

The Application of Analytical Hierarchy Process (AHP) for Students' Preferences in Tourism Destination Selection

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Abstract- Selecting the right destination for tourism is an important decision-making process to ensure that it will meet tourists' needs and satisfaction. The objective of this paper is to determine the preferences of students in selecting a destination in Malaysia for the factors (criteria) that influence the selection of tourist destinations. This study applied the Analytical Hierarchy Method (AHP) approach. AHP is one of the techniques under Multi-Criteria Decision Making (MCDM) in the field of Operational Research. The criteria that influenced the selection of tourism destinations are 'value for money', 'safety', 'natural beauty', 'entertainment', 'historical and cultural sites' and 'adventure expedition'. Five regions of Malaysia that have been chosen as the alternatives in this study are 'Northern Region', 'Central Region', 'East Coast Region', 'Southern Region', and 'East Malaysia Region'. The result discovers 'value for money' is the most influential criteria in the tourism destination selection. 'East Coast Region' happens to be the most desirable destination in Malaysia followed by 'Northern Region', 'East Malaysia Region', 'Southern Region' and 'Central Region'. It can be concluded that 'East Coast Region' has a lot to offer from students' perspectives. The findings of this study may assist relevant authorities and travel agencies to enhance and improve the quality of their services cater to different tourists' preferences.

Keywords – Analytical Hierarchy Process, Multi-Criteria Decision Making, Preference Analysis, Tourism Destination, Students' Preferences, Tourists' Preferences

I. INTRODUCTION

One of the most popular global activities in the world is focusing on the tourism sector. Over the past half-century, tourism activities have grown rapidly and the number of tourists traveling with different preferences is increasing every year (Gilandeh et al., 2017; Ilban & Yildirim, 2017). Asia is currently one of the most important and fastest growing tourism destinations in the world (Liaghat et al., 2013). Growth in the tourism sector has given a lot of impact on Malaysia's economy. However, comparing with other economic activities, the tourism sector is still considered as a new activity for a developing country such as Malaysia. In the Eleventh Malaysian Plan 2016-2020 (2016), the Malaysian government henceforth introduced a detailed plan under the Economic Transformation Programme (ETP), which amongst others set the target for the tourism sector as to increase its contribution to the Gross National Income (GNI) from RM36.9 billion in 2009 to RM103.6 billion by 2020. Various niche programs provided by the Ministry of Tourism, Arts and Culture Malaysia (2020) to promote Malaysia as an excellent tourism destination. Volunteer Tourism (Voluntourism), Malaysia My Second Home (MM2H), Agrotourism, and Homestay & Kampungstay are among these initiatives.

A study conducted by Chen and Li (2018) revealed that tourists' happiness and preferences affected by tourism destinations. Understanding tourists' preferences can be a key factor in the planning of the tourism authorities and travel agencies especially in determining the marketing strategies of each tourism destination. However, the selection of tourism's most preferred destination is a complicated process in decision making and it involves many criteria (Daud & Rozana, 2012). Most of the literature examined the criteria that affect tourists selecting tourism destination in Malaysia while there is a limited study to the knowledge of the authors that tried to discover the students' preferences in selecting Malaysia tourism destination. Therefore, the aim of this paper is to identify the preferences of students in selecting destination for tourism in Malaysia with respect to the factors (criteria) that influence the selection of destinations.

II. METHODOLOGY

The sample for this study representatives of local and foreign students from local universities in Malaysia. A total of 50 sets of questionnaires were distributed. However, 39 sets of questionnaires (78%) could only be used. The remaining 11 sets (22%) were excluded due to inconsistent results after the Consistency Ratio (CR) analysis. Therefore, it could not be utilized for further analysis. Obtaining a small number of respondents is allowed in the AHP as its application requires only a small number, but with expertise and knowledge about one particular area (Takala et al., 2006). A large sample is unnecessary as the AHP is mainly applied in handling a complex problem (Saaty, 1990).

