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# Implementation of Analytical Hierarchy Process for Recommendations of Islamic Venues

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## ABSTRACT

Walimah is an event that is carried out as an expression of gratitude after the ceremony is held, such as preparing a banquet for invited guests. Constraints that often occur by many prospective partners are experiencing difficulties in finding a wedding location that fits the needs and criteria that are considered according to the Sharia. So that many of them prepare all their Islamic wedding needs through a syar'i wedding organizer, one of which is related to Neosmotion Studio. Neosmotion Studio is a studio company that is directly related to wedding organizer syar'i in implementing the syar'i walimah. From this problem, it is necessary to have a method to get a recommendation for a location in accordance with the criteria for the bride and groom. The method used in this research is Analytical Hierarchy Process (AHP) by involving alternative places and criteria which are weighted and normalized in determining them. The results of this study obtained, the value of the highest criteria weight includes distance to the mosque (38.76%), cost (31.24%) and facilities (12.13%). From the prioritized criteria, we obtained recommendations for locations in various areas of DKI Jakarta, such as the At Taqwa Mosque in South Jakarta and the Sunda Kelapa Grand Mosque in Central Jakarta with a final score of 91.2775, the Manarul Amal Mosque in West Jakarta with a final score of 94.8514 and the Baitus Mosque. Greetings in East Jakarta with 89,7780.

**Key words :** Wedding Organizer, Islamic Marriage, Analytical Hierarchy Process, Recommendation.

## 1. INTRODUCTION

Neosmotion Studio is a studio company that is directly related to wedding organizer (WO) syar'i in implementing walimah syar'i. One of the obstacles in preparing a walimah is related to location selection. Choosing the right location is not easy because the more diverse choices and facilities offered and the budgets that the prospective bride and groom have can make it difficult for WO syar'i to make decisions [1]. Overcoming these problems, a solution was made by designing a website application that could help WO Syar'i to give consideration in choosing a walimah location that was in accordance with Islamic law with criteria that matched the client's needs. The website application is created using Analytical Hierarchy Process (AHP) method. Analytical Hierarchy Process (AHP) method is useful for calculating the weight of each criterion [2]. Analytical Hierarchy Process (AHP) method is able to consider the logical consistency in the assessment used from the collected data to determine a priority [3]. This method is able to maintain validity up to the inconsistency limit of various criteria and alternatives that will be presented [4]. Analytical Hierarchy Process (AHP) method is able to make decisions and take into account the durability of output [5]. However, this method depends on the main input, so this method is only mathematical without any structured testing [6]. The study, entitled Implementation of Analytical Hierarchy Process for Recommendations for Islamic Venues, is expected to later be able to help syar'i wedding organizer vendors in finding a wedding location that fits the criteria and needs of the client.

## 2. METHODOLOGY

At this stage, the steps for solving problems in determining the location of an Islamic marriage will be explained using the Analytical Hierarchy Process (AHP).

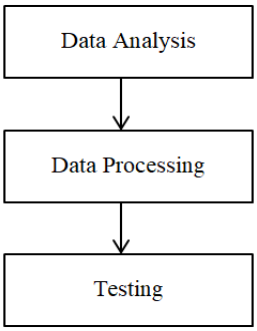


**Figure 1**: Research Methodology

### 2.1 Data Analysis

This stage is carried out to obtain the required data such as location as an alternative and priority criteria. One method of obtaining data in this research is by interviewing. The questions asked include confirmation of the determination of the location. The following are the results of the interview.
In addition, the results of the interviews also provided the locations of 25 places. The locations obtained are in DKI Jakarta, such as Central Jakarta, South Jakarta, East Jakarta and West Jakarta. This location has also been given criteria such as facilities, building area, road access, distance of the mosque, parking space, and costs

