

Modelling decision support system for selection maahad tafiz center using analytical hierarchal analysis

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ABSTRACT

Today, the interest of the community to send their children to religious-based schools that is Maahad Tahfiz Center (MTC)) whether managed by Government (State or Federal), private individuals, nonprofit organization (NGO) or certain organizations is very high. The demand that exceeds this offer has seen the growth of MTC rapidly. This situation provides many choices and advantages to parents. However, there is anxiety among parents to choose the MTC that fulfills the features that they want. Hence modeling decision support system (DSS) in a MTC selection has been modeled using Analytical Hierarchy Process (AHP) provides the effective way for parents to select appropriate MTC. AHP is an effective tool for dealing with the complex decision making and aid the parents to set priorities and provide the best decision in selection MTC. Hopefully by using this model and future development of this model will help the parents make the best choices of MTC based on their preferences.

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1. INTRODUCTION

In Malaysia, people's interest in religious education is very high. Parents' requests to send children to religious school known as Maahad Tahfiz Center (MTC) are growing in demands and becoming extremely large, so large than that they can offer. The latest developments show that the way MTC provides the curriculum that includes the memorizing of Al-Quran or the tahfiz Al-Quran began to gain public attention and as such the number of MTC has grown tremendously. What interesting is that each school offers a diverse and distinctive curriculum design and approach. There are also other institutions that offer al-Quran recitation programs, diplomas (after SPM), secondary schools, primary schools, pre-school and child care centers. The goals of the establishment and the implementation methods vary from each other. Some of them give full focus to the aspect of Quranic memorization only, meanwhile some others give a balance to several other components with varying rates other than the Quranic excerpts such as academic studies (offered by the mainstream schools), study of the 'kitab kuning'(turath) in Arabic language at the lodges, science flows, certain skills (such as vocational) and others [1-3].

This diversity is assumed to have different justifications, goals and direction between the various parties involved. First of all, parents have their own goals and justifications regarding the choice of places and types of MTC. Similarly, the individual or organization that established the MTC institution should have their own goals and objectives. The same is happen at the state or federal level, which also offers the MTC

flow system of the Quran. The expectations and goals between the three parties may be in harmony with each other and may also be different or contradictory to one another.

The justification and direction of the different or perhaps the similarities between the goals of the MTC with the aim of the parents, invites problems to parents in the selection of MTC that meet or suite with their features. Hence, this paper proposes a model that supports the parent's decision making process in selecting the right MTC for their children analytic hierarchy process (AHP) method. To obtain information on MTC, questionnaires' methods have been made in several MTC, at the district of Besut, Terengganu. This method is also applied to parents for obtaining the desired characteristics in the selection of MTC.

2. RELATED WORKS

Parents have shown a high interest in choosing religious education for their children such that the demand has exceeded the supply and as such this situation cannot be accommodated by religious schools provided by the government. Consequently, this condition encourages parents to choose MTCs which was founded by individuals, organizations or someone who are well-versed with the syllabus based on tahfiz al-quran. Due to this, the growth of the MTCs is so rapid [1-2] and this gives parents more options in choosing where to send their children to continue their studies.

The AHP technique has been repetitively studied and adopted into various applications that make use of multiple criteria decision making (MCDM) [4-10]. Some examples of applications are within the domains of education, engineering, government, industry, management, manufacturing, politic, social, and sports [5]. In [11], the authors illustrate the use of AHP at school. It was used to determine the quality of a school (ranking) based on the various criteria.

Subsequently, AHP technique and use of tools for quality development with the aim to improve the quality of industrial engineering at the educational institution [12]. Surveys and interviews were conducted for different groups that are related industrial engineering to obtain user requirements and AHP is used as a tool to prioritize these requirements.

Meanwhile, the author in [13] presented the AHP as a decision making tool that allows the consideration of multiple criteria in decision making procedure. Pre-School education selection system was created to demonstrate the AHP application. The multiple criteria were examined through questionnaires. The Pre-School score was calculated to assess parents' preferences based on criteria and sub criteria. Finally, the Pre-School was ranked based on their scores. The result of this study provides suggestions and directions for Pre-School operators to take appropriate actions in improving their businesses.

