive decision-making technique for quantitative and qualitative data types. The ANP method is one of complex and complex methods because it has many stages for the end result [16]. This ANP method is able to overcome the problem of interdependence and feedback between alternatives or criteria making it easier in a more systematic analysis [17]. In order to use the ANP method in the process there are two steps being declared. The first step is to get a priority weight value that shows some elements have interdependence relationship. The second step compares each criterion using a pairwise comparison matrix to obtain the criterion priority weight [18]. The third step is to combine the priority weight value to determine the value of supermatrix [19]. The general structure of ANP was first introduced by Saaty to provide a framework for dealing with decision-making issues. Since its introduction, it has been applied to a wide variety of decision-making issues. ANP is a common form of decision that is famous for the theory of Analytic Hierarchy Process (AHP). Similar to AHP, ANP is based on measurement of inherited scales to be used to allocate resources according to the scale-ratio priority needs. ANP generalizes a pairwise comparison matrix, so decision models can be built as complex networks of decision objectives, criteria, stakeholders, alternatives, and factors that affect each other's priorities [20]. In the ANP method allows the use of more complex modeling relationships including the dependence between the two decision levels [21]. According to Saaty the ANP method is a development of the AHP (Analytical Hierarchy Process) method [22]. ANP method is able to improve the weakness of AHP in the form of ability to accommodate the interrelationship between criteria or alternatives. The relevance of the ANP method is 2 types, namely the relation in a set of elements (inner dependence) and the interrelation between different elements (outer dependence). The existence of these linkages causes the ANP method to be more complex than the AHP method.

In general, the steps that must be done in using the ANP are:
1) Define the problem and determine the desired solution criteria.
2) Determine component membership from a managerial point of view.
3) Create a pairwise comparison matrix that describes the contribution or influence of each element over each criterion. Comparisons are based on judgment of decision making by assessing the importance of an element. A pairwise comparison matrix is made for pairwise comparison of factors within the component [23].
4) After collecting all pairwise comparison data and entering the inverse values as well as the value of one along the main diagonal, the priority of each criterion is sought and the consistency of the ratio is tested.
5) Determine the eigenvector of the matrix that has been created in step three.
6) Repeat steps 3, 4, and 5 for all criteria.
7) Create unweighted supermatrix by entering all calculated eigenvectors in step 5 into a supermatriks.
8) Create a weighted supermatrix by multiplication of each unweighted supermatrix content to the matrix of comparison criteria (cluster matrix).
9) Create a supermatrix limit by continuously raising supermatriks until the number in each column in a row is the same, after that do the normalization of the limit supermatrix.
10) Take the value of the compared alternative then normalized to find out the final result of the calculation.

Checking consistency, the consistency ratio should be 10% or less. If the value is more than 10% then the assessment of decision data should be corrected.

3. RESULTS AND DISCUSSION

In this decision support system using criteria such as the criteria of parent employment, parent income, the amount/ grade of the cost of Single Tuition, and the grade point average (GPA). Here is the stage in calculating the weights using the ANP method,

The first stage establishes the network structure of the ANP method for the determination of scholarship recipients. The control criterion will help the correct structure of the problem and establish a comparison between the components. This control criterion is used to answer the question of dominance, and to decompose a complex problem with various influences [24]. Network relationships in the ANP method not only show relationships between decision elements, but also calculate the relative weight value (eigenvector) of each decision element [25]. Model of ANP scholarship acceptance at the UNNES charitable house as shown in Figure 1.

