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Fuzzy logic algorithm and analytic network process (ANP) for boarding houses searching recommendations

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Abstract

Finding a boarding house is usually done manually or by visiting the boarding house in person. Several choices of boarding houses make boarding house seekers have to make choices according to the desired criteria, so it takes quite a long time. A decision support system is a system that can be used to help make decisions based on existing criteria for determining several alternatives to be selected. The methods used in this research are the Analytic Network Process (ANP) and the Fuzzy Logic method. This study employed several criteria in providing recommendations, including distance, price, facilities, security, number of spaces, parking space and convenience. The weighting of these criteria used the fuzzy logic method based on the priority scale determined by the boarding house seekers. This system has provided a recommendation for boarding houses based on the results of the calculation process using the ANP method and weighting using fuzzy logic. The result of calculations shows that the highest value was obtained by Munawar kos (boarding house) with a value of 6.55% and followed by Diding kos with a value of 6.52%.

Keywords: Analytic Network Process; Fuzzy Logic; DSS; Boarding house; Recommendation

Introduction

Currently, many employees and students from outside the city live in boarding houses because it can save time and transportation costs. It will be exhausting for them to go back and forth from their hometown to their workplaces and schools. The problem occurs when they want to find a boarding house that fits the criteria, as they have to search from one boarding house to another [1]. There are certain criteria for boarding house seekers to get the right and appropriate boarding house [2] [3]. However, limited information regarding the location, price, facilities and contact of the boarding house owner is the common problem often faced by them.

A study used the SAW (Simple Additive Weighting) method using 3 criteria, namely a) price; b) location; c) facilities and using 3 alternatives, obtained the best alternative output value of 3.99 [4]. Another study used the Analytic Network Process (ANP) method for the selection of boarding houses using 3 criteria, namely a) distance; b) price; c) facilities and using 30 alternative boarding houses obtained the result of 3,714 for Kos Putri (female boarding house) and then 3,702 for Asenkar boarding house [5].

In addition, a study using Fuzzy Sugeno employed 6 criteria, namely price, rooms, location of the market, nearby dining places, places of worship, and parking lots [6]. To obtain the result in this study, four stages of data collection were conducted; they included the formation of fuzzy sets, the formation of rules, application of implication functions and rule inference as well as defuzzification. Some of the main components in choosing the ideal house are accessibility and flooding avoidance [7], safety and convenience standards, i.e., parking availability, safe neighbourhood (from thefts and sexually immoral acts), adequate lighting, good air circulation, provision of clean water and windows [8] [9].

In addition, there are several health requirements for housing needed by humans such as oxygen, availability of clean water, air circulation, density of occupancy, disposal of waste, environmental facilities, and infrastructure as well as reforestation [10]. Referring to previous research in finding boarding houses that used 3 criteria, namely distance, price, and bathroom facilities, this study adds several criteria such as price, facilities, security [11], distance, convenience, parking space, and the number of spaces. 12]. It is hoped that the addition of the criteria can produce a system that is able to overcome the problems mentioned above.

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Method

A. Fuzzy Logic

The weighting of the criteria to be used is based on the priority determined by the boarding house seekers so that the weight can be determined using fuzzy logic. In this study, 7 criteria were proposed, and the boarding house seekers could choose all of these criteria, or it could be less than 7 criteria, depending on their needs.

In this study, the criteria used include rental prices, available facilities, security, distance, convenience, parking space and the number of spaces. These criteria can be selected by the seekers based on the order of priority, whether the main priority is based on distance, or based on price, and so on. The priority can be described as in **Figure 1**.