The questionnaire is the main source in collecting data for this study. The questionnaires were divided into three sections. Section A contains five questions asking about the demographic profile of respondents. Section B is about the pairwise comparison between criteria which attempted to explore the ranking among criteria in selecting tourism destination. The last section which is section C is related to the pairwise comparison between regions concerning criteria that attempted to determine the ranking of the tourism destination. All questions in each Section of B and C used the Relative Scale of Importance which provides nine scales for obtaining the responses.

Data collected through questionnaires were analyzed using the AHP approach. *Expert Choice 11*, a decision support system software was used to analyze the calculation of the weights for each of the selection criteria and the ranking of selection tourism destination in Malaysia. One reason why *Expert Choice 11* is selected is that the AHP is the most important element in supporting the *Expert Choice 11*. This software provides a systematical mathematical solution that is quick and easy in obtaining the result.

AHP is a technique for selecting the best criteria when a decision-maker has several criteria, and to determine the rank of the decision alternatives. AHP can help the decision-maker to make a better decision by decomposing the complex problem into a hierarchical structure (Saaty, 1980). The purposes of the AHP are to make the selection, evaluation, benchmarking, quality management, public policy, benefit-cost analysis, resource allocation, planning and development, priority and ranking, decision making and forecasting (Shahin & Mahbod, 2007; Vaidya & Kumar, 2006; Forman & Gass, 2001). AHP can be applied in numerous fields such as agriculture (e.g. Tascioglu et al., 2020), geology (e.g. Kaur et al., 2020), manufacturing (e.g. Han et al., 2020), mining (e.g. Kazemi et al., 2020), oil and gas (e.g. Guo et al., 2020), social (e.g. Afifah Hanim et al., 2019), and transportation (e.g. Loh et al., 2020).

Theoretically, the AHP is based on three steps in solving problems (Saaty, 1980). The principles are decision problem decomposition, selection criteria and alternatives comparative judgment and synthesis of the priorities. The decomposition of the decision problem is when the decision-makers model the problem as a three-level hierarchy. The top-level consists of the objective of the problem. The middle level is the criteria that describe the decision alternatives. In some cases, the middle level has several levels where each criterion is further broken down into sub-criteria or sub-sub criteria as the problem requires. The bottom level of the hierarchy is the decision alternatives of the problem. The three-level hierarchy is shown in Figure 1.

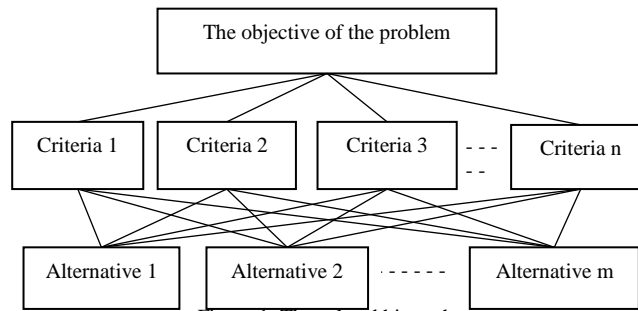


Figure 1. Three-level hierarchy

The second step in AHP is to make comparative judgments of elements in each hierarchy level (except top-level), and also construct the normalization matrix. The elements are compared pairwise (two at a time) to obtain their relative importance to the problem. The relative scale of importance that has been used by Saaty is shown in Table 1.

Table -1 Relative scale of importance

Scale	Definition	Explanation
1	Equally important, likely or preferred	Two activities contribute equally to the problem objective
3	Moderately more important, likely or preferred	Experience and judgments slightly favour one over another
5	Strongly more important, likely or preferred	Experience and judgments strongly favour one over another
7	Very strongly more important, likely or preferred	An activity is strongly favoured and its dominance is demonstrated in practice
9	Extremely more important, likely or preferred	The importance of one over another affirmed on the highest possible order
2, 4, 6, 8	Intermediate values to reflect compromise	Used to represent compromise between the priorities above

The final step in AHP is to synthesize the comparisons to derive the weights of each criterion concerning the objective and the priorities of the alternatives with respect to each criterion. This step in AHP is referred to as synthesis. Next, local priorities are multiplied by the respective criterion weights. The results are summed up to derive the overall priority of each alternative.