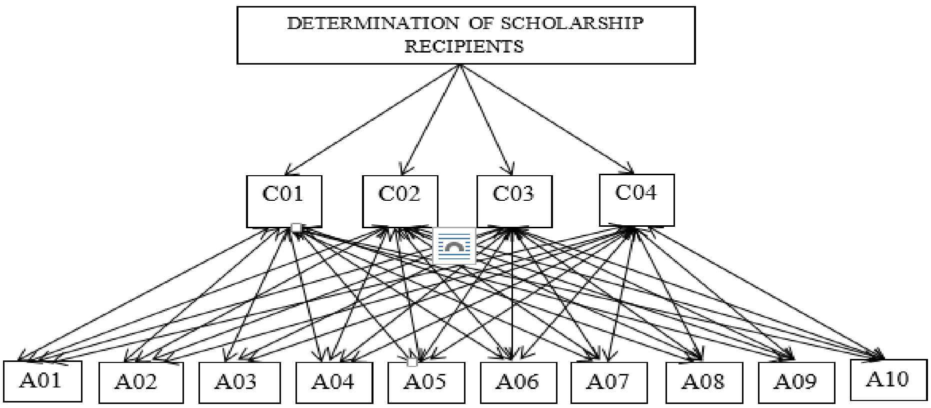

Figure 1. Model of ANP Scholarship Acceptance at the UNNES Charitable House

The second stage determines the pairwise comparison matrix between the criteria against the alternative. The value of the comparison is derived from the decision-making based on the scoring distance between the criteria against the alternative. Giving weight of importance level between scoring criteria against alternative 1 is shown in Table 1.

Table 1 Comparison of Scoring Criteria to Alternatives 01

No.	Criteria	Scoring	Definition of ANP scale	Intensity of Interest
1	C01-C02	5 : 5	C01 is just as important as C02	1
2	C01-C03	5 : 2	C01 is very important from C03	7
3	C01-C04	5 : 4	C01 is slightly more important than C04	3
4	C02-C03	5 : 2	C02 is very important from C03	7

5	C02-C04	5 : 4	C02 is slightly more important than C04	3
6	C03-C04	2 : 4	C04 is more important than C03	5

The intensity values of criterion importance in Table 1 are then summarized into paired comparison matrices for each criterion shown in Table 2.

Table 2 Matched Comparison Matrix between Criteria to A01

Criteria	C01	C02	C03	C04
C01	1	1	7	3
C02	1	1	7	3
C03	1/7	1/7	1	1
C04	1/3	1/3	1	1

Description Table 2 for line 2 column 4 criterion C01 compared to C03 with value 7 which means C01 is very important than C03. Row 4 column 2 criterion C03 compared to C01 with value 1/7 obtained from result of inverse value with C01 than C03 with value 7.

The third stage determines the value of the relative weights or eigenvectors. From Table 2 comparison matrix, then calculate the value of relative weights. The first step by summing each column in pairwise matrix. The result of the summation of the matrices of each criterion column is shown in Table 3.

Table 3 Summation of Each Matrix Column

Criteria	C01	C02	C03	C04
C01	1	1	7	3
C02	1	1	7	3
C03	0,143	0,143	1	1
C04	0,333	0,333	1	1
Total	2,476	2,476	16	8

Then do the normalization of the matrix by dividing the value of each element with the total value. The results of normalized matrix calculations and priority weights are shown in Table 4.

Table 4 Results of Normalized Matrix Calculations and Priority Weights

	C01	C02	C03	C04	Weight	Consistency Measure
C01	0,404	0,404	0,438	0,375	0,405	4,154
C02	0,404	0,404	0,438	0,375	0,405	4,154
C03	0,058	0,058	0,063	0,125	0,076	4,036
C04	0,135	0,135	0,063	0,125	0,114	4,028

Based on the calculation of Table 4 the value of 0.404 in row 2 of column 3 is obtained by dividing the value 1 (row 2 column 3 in Table 3) with the value of 2,476 (row 6 column 3 in Table 3). While the value of weight value column obtained from the division between the total of the elements in the column for each row with a value of 4 is the number of criteria used. Then for the consistency measure column obtained by calculating the matrix multiplication between the sum of values C01 to C04 in Table 3 with the sum of the weights in Table 4 divided by 0.405 (row 2 column 6 in Table 4).

The fourth stage is checking the consistency ratio of pairwise matrix comparison of a criterion. In finding the value of CI required maximum lamda (λ) or can also be the sum of the consistency measure value which will be shown in Table 5.