**Table 1:** Description of Assessment Based on Criteria

| Criteria | Amenities | Building | Access | Mosque Distance | Parking | Cost |
|---|---|---|---|---|---|---|
| 1 | Complete | Large | Very Nice | Close | Large | Not Expensive |
| 2 | Quite Complete | Moderate | Quite Good | Close Enough | Moderate | Quite Expensive |
| 3 | Incomplete | Small | Not Good | Far | Small | Expensive |

## 2.2 Data Processing

### 2.2.1 Defining the Problem

The problem raised is how to determine the location of the best walimah in the DKI Jakarta area by taking into account the following 6 criteria:

- Problem: Determining the location of the best walimah in the DKI Jakarta area.
- Criteria: Facilities, Building Area, Road Access, Distance to Mosque, Parking Area and Cost. Criteria code giving based on each criterion.

**Table 2:** Criteria Code

| Criteria | Code |
|---|---|
| Amenities | C1 |
| Building Area | C2 |
| Access Road | C3 |
| Mosque Distance | C4 |
| Parking Area | C5 |
| Cost | C6 |

- Alternatives: Sunda Kelapa Grand Mosque (A1), Grand Mosque (A2), DPR / MRP RI Mosque (A3), Ministry of Religion (A4), FK UI Mosque (A5), Gren Alia Prapatan Hotel (A6), Al Bina Mosque (A7), Gren Alia Cikini Hotel (A8), Pondok Indah Mosque (A9), Daarut Tauhid Mosque (A10), Griya Bhima Sakti (A11), Mosque At Taqwa (A12), Palapa Mosque (A13), Kalibata DPR House (A14), Al Ittihad Mosque (A15), Al Azhar Mosque (A16), Al Huda Mosque (A17), Baitus Salam Mosque (A18), At Tin Mosque (A19), Babussalam Mosque (A20), Bintaro IX Mosque (A21), Bani Umar Mosque (A22), Al Muchlisin Grand Mosque (A23), Azzahara Mosque (A24), and Manarul Amal Mosque (A25)

### 2.2.2 Creating a Hierarchical Structure

The creation of a hierarchical structure begins with a general purpose, and alternatives [7]. From the hierarchical structure, it can be seen that the first level is the main objective level, which is to determine the location of the best walimah, filled with data from several candidate locations that are determined for the selection of the desired walimah location.

### 2.2.3 Weighting criteria

At this stage, all criteria that are at each hierarchical level are given an assessment of the relative importance of one criterion to another [8]. The assessment uses weighting standards with a scale ranging from 1 to 9 and vice versa.

**Table 2:** Criteria and Alternative Weights

| Intensity of Interest | Information |
|---|---|
| 1 | The two elements are equally important |
| 3 | One element is slightly more important than the other |
| 5 | One element is more important than the other |
| 7 | One element is clearly more absolutely essential than the other |
| 9 | One element is absolutely more important than the others |
| 2,4,6,8 | The values between two adjacent comparative values |
| Opposite | If activity I gets one point compared to activity J, then J has the opposite value compared to I |

### 2.2.4 Calculating Weighting Criteria and consistency of Weighting

This stage calculates the weighting priority by finding the eigenvector value. The first thing the researcher did in processing the data was presenting the data into a pairwise comparison matrix [9].

### 2.2.5 Calculating the Alternative Weights

At this stage the alternative weighting is carried out for each criterion in the pairwise comparison matrix. The process for carrying out alternative weighting is the same as the process for calculating the weighting of the criteria.

### 2.2.6 Displaying Alternate Sequences

At this stage, calculate the eigenvector value obtained at the alternative weighting for each criterion with the eigenvector value obtained at the weighting of the previous criteria [10]. This is done to determine the choice of the available alternatives [11]. And the largest number of values is the best choice.