3. MAAHAD TAHFIZ CENTER

3.1. Definition of Maahad Tahfiz Center

According to the [14-15] Maahad (M) is refer as a place or study center of Islam and Tahfiz is a center to memorize and study the Al-Qur'an. By combining of the Maahad and the Tahfiz (MTC), it becomes the center of Islamic Study for memorizing and studying Al-Quran.

3.2. The attributes of the Maahad Tahfiz Center (MTC) School

Two separate set of questionnaires were distributed to the parents and MTC School. Parents are experts in knowing and selection the features/attributes of the Tahfiz Center that encourage them to send their children. Information of the Tahfiz Center that are needed encompasses of the learning curriculum, the available facilities and so on. Twenty-five parents with various academic aspects, residences and so on have participated in this questionnaires. Meanwhile four (4) MTC were selected to obtain the information. In some cases, some questions require respondents to select a scale from 1 to 5 with 1=very satisfying, 2=satisfying, 3=moderate 4=normal and lastly 5=unsatisfactory. In addition, respondents should state their choice of whether Y-Yes and T-No for specific questions. Table 1 shows the comparison of the attributes/sub attributes collected from the MTCs. In this study, MTC centers are labeled as A, B, C and D (to avoid the use of real names).

4. DECISION SUPPORT MODEL

To develop the decision support model, it involves a few steps. Firstly, we understand and structure the problem. The problem faced by parents in choosing or makes decision to select the right MTC that fulfills their features. The purpose is to send their children to pursue their studies there. Feedback from questionnaires as discussed in subsection 3.2 is analyzed and finally is classified into 4 attributes or criteria's and is shown in Table 2.

Table 1. Comparison of Attributes for MTC

MTC Attributes	MTC A	MTC B	MTC C	MTC D
General				
Year of establishment	2012	2017	2010	2012
Having a webpage/IG/Facebook	Facebook	Facebook	Facebook	Facebook
Location	Rural	Rural	Rural	Rural
Academic				
Number of staffs (academic)	4	4	5	6
Number of staffs (non-academic)	3	2	3	4
Number of students (active)	42	11	36	30
Student's Age	10-20	11-16	10-20	10-18
Entry requirements	Interviews	Interviews	Interviews	Interviews
Learning time:				
Normal day	5 am-4 pm	5 am-4 pm	5 am-5 pm	5 am-4.30 pm
Weekend				
Syllabus				
Tajwid and Al-Quran Studies	Y	Y	Y	Y
Memorizing Al-Quran	Y	Y	Y	Y
Jawi Studies	Y	N	N	Y
Arab Language Studies	Y	N	Y	Y
Fardu Ain Studies	Y	Y	Y	Y
Kitab (Books) Studies:				
Feqah (name)	Safinatun Najah	N	N	N
Tauhid (name)	Risalah Tauhid	N	N	N
Tassawuf (name)	Bidayatul- Hidayah	N	N	N
Carrier Path				
Are the students following the mainstream study (Example – Primary School, Secondary School)?				
	N	N	N	N
Are the students take public examinations?				
	Y-SPM & STAM (Link with third party – Pondok Moden)	Y-SPM (private)	Y-SPM (private)	Y-SPM (private)
Are the students further their study: Oversea IPTA/IPTS				
	MOU Indonesia Uitm tahfiz	N	N	N
Career opportunities				
	Ustaz/imam at the mosque	Ustaz/imam at the mosque	Ustaz/imam at the mosque	Ustaz/imam at the mosque
Facilities -Hostel				
All students stay at hostel?				
	Y	Y	Y	Y
Have a <i>surau</i> for religious activities?				
	Y	N	Y	Y
Have a study room (if Y), Condition?				
	3	-	3	3
Condition of the hostel/dorm? (1-5)				
	3	2	2	3
Food and Drink Preparation				
How many meals (times) per day?				
	3 times	3 times	3 times	3 times
Condition of food and drink (1-5)				
	3	3	3	3
Safety				
Registered with government agency?				
	Y (Maidam)	Y (Maidam)	Y (Maidam)	Y (Maidam)
Safety status provided?				
	2- Near the fire station	4	3	3
Functional fire extinguishers?				
	Y	Y	Y	Y
Have an emergency route and place to gather in case of an emergency?				
	Y	Y	Y	Y
Hold safety awareness talks to students?				
	Y	Y	Y	Y
Sport and Recreations				
Condition of facilities for students activity. (1-5)				
	2	2	2	2
Outdoor activities				
	Male-Football Field Female-Field	Male-Football Field Female-Field	Male-Football Field Female-Field	Male-Football Field Female-Field
Indoor activities				
	Place for Qasidah & Nasyid	Place for Qasidah & Nasyid	Place for Qasidah & Nasyid	Place for Qasidah & Nasyid
Fees and Donations				
Lump sum (Tuitions, accommodation & food)				
	RM 200 per month	RM 240 per month	RM 220 per month	RM 250 per month
Fees paid by students? (1-5)				
	2	4	2	3
Does the center receive funds from outside?				
	Y – individuals and company	Y – individuals and company	Y – individuals and company	Y – individuals and company