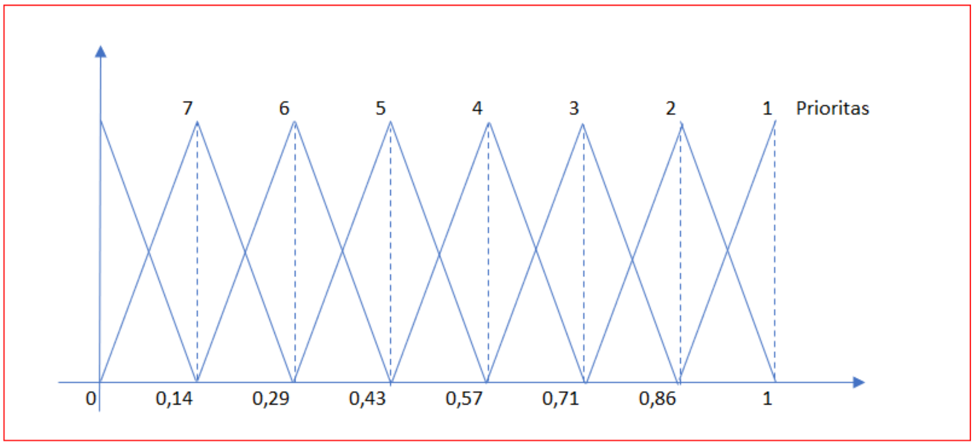

Figure 1. Fuzzy logic weighting

The equation (1) is:

$$\text{Weighting} = \big((count - n) + 1\big)x(1/count)x100 \quad (1)$$

Count = number of priority
N = priority order

B. Analytic Network Process (ANP)

The Analytic Network Process (ANP) method is a qualitative approach developed to improve the weaknesses of the Analytical Hierarchy Process (AHP) method in the form of the ability to recommend linkages to the ANP method [13]. The Analytical Network Process (ANP) method is a mathematical theory that is able to analyze an effect by using an assumption approach to solve problems. This method is used with consideration of adjusting the complexity of the problem by means of a synthesis decomposition accompanied by a priority scale that produces the greatest priority effect. In the AHP network there are levels of objectives, criteria, sub-criteria, and alternatives, each of which has elements. Whereas in the ANP network, the level in AHP is called a cluster which can have criteria and alternatives in it [14]

The advantage of the ANP method when compared to AHP is in solving more complex problems [15]. Research using the Analytic Network Process (ANP) method is the right solution in determining priority road handling based on the level of road service. The study shows a correlation value between -1 to 1 with a value of 0.867 which has been validated using the Spearman Rank for 10 roads in the city of Cirebon [16]. The steps used to solve this problem are:

1. Identify problems and determine solution criteria.
2. Determine the weighting of the criteria by the user
3. Create a Comparison Matrix

Comparison matrix is done by making comparisons in pairs for each hierarchical sub-system, then transforming it in the form of a matrix for a numerical analysis process (n x n matrix). Comparison matrixe is shown in **Table 1**.

Table 1. Comparison matrix

A	*B1*	*B2*	*B3*	...	*Bn*
B1	B11	B12	B13	….	B1n
B2	B21	B22	B23	….	B2n
B3	B31	B32	B33	….	B3n
...	….	….	….	….	….
…..	…..	….	…..	…	….
Bn	Bn1	Bn2	Bn3	….	Bnn

4. Calculating the Eigenvector Value

To calculate the eigenvector value, we added up the values in each column of the matrix then divided each value in the column cell by the total column, then added up the values for each row and divide by the value of n. The calculation of the eigenvector value can be seen in equation (2).

$$X = \sum\left(\frac{W_i}{\sum W_i}\right) \quad (2)$$

X = eigenvector
Wi = single row column cell value (i = 1 .... n)
∑W_i = total number of columns

5. Checking Consistency Ratio
   a. Looking for the value of λmaks shown in equation (3)

      λmaks = (eigenvector value 1 x number of columns 1) +
      (eigenvector value 2 x number of columns 2) ... n (3)

   b. Calculating the Consistency Index (CI), with equation (4).