Table 5 Result of Consistency Ratio Calculation

Result of Consistency Ratio	
Lamda maksimum	4,131
Consistency Index (CI)	0,031
Ratio Index (RI)	0,9
Consistency Ratio (CR)	0,034
Consistency	Consistent

The value of 4.131 (row 2 column 2 in Table 5) is obtained by multiplying each weight element in Table 4 with each element of the total sum column of each criterion in Table 3. While the CI = 0.031 (row 3 column 2 in Table 5) is obtained from the lamda value max and number of criteria used. Look for a consistency index value (CI). Here is the CI Formula.

$$\mathrm{CI} = \frac{\lambda_{maks} - n}{n-1} \tag{1}$$

Information:
CI = Consistency Index
n = Number of matrix comparison of a criterion

After the CI value is obtained with a value of 0.031 (in row 3 column2 Table 5), then further calculate the CR value by dividing the CI value by the RI value. The RI value is derived from Table RI (in Table 5) according to the number of criteria used ie 4 so that the RI value used is 0.90 (row 4 column 2 in Table 5). Here is a CR calculation.

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

$$\mathrm{CR} = \frac{0{,}031}{0{,}90}$$

$$\mathrm{CR} = 0{,}034$$

Information:
CR = Consistency Ratio
CI = Consistency Index
RI = Random Index

The resulting consistency ratio should be either ≤0.1 or ≤10%, since the comparative matrix assessment should be on the scale of pairwise assessment and the random index value, if more then the considerations of paired matirks need to be improved. The value of 0.034 is the value obtained from the calculation of CR. The resulting value is ≤ 0.1, so the pairwise comparison matrix between the criteria is consistent.

The next stage determines Supermatrix. After generating the priority value of pairwise comparison matrix calculation and consistency test of pairwise matrix matrices, then done next step, that is calculate the value of supermatrix from result of weighting on banner of criterion and alternative that influence each other. From the weighting will be obtained three matrices, namely unweighted supermatrix, weighted supermatrix and limit supermatrix [26].

1) Supermatrix Value

Supermatrix is a matrix consisting of several matched pair matrices. Supermatrix is used in the ANP method to show the relationship between elements in the network structure. The results of supermatrix calculations can be seen in Table 6.

Table 6 Supermatrix Calculation Results

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	C1	C2	C3	C4	Total
A1	1	0	0	0	0	0	0	0	0	0	0,120	0,156	0,037	0,107	1,421176
A2	0	1	0	0	0	0	0	0	0	0	0,158	0,206	0,195	0,042	1,600847
A3	0	0	1	0	0	0	0	0	0	0	0,130	0,142	0,086	0,124	1,482893
A4	0	0	0	1	0	0	0	0	0	0	0,158	0,142	0,081	0,056	1,437361
A5	0	0	0	0	1	0	0	0	0	0	0,043	0,052	0,059	0,089	1,243194
A6	0	0	0	0	0	1	0	0	0	0	0,182	0,052	0,020	0,180	1,434391
A7	0	0	0	0	0	0	1	0	0	0	0,065	0,080	0,020	0,038	1,202402
A8	0	0	0	0	0	0	0	1	0	0	0,078	0,081	0,178	0,020	1,358377
A9	0	0	0	0	0	0	0	0	1	0	0,022	0,044	0,100	0,089	1,254104
A10	0	0	0	0	0	0	0	0	0	1	0,043	0,044	0,225	0,254	1,565255
C1	0,405	0,389	0,389	0,417	0,303	0,526	0,574	0,524	0,125	0,167	1	0	0	0	4,817874
C2	0,405	0,389	0,389	0,417	0,399	0,217	0,214	0,212	0,375	0,167	0	1	0	0	4,182619
C3	0,076	0,153	0,069	0,083	0,061	0,040	0,042	0,212	0,125	0,167	0	0	1	0	2,027196
C4	0,114	0,069	0,153	0,083	0,237	0,217	0,171	0,053	0,375	0,500	0	0	0	1	2,972311
Total	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	28,000

2) Weighted Supermatrix Value

Create a weighted supermatrix by normalizing the matrix cluster on supermatrix calculations. The results of Weighted Supermatrix calculations are shown in Table 7.