Table 2. Attributes to Select MTC

Criteria	Explanation
Academic	This attribute refers to the syllabus offered by MTC. It can be divided into sub attributes.
Facilities	The facilities provided by MTC centers refer to the facilities provided either in schools or hostels. This attributes can be divided into sub attributes.
Cost	All the fees charged to the students.
Location	Location of the MTC, either urban or rural.

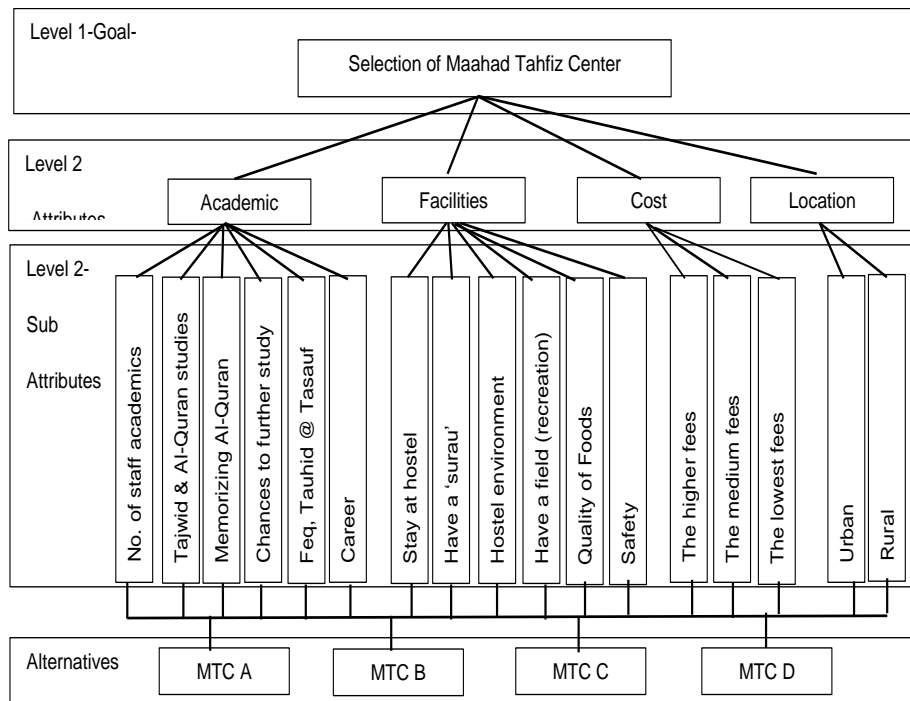


Figure 1. The hierarchy of modelling MTC

The problem is structured based on hierarchy diagram, where the top represent the goal, followed by attributes (criteria) at second level and third level represents sub attributes/sub-criteria and the lowest level is alternatives. This hierarchy diagram is represented in Figure 1.