      CI = ((λmaks-n)) / ((n-1)) (4)

      Where:
      CI = Consistency Index
      λmaks = the largest eigenvector value
      n = number of comparison matrices
   c. Determining Consistency Ratio (CR)

      $$CR = CI\ /\ RI \quad (5)$$

Table 2. Random Index Value

Orde Matrix	***1***	***2***	***3***	***4***	***5***	***6***	***7***		***9***
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

CR will have a better value and can show its consistency if it is close to zero in the comparison matrix. Random Index Value is shown in **Table 2.**

6. Making Supermatrix
   There are 3 types of supermatrix in ANP.
   a. Unweight supermatrix, the eigenvector generated from the whole pairwise comparison matrix in the network.
   b. Weighted supermatrix, multiplying the contents of the unweighted supermatrix with the cluster weight.
   c. Limit supermatrix, performing the weighted supermatrix continuously until the number in each column in one row is the same then normalize.

7. Ranking
   It is the final value in the ANP method that has been carried out by the normalization process to find out the final value of the calculation. The best alternative is generated from the highest alternative score [16].

C. Methodology

In this study, our methodology is as shown in **Figure 2**.

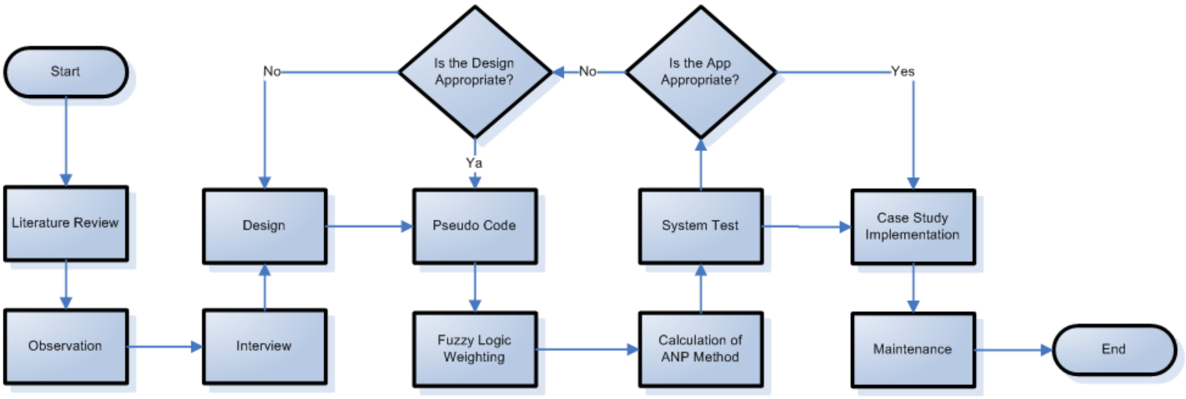

Figure 2. Methodology

This research was conducted with the following stages:

1. Interview
   The interview was conducted to know the business process in searching for boarding houses manually by conducting questions and answers to employees and students in order to get precise and accurate results.
2. Observation
   The researcher collected data based on predetermined criteria for several boarding houses in Tangerang area.
3. Literature/Library Studies
   The data was further analyzed by studying several journals related to the search for boarding houses including the criteria used [17].

Results and Discussion

A. Design

In this study, the boarding house seekers used 7 selected criteria with top priority starting from the price offered, the facilities provided, the security of the boarding house whether security was available or not, the distance from the boarding house to the place of activity, the convenience of the boarding house, the availability of parking lot both car parking and motorbike parking, and the last priority is the number of rooms in the boarding house. Based on equation 1, the weights for each criterion were obtained as shown in **Table 3**.

Table 3. Weighting criteria

Priority	Code	Criteria	Weight
1	H	Price	100
2	F	Facility	86
3	KA	Security	71
4	J	Distance	57
5	KN	Convenience	43
6	P	Parking lot	29
7	R	Number of rooms	14

After the weight value was determined by the user, then the researcher made a pairwise comparison matrix as shown in **Table 4**.