### 2.2.7 Specifying Criteria Values

The first implementation will determine the weight of the criteria by filling in the pairwise comparison matrix and comparing the priority of each criterion as in the following table:

**Table 3:** Pairwise Comparison Table

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| C1 | 1 | 5 | 5 | 1/7 | 1 | 1/5 |
| C2 | 1/5 | 1 | 5 | 1/7 | 1 | 1/5 |
| C3 | 1/5 | 1/5 | 1 | 1/7 | 1 | 1/5 |
| C4 | 7 | 7 | 7 | 1 | 7 | 1 |
| C5 | 1 | 1 | 1 | 1/7 | 1 | 1/5 |
| C6 | 5 | 5 | 5 | 1 | 5 | 1 |

Then the value is converted into a decimal number, to simplify calculations.

**Table 4:** Pairwise Comparison Matrix

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| C1 | 1 | 5 | 5 | 0,143 | 1 | 0,2 |
| C2 | 0,2 | 1 | 5 | 0,143 | 1 | 0,2 |
| C3 | 0,2 | 0,2 | 1 | 0,143 | 1 | 0,2 |
| C4 | 7 | 7 | 7 | 1 | 7 | 1 |
| C5 | 1 | 1 | 1 | 0,143 | 1 | 0,2 |
| C6 | 5 | 5 | 5 | 1 | 5 | 1 |

After obtaining the results from the pairwise comparison matrix value, the weighting stage of each alternative will then be carried out .

### 2.2.8 Weighting of Score

This stage is a weighting stage in the assessment carried out from the results of previous interviews. The results of the assessment will be given weight to the criteria as shown in the table below

**Table 5:** Weighted Assessment Criteria

| Assessment criteria (weight) | Criteria | Assessment criteria (weight) | Criteria |
|---|---|---|---|
| Complete (100) | Amenities | Very Nice (100) | Access Road |
| Quite complete (80) | | Quite Good (80) | |
| Incomplete (60) | | Not Good (60) | |
| Large (100) | Building Area | Close (100) | Mosque distance |
| Moderate (80) | | Close Enough (80) | |
| Small (60) | | Far (60) | |
| Large (100) | Parking Area | Not expensive (100) | Cost |
| Moderate (80) | | Quite expensive (80) | |
| Small (60) | | Expensive (60) | |

After getting the weighted value of each criterion, then the value is entered into each table and performs calculations like the following formula:

*Criteria Weight Value x Criteria Priority Value*

Then get a result like this:

**Table 6:** AHP Criteria Calculation Results

| | C1 | C2 | C3 | C4 | C5 | C6 |
|---|---|---|---|---|---|---|
| A1 | 9,706 | 4,639 | 3,407 | 38,752 | 3,52 | 31,24 |
| A2 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A3 | 9,706 | 7,732 | 4,259 | 38,752 | 5,87 | 18,74 |
| A4 | 9,706 | 6,186 | 4,259 | 31,002 | 5,87 | 31,24 |
| A5 | 9,706 | 7,732 | 3,407 | 38,752 | 5,87 | 24,99 |
| A6 | 12,13 | 7,732 | 4,259 | 38,752 | 4,70 | 18,74 |
| A7 | 9,706 | 7,732 | 4,259 | 38,752 | 4,70 | 24,99 |
| A8 | 12,13 | 7,732 | 4,259 | 38,752 | 4,70 | 18,74 |
| A9 | 9,706 | 7,732 | 4,259 | 38,752 | 5,87 | 18,74 |
| A10 | 9,706 | 4,639 | 4,259 | 38,752 | 3,52 | 24,99 |
| A11 | 12,13 | 6,186 | 3,407 | 23,251 | 4,70 | 24,99 |
| A12 | 9,706 | 4,639 | 3,407 | 38,752 | 3,52 | 31,24 |
| A13 | 9,706 | 4,639 | 3,407 | 38,752 | 3,52 | 31,24 |
| A14 | 9,706 | 6,186 | 4,259 | 31,002 | 3,52 | 24,99 |
| A15 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A16 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A17 | 7,279 | 4,639 | 4,259 | 38,752 | 3,52 | 31,24 |
| A18 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A19 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A20 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A21 | 9,706 | 4,639 | 3,407 | 38,752 | 3,52 | 31,24 |
| A22 | 7,279 | 6,186 | 3,407 | 38,752 | 3,52 | 31,24 |
| A23 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A24 | 9,706 | 6,186 | 4,259 | 38,752 | 5,87 | 24,99 |
| A25 | 9,706 | 6,186 | 4,259 | 38,752 | 4,70 | 31,24 |

