

DECISION SUPPORT SYSTEM FOR BUREAU AGENT SELECTION THE BEST UMROH TRAVEL AND RELIGIOUS TOURISM BY USING THE AHP METHOD (CASE STUDY: PT. AL-KHAIR TOUR&TRAVEL)

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Keywords: Decision Support System, AHP,
Best Bureau Agent, Umroh, Tour&Travel

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Abstract: Decision Support System Using the Analytical Hierarchy Process (AHP) Method for Selection of the Best Umrah and Religious Tourism Agents. Assessing the performance of bureau agents is important to support the smooth running of the number of Umrah pilgrims and tourist trips. Choosing the best bureau agent will increase the bureau agent's performance motivation. This research takes a case study at PT. Al-Khair Tour & Travel uses the Analytical Hierarchy Process (AHP) method, where previously the evaluation process for selecting the best bureau agent had never been carried out. Some of the problems encountered are that there is no performance assessment process for bureau agents, there is no appropriate selection method, and there is no Decision Support System (DSS) available that can make it easier to assess the selection of the best bureau agent. So an SPK application is needed to assess the selection of the best bureau agent. The method that can be used is the AHP method. The AHP method produces alternative priorities and criteria weights in determining the best bureau agent objectively based on the criteria provided by PT. Al-Khair Tour & Travel as a decision maker will provide bonus rewards for the best bureau agents, the aim is to motivate bureau agents to improve their performance.

INTRODUCTION

Religious tourism or Umrah is considered to have become a new trend for Indonesian people in spending their long holidays. This is proven by the increasing number of Muslims who perform the Umrah pilgrimage from year to year. Carrying out this pilgrimage requires a travel agency that will provide guidance and procedures for Umrah to prospective pilgrims, apart from also preparing tourist destinations to several cities or countries around the Middle East, so that the Umrah trip is not only aimed at increasing faith but can also be a holiday for Muslims. (Santoso, Harianto, & Sumanto, 2019)

The method used is the Analytical Hierarchy Process (AHP). This research provides an alternative in the form of a decision support system to help and make it easier for company stakeholders to decide on the best employees with AHP and Expert Choice. Improving the calculation process and also this system can provide recommendations for the best employees based on ranking. (Prawira & Amin, 2022).

In this research, a decision support system will be created that can help PT. Al-Khair Tour & Travel in making decisions to determine the best agent. Decision support systems are used to compare several criteria and several alternatives and can use the Analytical Hierarchy Process (AHP) method. By using AHP, existing problems are described based on more structured criteria using a hierarchical system, then processed in such a way as to find optimal alternative solutions (Dewi, Wandani, Anggraeni, & Eko Setia Budi, 2021). Apart from that, the AHP method has advantages in making decisions, namely by comparing decisions and comparing each criterion in pairs so that a weighted value is obtained from the importance of each existing criterion. (Yasa, Werthi, & I Putu Satwika, 2021)

RESEARCH METHODS

The framework of this research explains several steps in carrying out research related to selecting the Best Umrah and Religious Tourism Agent. This research has three stages related to selecting the best Umrah and Religious Tourism Agent. In the following image are the stages carried out to support the creation of an application program for selecting the best Umrah and Religious Tourism Agency Agent that suits your needs. (Merlina & Anita, 2015).

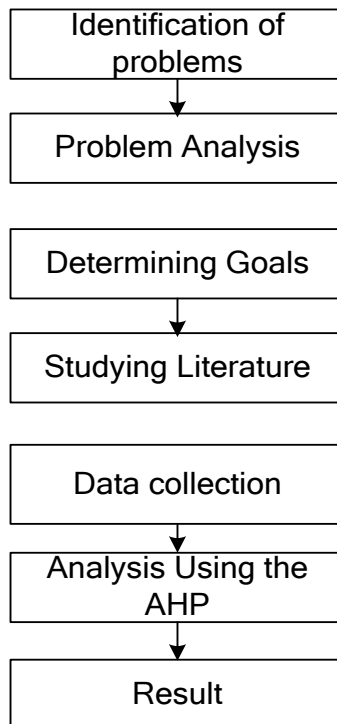


Figure 1. Research Framework

A description of the explanation of each step in the research framework in the picture above is explained as follows:

1. Identify the Problem

In this stage, observations will be made of the problems that occur in the current system, which will be used as a research basis for determining research problems.