Table 4. Comparison matrix

Criteria	H	F	KA	J	KN	P	R
H	1.00	1.16	1.41	1.75	2.33	3.45	7.14
F	0.86	1.00	1.21	1.51	2.00	2.97	6.14

Criteria	H	F	KA	J	KN	P	R
KA	0.71	0.83	1.00	1.25	1.65	2.45	5.07
J	0.57	0.66	0.80	1.00	1.33	1.97	4.07
KN	0.43	0.50	0.61	0.75	1.00	1.48	3.07
P	0.29	0.34	0.41	0.51	0.67	1.00	2.07
R	0.14	0.16	0.20	0.25	0.33	0.48	1.00
∑	4.00	4.65	5.63	7.02	9.30	13.79	28.57

The next step was to determine the eigenvector value using the equation (2) by adding up the value of each row from the matrix and then dividing each value of the number of row cells by the total column. The eigenvector value is shown in **Table 5**.

Table 5. Eigen value

Criteria code	Total	Eigen
H	18.24	0.25
F	15.69	0.22
KA	12.95	0.18
J	10.40	0.14
KN	7.84	0.11
P	5.29	0.07
R	2.55	0.04
∑	72.97	1 00

Furthermore, after the eigenvector value is obtained, the next step was to check the consistency ratio using the formula in equation 3, if the value is < 0.1 then results are consistent.

$\lambda maks$ = (0.25x 4.00) + (0.22 x 4.65) + (0.18 x 5.63) + (0.14 x 7.02) + (0.11 x 9.30) + (0.07 x 13.79) + (0.04 x 28.57)
= 7

Next was calculating CI with the number of orders using 7 criteria. To calculate CI the equation (4) was used.

CI = (λmax – n) / (n – 1)
= (7 – 7) / (7 – 1)
= 0.00

The Random Index (RI) used is 1.32 based on the value specified in table 2. The calculation of the CR value can use equation (5).

CR = CI / RI
= 0.00 / 1.32
= 0.00

Because the CR result is 0.00 less than 0.10 (CR<0.1), the eigenvector value is considered consistent.

The next step was to calculate the eigenvector price using the equation (2). The first step was to calculate the reverse value. The reverse price value is to reverse the value by subtracting the total price value by the price value of each Kos (boarding house). After that, the eigenvector value was obtained by dividing each reserve value of Kos by the total reverse price. **Table 6** is the result of the eigenvector price calculation.

Table 6. Eigenvector Price

No	Alternative	Price Value	Reverse Price	Eigen vector
1	Mariyam Kos	850,000	13,455,000	0.0495
2	Hariyono Kos	800,000	13,505,000	0.0497
3	Deni Kos	750,000	13,555,000	0.0499

No	Alternative	Price Value	Reverse Price	Eigen vector
4	Budi Kos	650,000	13,655,000	0.0502
5	Sinta Kos	700,000	13,605,000	0.0501
6	Aldian Kos	615,000	13,690,000	0.0504
7	Doni Kos	800,000	13,505,000	0.0497
8	Munawar Kos	800,000	13,505,000	0.0497
9	Andreas Kos	580,000	13,725,000	0.0505
10	Harry Kos	850,000	13,455,000	0.0495
11	Rika Kos	550,000	13,755,000	0.0506
12	Riski Kos	700,000	13,605,000	0.0501
13	Dedi Kos	560,000	13,745,000	0.0506
14	Dede Kos	600,000	13,705,000	0.0504
15	Anang Kos	570,000	13,735,000	0.0505
16	Mariya Kos	750,000	13,555,000	0.0499
17	Slamet Kos	900,000	13,505,000	0.0493
18	Diding Kos	850,000	13,405,000	0.0495
19	Yanto Kos	880,000	13,455,000	0.0494
20	Nurul Kos	550,000	13,425,000	0.0506
	∑	14,305,000	271,795,000	1

The second criterion is that the facility that used equation (2) without using the reverse process, because the higher the facility value, the better. The calculation process is the value of each facility divided by the total value of all Kos facilities. **Table 7** is the result of the calculation of the eigenvector facility.