Table 7 Results of Weighted Supermatrix Calculations

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	C1	C2	C3	C4	Total
A1	0,5	0	0	0	0	0	0	0	0	0	0,060	0,078	0,018	0,054	0,710588
A2	0	0,5	0	0	0	0	0	0	0	0	0,079	0,103	0,097	0,021	0,800424
A3	0	0	0,5	0	0	0	0	0	0	0	0,065	0,071	0,043	0,062	0,741446
A4	0	0	0	0,5	0	0	0	0	0	0	0,079	0,071	0,040	0,028	0,71868
A5	0	0	0	0	0,5	0	0	0	0	0	0,022	0,026	0,029	0,045	0,621597
A6	0	0	0	0	0	0,5	0	0	0	0	0,091	0,026	0,010	0,090	0,717195
A7	0	0	0	0	0	0	0,5	0	0	0	0,032	0,040	0,010	0,019	0,601201
A8	0	0	0	0	0	0	0	0,5	0	0	0,039	0,041	0,089	0,010	0,679189
A9	0	0	0	0	0	0	0	0	0,5	0	0,011	0,022	0,050	0,045	0,627052
A10	0	0	0	0	0	0	0	0	0	0,5	0,022	0,022	0,112	0,127	0,782627
C1	0,2025	0,1945	0,1945	0,2083	0,1515	0,2630	0,2869	0,2619	0,0625	0,0833	0,5	0	0	0	2,408937
C2	0,2025	0,1945	0,1945	0,2083	0,1996	0,1085	0,1068	0,1058	0,1875	0,0833	0	0,5	0	0	2,09131
C3	0,0379	0,0767	0,0343	0,0417	0,0303	0,0200	0,0211	0,1058	0,0625	0,0833	0	0	0,5	0	1,013598
C4	0,0571	0,0343	0,0767	0,0417	0,1186	0,1085	0,0853	0,0264	0,1875	0,2500	0	0	0	0,5	1,486156
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

3) Supermatrix Limit Value

   Create a limit supermatrix by raising the weighted supermatrix continuously until the numbers in each column in a row is the same value, namely raising the weighted supermatrix with the rank k where k = 1, 2, ..., n. Table 8 is the result of supermatrix limit calculation.

Table 8 Supermatrix Limit Limitations

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	C1	C2	C3	C4
A1	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606	0,0606
A2	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785
A3	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643	0,0643
A4	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634	0,0634
A5	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279	0,0279
A6	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613
A7	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301	0,0301
A8	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397	0,0397
A9	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244	0,0244
A10	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497	0,0497
C1	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966	0,1966
C2	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632	0,1632
C3	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515
C4	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886	0,0886
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The final stage is alternative ranking. This last stage of the process of alternative breeding based on the results obtained from the calculation of supermatrx limit.

a. Original Weight (RAW)
   The raw weight is the eigenvector value of the normalized result of the supermatrix limit calculation.
b. Normal Value Weight
   The normal weight is obtained from the raw weights divided by the total of the raw weights.

The test of this system is only done with data of research sample as much as 10. From this sample data will be inserted value level of interest based on scoring criteria that exist in actual data. Based on the results of the implementation of the ANP method in decision support system of determination of scholarship at UNNES Charity House of Lazis used to know priority of each criterion and alternative. The ANP method is weighted in pairwise comparisons of criteria and alternatives that influence each other. The following is the result of the priority criteria weighted value of the alternative.

a. C01 is generated priority weighting of alternatives
   A01(0,12), A02 (0,158), A03 (0,13), A04 (0,158), A05 (0,043), A06 (0,182), A07 (0,065), A08 (0,078), A09 (0,022), A10 (0,043).
b. C02
   A01 (0,156), A02 (0,206), A03 (0,142), A04 (0,142), A05 (0,052), A06 (0,052), A07 (0,08), A08 (0,081), A09 (0,044), A10 (0,044).
c. C03
   A01 (0,037), A02 (0,195), A03 (0,086), A04 (0,081), A05 (0,059), A06 (0,02), A07 (0,02), A08 (0,178), A09 (0,1), A10 (0,225).

d. C04
A01 (0,107), A02 (0,42), A03 (0,124), A04 (0,056), A05 (0,089), A06 (0,18), A07 (0,038), A08 (0,02), A09 (0,089), A10 (0,254).