2. Problem Analysis

The problem analysis stage is a step to understand the problems that occur which have certain limitations, namely:

- a. Preliminary Analysis: This analysis is carried out to determine the characteristic values of variables from each existing data, which will be used in the process of determining the use of criteria as a basis for the use of these criteria.
- b. Advanced Analysis. This analysis aims to carry out more in-depth calculations and testing of the existing hypothesis results

3. Determine goals

This stage of determining objectives is a stage that can be used to determine the objectives of the research carried out which is based on the problem formulation that has been formulated.

4. Study Literature

Literature study is learning carried out based on sources from books, journals and proceedings related to decision support systems using the Analytical Hierarchy Process (AHP) method. And this source is generally used regarding the literature study in this research.

5. Collect Data

The following are the data collection stages carried out in Obtain information using data collection methods, including:

a. Observation: Conducting observations at the PT Office. Al-Khair Tour & Travel to find out several criteria that can be used to select the best Umrah and Religious Tourism Agency Agent according to the PT Office. Al-Khair Tours & Travel. Observations were made to see the truth of the data collection results.

b. Literature review: Collect data and search for information obtained from reading and studying books, research journals and proceedings related to research.

6. Analysis using the AHP

This stage is a continuation stage of the previous stages that have been carried out, where the data collection and problem analysis that has been carried out can be used to carry out analysis in determining the criteria that will be used in processing data using the AHP method in determining the best agent..

7. Results

This stage is the final stage which is used as a testing stage of the research results on the decision support system in determining the best agent using the Analytical Hierarchy Process (AHP) method. The research results were tested

- a) Carry out data processing using the AHP method
- b) Testing the results of the decision support system in determining the best agent using the AHP method.

RESULTS AND DISCUSSION

1. Test Data

The implementation system is the stage where the designed application is

executed. This stage shows whether each process can run well and is able to produce the expected results. The application design process using Visual Basic.Net is displayed in the form of forms which become a means for users to carry out the implementation process.(Ghani & Muhammad Luthfi Hamzah, 2022). carry out trials of decision support system calculation results to determine the selection of the best agent. Testing is carried out in two ways, namely manually and using an application program. The two calculation results obtained must have or show the same AHP value for the calculation to be correct. (Pebrianti, Sirait, & Yeremia Tiopan Pandapotan Purba, 2022)

Table 1. Criteria Set by the Company

No	Criteria	Code/Abbreviation
1	Productivity	K1
2	Responsibility	K2
3	Discipline	K3
4	Experience	K4
5	Service	K5

Table 2. Criterion Pairwise Comparison Matrix

	K1	K2	K3	K4	K5
K1	1	3	3	5	4
K2	1/3	1	2	3	5
K3	1/3	1/2	1	6	3
K4	1/5	1/3	1/6	1	2
K5	1/4	1/5	1/3	1/2	1

2. Selection of the Best Agent

The data used in selecting the best agent is data obtained from the company, then the data will be processed using the AHP method in the process of selecting the best data agent. Where each agent's data will have a value for each criterion given as a basis for calculations in determining who is the best agent. (Kaunan, Kelen, & Nababan, 2023). Where the process for getting the best agent is described in the form of a flowchart as follows.

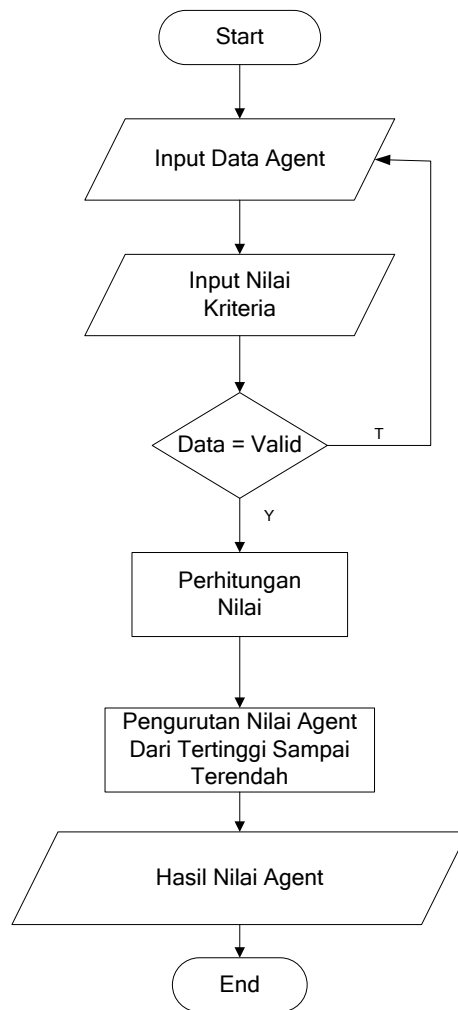


Figure 2. AHP Method SPK Flowchart

3. AHP Method Computation Steps

Selecting the best agent can be done by following several steps as follows (Ibad, Amin, Rahayudi, & Setiawan, 2023) , namely:

1. Arrange a hierarchy starting with objectives and then criteria at the lower level
2. After the hierarchy above has been arranged, the next step is to determine the priority of the elements. This step is divided into two steps, namely making pairwise comparisons and filling in the pairwise comparison matrix
3. Once the matrix element values are known, the next step is to add up the element values for each column of the criteria comparison matrix as in the table below

Table 3. Addition of Element Values for Each Matrix Column

	K1	K2	K3	K4	K5
K1	1	3	3	5	4
K2	0,33	1	2	3	5
K3	0,33	0,50	1	6	3
K4	0,20	0,33	0,17	1	2
K5	0,25	0,20	0,33	0,50	1
Amount	2,11	5,03	6,50	15,50	15

4. Divide the value of each element of the comparison matrix by the corresponding number of columns as in the table below.

Table 4. Criteria Priority Weighting Matrix

	K1	K2	K3	K4	K5
K1	1/2,11	3/5,03	3/6,50	5/15,50	4/15
K2	0,33/2,11	1/5,03	2/6,50	3/15,50	5/15
K3	0,33/2,11	0,50/5,03	1/6,50	6/15,50	3/15
K4	0,20/2,11	0,33/5,03	0,17/6,50	1/15,50	2/15
K5	0,25/2,11	0,20/5,03	0,33/6,50	0,50/15,50	1/15

5. After the division results are obtained, then add up the element values of the criteria priority weight matrix elements in rows as in the table below.

Table 5. Addition of Element Values for Each Row Criteria Priority Weighting Matrix

	K1	K2	K3	K4	K5	Total Per Row
K1	0,4739	0,5964	0,4615	0,3226	0,2667	2,1211
K2	0,1564	0,1988	0,3077	0,1935	0,3333	1,1898
K3	0,1564	0,0994	0,1538	0,3871	0,2000	0,9967
K4	0,0948	0,0656	0,0262	0,0645	0,1333	0,3844
K5	0,1185	0,0398	0,0508	0,0323	0,0667	0,3079

6. After that, the sum result is divided by the number of criteria (in this case there are 5 criteria) so that the priority weights are found as in the table below.

Table 6. Division of Number of Element Values

	K1	K2	K3	K4	K5	Amount	Priority Weight
K1	0,4739	0,5964	0,4615	0,3226	0,2667	2,1211/5	0,4242
K2	0,1564	0,1988	0,3077	0,1935	0,3333	1,1898/5	0,2380
K3	0,1564	0,0994	0,1538	0,3871	0,2000	0,9967/5	0,1993
K4	0,0948	0,0656	0,0262	0,0645	0,1333	0,3844/5	0,0769
K5	0,1185	0,0398	0,0508	0,0323	0,0667	0,3079/5	0,0616

7. After obtaining the priority weight value for each criterion, then check the consistency of the comparison ratio (CR) between the criteria by multiplying the entire contents of the criteria comparison matrix column (table 3) with the priority weight of the criteria (table 6) as in the table below.

Table 7. Criterion Consistency Matrix

	K1	K2	K3	K4	K5
K1	1*0,4242	3*0,2380	3*0,1993	5*0,0769	4*0,0616
K2	0,33*0,4242	1*0,2380	2*0,1993	3*0,0769	5*0,0616
K3	0,33*0,4242	0,50*0,2380	1*0,1993	6*0,0769	3*0,0616
K4	0,20*0,4242	0,33*0,2380	0,17*0,1993	1*0,0769	2*0,0616
K5	0,25*0,4242	0,20*0,2380	0,33*0,1993	0,50*0,0769	1*0,0616

8. After the results of the multiplication table 7 are obtained, then add up the values of the elements of the criterion consistency matrix in rows as in the table below.

Table 8. Criterion Consistency Matrix

	K1	K2	K3	K4	K5	Amount
K1	0,4242	0,7140	0,5979	0,3845	0,2464	2,3670
K2	0,1400	0,2380	0,3986	0,2307	0,3080	1,3153
K3	0,1400	0,1190	0,1993	0,4614	0,1848	1,1045
K4	0,0848	0,0785	0,0339	0,0769	0,1232	0,3974
K5	0,1061	0,0476	0,0658	0,0385	0,0616	0,3195

9. After that, the summation results are divided by the corresponding criteria priority weights (table 6) so that the consistency weights are found as in the table below.