Then do the summation of the criteria for each alternative, then the following results are obtained

**Table 7:** Alternative Weight Calculation Results

| Alternatives | Weight Calculation Results |
|---|---|
| A1 | 91,227 |
| A2 | 89,778 |
| A3 | 85,075 |
| A4 | 88,277 |
| A5 | 90,473 |
| A6 | 86,326 |
| A7 | 90,149 |
| A8 | 86,326 |
| A9 | 85,075 |
| A10 | 85,880 |
| A11 | 74,676 |
| A12 | 91,277 |
| A13 | 91,277 |

| | |
|---|---|
| A14 | 79,676 |
| A15 | 89,778 |
| A16 | 89,778 |
| A17 | 89,703 |
| A18 | 89,778 |
| A19 | 89,778 |
| A20 | 89,778 |
| A21 | 91,277 |
| A22 | 90,398 |
| A23 | 89,778 |
| A24 | 89,778 |
| A25 | 94,851 |

### 2.3 Testing

In this stage, the website application will be tested according to the method to be implemented. System testing will be carried out by the following mechanism:

1. Determine the location according to the desired location criteria in the DKI Jakarta area. There are four (4) location groupings, such as Central Jakarta, South Jakarta, East Jakarta and West Jakarta.
2. Adjusting the budget from the client by inputting the nominal value of the client's budget so that it will be classified based on cost criteria such as inexpensive, quite expensive, and expensive.
3. Comparing system test results with manual counting results.

The results of this test will be used to make it easier for wedding organizer (WO) vendors to determine the location of the walimah in accordance with the client's requirements.

## 3. RESULTS AND DISCUSSION

In the results and discussion chapter, it will explain the implementation of AHP in producing recommendations for wedding venues based on the converted regions through coding. This AHP stage starts from determining priorities to obtaining alternative results of the wedding venue from each region. To determine the priority of a criterion, it is necessary to conduct an interview with the Chief Director of Neosmotion Studio to determine which criteria are the most priority. The name of the criteria in the matrix is abbreviated as Amenities (A), Building Area (BA), Access Road (AR), Mosque Distance (MD), Parking Area (PA) and Cost (C).

**Table 8:** Comparison between criteria

| Criteria | A | BA | AR | MD | PA | C |
|---|---|---|---|---|---|---|
| A | 0.069 | 0.26 | 0.208 | 0.055 | 0.062 | 0.071 |
| BA | 0.013 | 0.052 | 0.208 | 0.055 | 0.062 | 0.071 |
| AR | 0.013 | 0.010 | 0.041 | 0.055 | 0.062 | 0.071 |
| MD | 0.485 | 0.364 | 0.291 | 0.388 | 0.437 | 0.357 |
| PA | 0.095 | 0.052 | 0.041 | 0.055 | 0.062 | 0.071 |
| C | 0.347 | 0.260 | 0.208 | 0.388 | 0.312 | 0.357 |

This result is obtained from the comparison between criteria such as as important as (1), more important than (5), for very important than (0.143), for more important than (0.2) and others. Then the results obtained in table 8 are added up for each row and the results are divided by 6. The goal is to get the priority value of this criterion.

**Table 9:** Criteria Priority

| Criteria | Weight | Percent (%) | Priority |
|---|---|---|---|
| Amenities | 0.1213 | 12.13% | 3 |
| Building area | 0.0773 | 7.73% | 4 |
| Access Road | 0.0426 | 4.26% | 6 |
| Mosque distance | 0.3875 | 38.76% | 1 |
| Parking area | 0.0588 | 5.88% | 5 |
| Cost | 0.3125 | 31.24% | 2 |

Based on the results obtained in table 4.3, it is found that the criteria for the Distance of the Mosque (38.76%) and Cost (31.24%) are the highest priority values when choosing an alternative wedding venue.