While the following is the result of the value of priority weighting between alternatives to the criteria.

a. A01
C01 (0,405), C02 (0,405), C03 (0,076), C04 (0,114)
b. A02
C01 (0,389), C02 (0,389), C03 (0,153), C04 (0,069)
c. A03
C01 (0,389), C02 (0,389), C03 (0,069), C04 (0,153)
d. A04
C01 (0,417), C02 (0,417), C03 (0,083), C04 (0,083)
e. A05
C01 (0,303), C02 (0,399), C03 (0,061), C04 (0,237)
f. A06
C01 (0,526), C02 (0,217), C03 (0,04), C04 (0,217)
g. A07
C01 (0,574), C02 (0,214), C03 (0,042), C04 (0,171)
h. A08
C01 (0,524), C02 (O,212), C03 (0,212), C04 (0,053)
i. A09
C01 (0,125), C02 (0,375), C03 (0,125), C04 (0,375)
j. A10
C01 (0,167), C02 (0,167), C03 (0,167), C04 (0,5)

Then after getting the priority weight value of each criterion and alternative, then will be done calculation of supermatrix and ranking. Here is the result of ranking from supermatrix calculation. From the calculation scenario of this system is generated percentage ranking for the determination of the scholarship recipient is as shown in Table 9.

Table 9 Alternative Ranking Results

Code	Value of Origin (RAW)	Normal Value
A02	0,0785	15,7%
A03	0,0643	12,9%
A04	0,0634	12,7%
A06	0,0613	12,3%
A01	0,0606	12,1%
A10	0,0497	9,94%
A08	0,0397	7,94%
A07	0,0301	6,02%
A05	0,0279	5,58%
A09	0,0244	4,88%

After the percentage of ranking is obtained, then the evaluation of the actual data from the House of Charity Lazis UNNES. This evaluation will result in system accuracy and error rate of the ranking process.

Accuracy (%) $= \frac{Number\ of\ data\ equations\ correct}{amount\ of\ data}$
= 8/10
= 0.8
= 80%
Error Rate = 1- Accuracy
= 1 - 0.8 = 0.2 = 20%

So, from the results of the above calculation dperoleh results of accuracy of 80%, this value is obtained from the calculation of the sum of all data that is predicted correctly divided by all test data. While the error rate obtained by 20% obtained from the calculation of the reduction of value 1 minus the value of accuracy obtained. The advantage of this system is that the system can determine whether or not a student is eligible to receive a scholarship based on the ranking of the ANP method from the highest to the lowest value percentage. While the lack of this system that is tested data is still using by means of weighting manually, so users will be difficult in determining the weighting of the data with a lot of amount. From the experiments conducted showed that the implementation of the ANP method for the determination of scholarship recipients more accurate than the scoring criteria on the actual data in UNNES Charitable House with the accuracy of the ranking results compared with the results of the scoring criteria scoring manual based on the value of the overall scoring criteria on each alternative without consider the weighted value of importance on each of the criteria.

4. CONCLUSION

Implementation of Analytic Network Process method in decision support system of awarding of scholarship recipient at UNNES Charity House has several stages. The stages are: (1) The first stage is the process of data collection, (2) The second stage is the data processing process by determining the criteria and priority criteria weighting value used, (3) The third stage is ranking from the priority value using the supermatrix calculation. The result of this research is ranking the priority value of each student (alternative) to show the students eligibility to get scholarship based on four criteria such as parent's job, parent's income, amount/ grade of Single Tuition, and Grade Point Average value with weight value prirorita supermatrix calculations. From 10 student data, scholarship recipients are drawn 5 best with priority weight and highest percentage value. Students with the highest priority weighted value are eligible for a scholarship.

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