Table 7. Eigenvector Facility

No	Alternative	Facility value	Eigen vector
1	Mariyam Kos	4	0.0727
2	Hariyono Kos	4	0.0727
3	Deni Kos	1	0.0182
4	Budi Kos	1	0.0182
5	Sinta Kos	1	0.0182
6	Aldian Kos	1	0.0182
7	Doni Kos	4	0.0727
8	Munawar Kos	4	0.0727
9	Andreas Kos	1	0.0182
10	Harry Kos	4	0.0182
11	Rika Kos	1	0.0182
12	Riski Kos	4	0.0727
13	Dedi Kos	1	0.0182
14	Dede Kos	1	0.0182
15	Anang Kos	1	0.0182
16	Mariya Kos	4	0.0727
17	Slamet Kos	4	0.0727
18	Diding Kos	7	0.1273
19	Yanto Kos	4	0.0727
20	Nurul Kos	3	0.0545

No	Alternative	Facility value	Eigen vector
	∑	55	1

The third criterion is security using equation (2). The calculation process is the same as finding the eigenvector facility where the higher the security value, the better, so the calculation process is the value of each security divided by the total security value of all Kos. **Table 8** is the result of the calculation of the eigenvector security.

Table 8. Eigenvector Security

No	Alternative	Security Value	Eigen vector
1	Mariyam Kos	1	0.0435
2	Hariyono Kos	1	0.0435
3	Deni Kos	1	0.0435
4	Budi Kos	1	0.0435
5	Sinta Kos	2	0.0870
6	Aldian Kos	1	0.0435
7	Doni Kos	1	0.0435
8	Munawar Kos	2	0.0870
9	Andreas Kos	1	0.0435
10	Harry Kos	1	0.0435
11	Rika Kos	1	0.0435
12	Riski Kos	1	0.0435
13	Dedi Kos	1	0.0435
14	Dede Kos	1	0.0435
15	Anang Kos	1	0.0435
16	Mariya Kos	2	0.0870
17	Slamet Kos	1	0.0435
18	Diding Kos	1	0.0435
19	Yanto Kos	1	0.0435
20	Nurul Kos	1	0.0435
	∑	23	1

The fourth criterion is the distance using the equation (2). The calculation process is the same as finding the eigenvector price by calculating the reverse value by subtracting the total value of the distance by the value of the distance of each Kos. After that, to find the eigenvector value, we divided the value of each reverse Kos distance by the total reverse distance. **Table 9** is the result of calculating the eigenvector distance.

Table 9. Eigenvector Distance

No	Alternative	Distance value	Reverse distance	Eigen vector
1	Mariyam Kos	10,000	253,700	0.05063569
2	Hariyono Kos	8,800	254,900	0.050875197
3	Deni Kos	10,000	253,700	0.05063569
4	Budi Kos	9,900	253,800	0.050655649
5	Sinta Kos	9,300	254,400	0.050775403
6	Aldian Kos	79,000	184,700	0.03686406
7	Doni Kos	9,500	254,200	0.050735485
8	Munawar Kos	10,000	253,700	0.05063569
9	Andreas Kos	10,000	253,700	0.05063569
10	Harry Kos	10,000	253,700	0.05063569
11	Rika Kos	10,000	253,700	0.05063569

No	Alternative	Distance value	Reverse distance	Eigen vector
12	Riski Kos	9,600	254,100	0.050715526
13	Dedi Kos	11,000	252,700	0.050436102
14	Dede Kos	10,000	253,700	0.05063569
15	Anang Kos	10,000	253,700	0.05063569
16	Mariya Kos	9,300	254,400	0.050775403
17	Slamet Kos	9,300	254,400	0.050775403
18	Diding Kos	8,000	255,700	0.051034868
19	Yanto Kos	10,000	253,700	0.05063569
20	Nurul Kos	10,000	253,700	0.05063569
	∑	263,700	5,010,300	1

The fifth criterion is the convenience, using the equation (2), the calculation process is the same as finding the facility eigenvector. The result is in **Table 10**.