Table 9. Division of the Number of Consistency Matrix Element Values

	K1	K2	K3	K4	K5	Amount	Weight Consistency
K1	0,4242	0,7140	0,5979	0,3845	0,2464	2,3670/0,4242	5,5795
K2	0,1400	0,2380	0,3986	0,2307	0,3080	1,3153/0,2380	5,5274
K3	0,1400	0,1190	0,1993	0,4614	0,1848	1,1045/0,1993	5,5405
K4	0,0848	0,0785	0,0339	0,0769	0,1232	0,3974/0,0769	5,1686
K5	0,1061	0,0476	0,0658	0,0385	0,0616	0,3195/0,0616	5,1872

10. Add up all the consistency weight values.

$$5,5795 + 5,5274 + 5,5405 + 5,1686 + 5,1872 = 27,0033$$

11. Then count λ_{\max}

$$\lambda_{\max} = 27,0033 / 5 = 5,4007$$

12. After that count CI (Consistency Index)

$$\begin{aligned} CI &= (\lambda_{\max} - n) / (n) \\ &= (5,4007 - 5) / (5) \\ &= 0,4007 / 5 \\ &= 0,0801 \end{aligned}$$

13. Then calculate CR

$$\begin{aligned} CR &= CI / IR \\ &= 0,0801 / 1,12 \\ &= 0,0715 \end{aligned}$$

Because $CR < 0.1$, the comparison is 100% consistent and acceptable.

To calculate the difference between each agent that will be used as an alternative for selecting the best agent, you can do the calculation using the AHP method with the steps above. The following will show the calculation of the agent's assessment which is directly calculated based on the agent's value data which is given a value for each criterion for selecting the best agent. (Kurniawan, Putra, & Wadisman, 2023)

Table 10. Best Data Agent Candidate

Agent name	Code
Kartika Dewi	K001
Ade Gunawan	K002
Hermansyah	K003
Riana Sari	K004
Hendra Putra	K005

Give a score to each candidate for the best agent on the value of each criterion starting from the productivity criteria value, the responsibility criteria value, the discipline criteria value, the experience criteria value and the service criteria value. (Fajar Eka & Priharsari, 2022).

a. Criteria value for Kartika Dewi (K001)

Table 11. Kartika Dewi Criteria Values

No	Criteria	Criterion Value
1	Productivity	6
2	Responsibility	7
3	Discipline	8
4	Experience	7
5	Service	7

Calculate the total value of the criteria by multiplying the corresponding priority weights

Table 12. Kartika Dewi Value * Criteria Weight

No	Criteria	Criteria Value	Weight Priority	Criteria Value * Weight
1	Productivity	6	0,4242	2,5454
2	Responsibility	7	0,2380	1,6657
3	Discipline	8	0,1993	1,5948
4	Experience	7	0,0769	0,5382
5	Service	7	0,0616	0,4311
Total Value :				6,7751

b. Criteria value for Hendra Putra (K005)

Table 13. Hendra Putra Criteria Values

No	Criteria	Criterion Value
1	Productivity	8
2	Responsibility	8
3	Discipline	7
4	Experience	9
5	Service	8

Calculate the total value of the criteria by multiplying the corresponding priority weights

Table 14. Hendra Putra Value * Criteria Weight.

No	Criteria	Criteria Value	Weight Priority	Criteria Value * Weight
1	Productivity	8	0,4242	3,3938
2	Responsibility	8	0,2380	1,9036
3	Discipline	7	0,1993	1,3954
4	Experience	9	0,0769	0,6919
5	Service	8	0,0616	0,4927
Total Value :				7,8775

The final results of the assessment of all existing agent data can be seen in the following table.

Tabel 15. Overall Agent Data Assessment Results

No	Name	Abbreviations/Code	Total Value
1	Hendra Saragih	K005	7,8775
2	Riana Sari	K004	7,6874
3	Ade Gunawan	K002	7,6236
4	Hermansyah	K003	7,1863
5	Kartika Dewi	K001	6,7751

In accordance with the standard value, the best agent is an agent who has a value ≥ 7.50 . So the worthy agent chosen to be the best agent is Hendra Putra.

CONCLUSION

1. The AHP method is successful in assessing the agent that will be selected according to the needs of the PT. Al-Khair Tour & Travel.
2. Priority weight is a parameter that functions to regulate variations in assessment results compared to the given criteria values.
3. The resulting AHP value has accuracy based on manual calculations from the alternative data provided.

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