Table 3. The Degree of Importance

Scale	Explanation
1	Equal importance
2	Weak
3	Moderate Importance
4	Moderate Plus
5	Strong Importance
6	Strong Plus
7	Very Strong
8	Very-very Strong
9	Extreme Importance

Secondly, we compute the priority. A priority is a score that ranks of the importance of the criteria (attributes) in made decision. In AHP, it uses pairwise comparison and generally is evaluated on 1-9 scale [16]. We compare each element in the corresponding level and calibrate them on the numerical. Table 3 shows the scale of comparison.

The comparison is collected in a matrix form that is pairwise comparison between the criteria, and an example is shown in Table 4 and named as A matrix.

Table 4. Comparison Matrix (A)

	Criteria 1	Criteria 2	Criteria 3	Criteria N
Criteria 1	a_{ij}	$a_{i j+1}$	$a_{i j+2}$	$a_{i j+n}$
Criteria 2	$a_{i+1 j}$	$a_{i+1 j+1}$	$a_{i+1 j+2}$	$a_{i+1 j+n}$
Criteria 3	$a_{i+2 j}$	$a_{i+2 j+1}$	$a_{i+2 j+2}$	$a_{i+2 j+n}$
Criteria N	$a_{i+n j}$	$a_{i+n j+1}$	$a_{i+n j+2}$	$a_{i+n j+n}$

The number of comparisons for each matrix can be computed using (1).

$$\frac{n^2-n}{2} \tag{1}$$

Where n is number of attributes (criteria).

In Table 4, Comparison matrix, A , suppose the entry a_{ij} in the i th row and the j th column of this matrix. Each entry a_{ij} of the matrix A , show the importance of the i th criterion relative to j th criterion. It can be concluded that, if $a_{ij} > 1$, means that the i th criterion is more important compare the j th criterion and vice versa. If $a_{ij} = 1$, it represents the criterion is same important. Matrix A , also reciprocal, that is why only half comparison are required and main diagonal is 1 because it's compare to itself.

Next, normalized pairwise comparison Matrix A using (2) and sum of the entries on each column equal to 1

$$\bar{a}_{ij} = \frac{a_{ij}}{\sum_{t=1}^n a_{tj}} \tag{2}$$

Where n number of column (criteria).

It is followed by calculating criteria weight (w), by averaging the entries on each row. (3) is used to calculate this value.

$$w_j = \frac{\sum_{t=1}^n \bar{a}_{tj}}{n} \tag{3}$$

Since it is normalized, the sum of all elements w is 1. The priority w shows relative weights among the factors that we compare.

The third steps are consistency check followed by sensitivity analysis. This step is optional but this is important for confirming the robustness of the results. In this step, we check the consistency by computing the consistency index (CI), using (4).

$$CI = \frac{\gamma_{max}-n}{n-1} \tag{4}$$

Where γ_{max} is the maximal eigenvalue, and thus consistency ratio (CR) is given by

$$CR = \frac{CI}{RI} \tag{5}$$

Where RI is the random index. If CR is less than 10% then the matrix is of an acceptable consistency. Table 5 shows the RI [17].

Table 5. Random Indices (RI)

n	3	4	5	6	7	8	9	10
RI	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

where n is number of attribute (criteria).

The final step of the decision process is the sensitivity analysis, where input data of the scenario is modified. Observation is made on the results whether there is any implication or not. Process sensitivity analysis allows using different scenarios to be generated. These different scenarios may result in other rankings, and further discussion may be needed to reach a consensus. If the ranking does not change, the results are said to be robust – otherwise they are sensitive.

5. CONCLUSION AND FUTURE WORKS

The selection of the Tahfiz Center that conforms to the taste of parents is one of the crucial criteria. Proper selection ensures the learning process can run effectively and the resulting student can memorize Al-Quran and have a high personality character. The proposed multi-criteria selection model is expected to help parents identify the best MTC. For future recommendations, the implementation of this model will be tested by the experts (parent and MTC). We also refine the decision attributes (criteria) and sub attributes in detail to make sure the robustness of this model and finally give the best choice for parents in the MTC selection.

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