Table 10. Eigenvector convenience

No	Alternative	Convenience Value	Eigen vector
1	Mariyam Kos	3	0.05
2	Hariyono Kos	3	0.05
3	Deni Kos	3	0.05
4	Budi Kos	3	0.05
5	Sinta Kos	3	0.05
6	Aldian Kos	3	0.05
7	Doni Kos	3	0.05
8	Munawar Kos	3	0.05
9	Andreas Kos	3	0.05
10	Harry Kos	3	0.05
11	Rika Kos	3	0.05
12	Riski Kos	3	0.05
13	Dedi Kos	3	0.05
14	Dede Kos	3	0.05
15	Anang Kos	3	0.05
16	Mariya Kos	3	0.05
17	Slamet Kos	3	0.05
18	Diding Kos	3	0.05
19	Yanto Kos	3	0.05
20	Nurul Kos	3	0.05
	∑	60	1

The sixth criterion is the parking lot using the equation (2). The calculation process is the same as finding the facility eigenvector. The result is in **Table 11**.

Table 11. Eigenvector Parking Lot

No	Alternative	Parking lot Value	Eigen vector
1	Mariyam Kos	2	0.0909
2	Hariyono Kos	1	0.0455

No	Alternative	Parking lot Value	Eigen vector
3	Deni Kos	1	0.0455
4	Budi Kos	1	0.0455
5	Sinta Kos	1	0.0455
6	Aldian Kos	1	0.0455
7	Doni Kos	1	0.0455
8	Munawar Kos	2	0.0909
9	Andreas Kos	1	0.0455
10	Harry Kos	1	0.0455
11	Rika Kos	1	0.0455
12	Riski Kos	1	0.0455
13	Dedi Kos	1	0.0455
14	Dede Kos	1	0.0455
15	Anang Kos	1	0.0455
16	Mariya Kos	1	0.0455
17	Slamet Kos	1	0.0455
18	Diding Kos	1	0.0455
19	Yanto Kos	1	0.0455
20	Nurul Kos	1	0.0455
	∑	22	1

The seventh criterion is the amount of space using the equation (2). The calculation process is the same as searching for the eigenvector of facilities where the higher the value of the number of spaces, the better, so the calculation process is the value of each number of rooms divided by the total value of the total number of rooms for all Kos. **Table 12** is the result of the calculation of the eigenvector of the number of spaces.

Table 12. Eigenvector Number of Spaces

No	Alternative	Number of Spaces Value	Eigen vector
1	Mariyam Kos	3	0.0811
2	Hariyono Kos	3	0.0811
3	Deni Kos	2	0.0541
4	Budi Kos	1	0.0270
5	Sinta Kos	1	0.0270
6	Aldian Kos	1	0.0270
7	Doni Kos	2	0.0541
8	Munawar Kos	3	0.0811
9	Andreas Kos	1	0.0270
10	Harry Kos	3	0.0811
11	Rika Kos	1	0.0270
12	Riski Kos	2	0.0541
13	Dedi Kos	1	0.0270
14	Dede Kos	1	0.0270
15	Anang Kos	1	0.0270
16	Mariya Kos	2	0.0541
17	Slamet Kos	3	0.0811
18	Diding Kos	2	0.0541

No	Alternative	Number of Spaces Value	Eigen vector
19	Yanto Kos	3	0.0811
20	Nurul Kos	1	0.0270
	∑	37	1

After obtaining each priority criterion, the eigenvector value of each cost was obtained, and the unweighted supermatrix was compiled from all the eigenvector values from the previous calculation. After that the value of the unweighted supermatrix was multiplied by the eigenvector from the results of the pairwise comparison matrix of criteria weights to produce the weighted supermatrix value. The final step was to iterate over the weighted supermatrix with itself so that the same value was obtained in each row for the limiting supermatrix process. To generate a global priority value, we calculated the alternative data of the Kos multiplied by the global eigenvector criteria using equation (6).

Global priority = (alternative eigenvector criteria 1 x eigencriteria 1) +
(alternative eigenvector criteria 2 x eigencriteria 2)..n (6)

To calculate the global priority for each Kos, first we collected the eigen values of the criteria in the alternative like in the eigen values of the criteria in the Mariyam Kos alternative. See **Table 13**.