The results obtained are the results of the multiplication of each criterion row with the priority value column, which then the results of each multiplication are added. After obtaining the matrix value above, then the value between the matrix results and the priority is added up and averaged. The result of the mean was 1,344. Then this average value will be a reference to get the Consistency Index (CI) value [12].

$$CI = \frac{\lambda maks - n}{n - 1} = \frac{1.3433 - 6}{6 - 1} = -0.9312$$

From the results of the above equation, the calculation of Consistency Ratio (CR) is obtained from the Index Random (IR) value, where IR is 1.24 with a size-6 matrix [13]. Here are the equations and the results of the consistency ratio value

$$CR = \frac{CI}{IR} = \frac{-0.9312}{1.24} = -0.751$$

With the results of the above equation which is -0.751, it can be said that the value is consistent because, -0.751 <1.0. With the priority criteria obtained, each alternative will be linked to these criteria and get a ranking (priority) from each region. This value is also validated by Neosmotion Studio to determine the correctness of system calculations using manual calculations

**Table 9:** Alternative ranking in each region

| Region | Location | Result | Ranking |
|---|---|---|---|
| South Jakarta | Masjid At Taqwa | 91,2775 | 1 |
| | Masjid Palapa | 91,2775 | 2 |
| | Masjid Al Ittihad | 89,7780 | 3 |
| | Masjid Al Azhar | 89,7780 | 4 |
| | Masjid Al Huda | 89,7029 | 5 |
| Central Jakarta | Masjid Agung Sunda Kelapa | 91,2775 | 1 |

| Region | Location | Result | Ranking |
|---|---|---|---|
| | Masjid Bintaro IX | 91,2775 | 2 |
| | Masjid FK UI | 90,4727 | 3 |
| | Masjid Bani Umar | 90,3975 | 4 |
| | Masjid Al Bina | 90,1486 | 5 |
| West Jakarta | Masjid Manarul Amal | 94,8514 | 1 |
| | Masjid Agung Al Muchlisin | 89,7780 | 2 |
| | Masjid Assahara | 89,7780 | 3 |
| East Jakarta | Masjid Baitus Salam | 89,7780 | 1 |
| | Masjid At Tiin | 89,7780 | 2 |
| | Masjid Babussalam | 89,7780 | 3 |

## 4. CONCLUSION

Based on the results and discussion in the previous chapter, the Analytical Hierarchy Process (AHP) method can be applied to determine the location of Islamic marriages in the DKI Jakarta area. In this study, the alternatives used were 25 places which were divided in each area of DKI Jakarta. Of the various alternative places that exist, adjusted to criteria such as facilities, building area, road access, mosque distance, parking area, and costs. This criterion greatly influences the place classification. From the results of weighting the value that has been normalized, the criteria for the distance of the mosque (38.76%), cost (31.24%) and facilities (12.13%) are obtained with the highest criteria priority. The results obtained by the system are then validated against the Neosmotion Studio. Highest yields from each region will be given top priority in providing recommendations for sites. The location with the highest finish can be seen as follows: At Taqwa Mosque got the highest finish in South Jakarta with 91.2775. The Grand Mosque gets the highest final result in Central Jakarta with 91.2775. The Manarul Amal Mosque got the highest finish in West Jakarta with 94.8514. Baitus Salam Mosque got the highest final result in East Jakarta with 89.7780. The suggestions put forward can be expected to become evaluation materials and can be developed in further research, namely: adding some alternative places and criteria in determining a wider location. To increase the results that are better than before, the Analytical Hierarchy Process (AHP) method can be combined with other methods such as SAW in determining the location of marriage.

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