Table 13. Eigen of Mariyam Kos Alternative

Kode Kriteria	***Nilai Eigen***	***Eigen Global***
H	0.0495	0.25
F	0.0727	0.22
KA	0.0435	0.18
J	0.0506	0.14
KN	0.05	0.11
P	0.0909	0.07
R	0.0811	0.04

The calculation process used equation 6.

Mariyam kos Priority Value

= (0.0495 * 0.25) + (0.0727 * 0.22) + (0.0435 * 0.18) + (0.0506 * 0.14) + (0.05 * 0.11) + (0.0909 * 0.07) + (0.0811 * 0.04)

= 0.05721082

So, the priority value on the Mariyam Kos alternative is 0.05721082.

The results of calculations using global priorities can be seen in **Table 14.**

Table 14. Alternative calculation

No	Alternatif	H	F	KA	J	KN	P	R		Eigen	Prioritas
1	Mariyam Kos	0.0495	0.0727	0.0435	0.0506	0.05	0.0909	0.0811		0.25	0.05721082
2	Hariyono Kos	0.0497	0.0727	0.0435	0.0509	0.05	0.0455	0.0811		0.22	0.054014794
3	Deni Kos	0.0499	0.0182	0.0435	0.0506	0.05	0.0455	0.0541		0.18	0.043366705
4	Budi Kos	0.0502	0.0182	0.0435	0.0507	0.05	0.0455	0.0270		0.14	0.042504853
5	Sinta Kos	0.0501	0.0182	0.0870	0.0508	0.05	0.0455	0.0270	X	0.11	0.048690892
6	Aldian Kos	0.0504	0.0182	0.0435	0.0369	0.05	0.0455	0.0270		0.07	0.039084642
7	Doni Kos	0.0497	0.0727	0.0435	0.0507	0.05	0.0455	0.0541		0.04	0.05303392
8	Munawar Kos	0.0497	0.0727	0.0870	0.0506	0.05	0.0909	0.0811			0.063446024
9	Andreas Kos	0.0505	0.0182	0.0435	0.0506	0.05	0.0455	0.0270			0.042555236

No	Alternatif	H	F	KA	J	KN	P	R		Eigen	Prioritas
10	Harry Kos	0.0495	0.0727	0.0435	0.0506	0.05	0.0455	0.0811			0.053915366
11	Rika Kos	0.0506	0.0182	0.0435	0.0506	0.05	0.0455	0.0270			0.042578967
12	Riski Kos	0.0501	0.0727	0.0435	0.0507	0.05	0.0455	0.0541			0.053108034
13	Dedi Kos	0.0506	0.0182	0.0435	0.0504	0.05	0.0455	0.0270			0.042521159
14	Dede Kos	0.0504	0.0182	0.0435	0.0506	0.05	0.0455	0.0270			0.042539415
15	Anang Kos	0.0505	0.0182	0.0435	0.0506	0.05	0.0455	0.0270			0.042563146
16	Mariya Kos	0.0499	0.0727	0.0870	0.0508	0.05	0.0455	0.0541			0.059279104
17	Slamet Kos	0.0493	0.0727	0.0435	0.0508	0.05	0.0455	0.0811			0.053910742
18	Diding Kos	0.0495	0.1273	0.0435	0.0510	0.05	0.0455	0.0541			0.062751032
19	Yanto Kos	0.0494	0.0727	0.0435	0.0506	0.05	0.0455	0.0811			0.053891635
20	Nurul Kos	0.0506	0.0545	0.0435	0.0506	0.05	0.0455	0.0270			0.049033512

After obtaining the global priority, we then sorted the values from the highest to the lowest value, then normalized them in the form of a percent so that the difference in values between alternative costs is more visible. The ranking results can be seen in **Table 15**.

Table 15. Alternative calculation

No	Alternatif	Nilai	Normalisasi
1	Munawar Kos	0,063446024	6,3446024
2	Diding Kos	0,062751032	6,2751032
3	Mariya Kos	0,059279104	5,9279104
4	Mariyam Kos	0,05721082	5,721082
5	Hariyono Kos	0,054014794	5,4014794
6	Harry Kos	0,053915366	5,3915366
7	Slamet Kos	0,053910742	5,3910742
8	Yanto Kos	0,053891635	5,3891635
9	Riski Kos	0,053108034	5,3108034
10	Doni Kos	0,05303392	5,303392
11	Nurul Kos	0,049033512	4,9033512
12	Sinta Kos	0,048690892	4,8690892
13	Deni Kos	0,043366705	4,3366705
14	Rika Kos	0,042578967	4,2578967
15	Anang Kos	0,042563146	4,2563146
16	Andreas Kos	0,042555236	4,2555236
17	Dede Kos	0,042539415	4,2539415
18	Dedi Kos	0,042521159	4,2521159
19	Budi Kos	0,042504853	4,2504853
20	Aldian Kos	0,039084642	3,9084642

B. Data Modelling

The table relations can be seen in **Figure 3**.

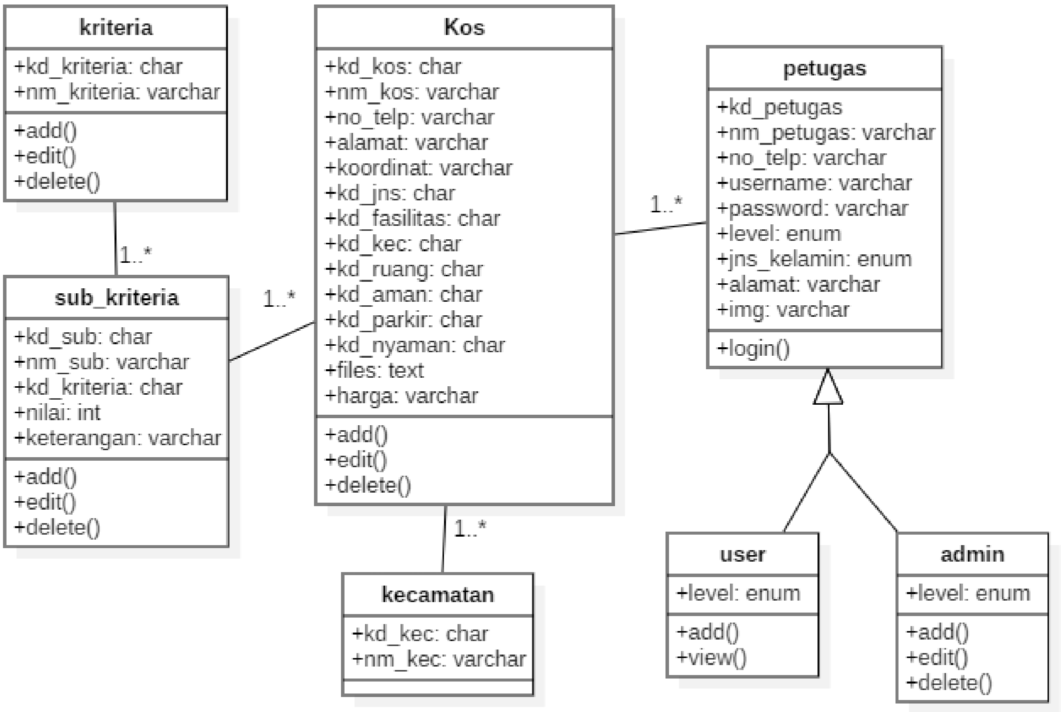

Figure 3. Data Modelling

Conclusion

Based on the results of tests and analysis, the following conclusions can be drawn 1) The boarding house searching process using the Analytic Network Process (ANP) method is dynamic, which means that the total priority can be increased or decreased as needed. 2) The results of calculations show that the highest value is 6.55%, namely Munawar Kos and then Diding Kos with a value of 6.52%. 3) When viewed as the chosen priority, the prices and facilities owned by Munawar Kos and Doni Kos are the same. However, Munawar Kos was in first place, while Doni Kos was in tenth place. From these results, the level of security of the boarding house is the determinant factor. Munawar Kos has a better level of security when compared to Doni Kos, even though Doni Kos is closer than Munawar Kos.

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