The other processes which are important in AHP are Consistency Index (CI) and Consistency Ratio (CR). CI is denoted by:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

where λ_{max} is the maximum eigen value of pairwise comparison matrix and n is the matrix size. The closer λ_{max} is to the matrix size, the more consistent the result will be. Then a CR can be computed by using a CI:

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

where Random Index (RI) was determined by:

$$RI = \frac{1.98 (n - 2)}{n}$$

The value of CR needs to be less than 0.1. This is important because we do not want to make a bias decision. Vice versa any result which is greater than 0.1 is considered as inconsistent since the result is not valid and the need to be re-evaluated.

III. RESULTS AND DISCUSSION

The criteria that influence the tourism destination selection in this study are ‘value for money’ (C1), ‘safety’ (C2), ‘natural beauty’ (C3), ‘entertainment’ (C4), ‘historical and cultural sites’ (C5) and ‘adventure expedition’ (C6). Five regions of Malaysia that have been selected as the choices of alternative are ‘Northern Region’ (R1: representing Perlis, Kedah, Penang and Perak), ‘Central Region’ (R2: representing Selangor, Wilayah Persekutuan Kuala Lumpur and Negeri Sembilan), ‘East Coast Region’ (R3: representing Pahang, Kelantan and Terengganu), ‘Southern Region’ (R4: representing Johor and Malacca), and ‘East Malaysia Region’ (R5: representing Wilayah Persekutuan Labuan, Sabah and Sarawak). The hierarchy of the tourism destination selection in Malaysia is shown in Figure 2, which was formed by six criteria and five alternatives.

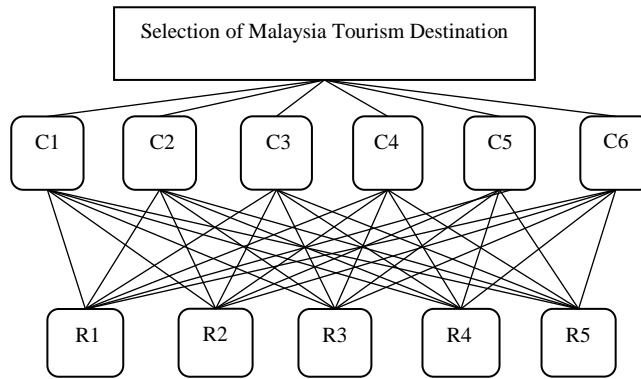


Figure 2. Hierarchy of the tourism destination selection in Malaysia

In order to derive an overall weight of criteria, the aggregation process of all analysis needs to meet its requirement of CR less than 0.1 calculated using 'Weighted Arithmetic Mean' technique. The aggregation results of 39 respondents who produced the overall weightage of the criteria are depicted in Table 2.

Table -2 Weightage and ranking of criteria in selecting tourism destination

Criteria	Weightage	Rank
C1 (Value for Money)	0.2558	1
C2 (Safety)	0.0774	6
C3 (Natural Beauty)	0.1978	3
C4 (Entertainment)	0.1125	5
C5 (Historical and Cultural Sites)	0.1255	4
C6 (Adventure Expedition)	0.2310	2

From the analysis above, it can be seen that in selecting the best tourism destination, the ‘Value for Money’ happens to be the most important criterion. It indicates that when university students select a tourism destination, they will consider whether the prices and costs are affordable for their vacation. The second most important criterion that influenced the tourism destination selection is ‘Adventure Expedition’, followed by ‘Natural Beauty’, ‘Historical and Cultural Sites’ and ‘Entertainment’. The least important criterion is ‘Safety’. This has been proven that the ‘Safe City Programme’ launched by Malaysian government since 10th August 2004 succeed and meet the program objectives (Ahmad Nazrin & Zainab, 2009), as 'Safety' criterion in this study was chosen to be the last criterion in selecting tourism destination in Malaysia.

For an aggregation process of individual decisions that derive the overall weightage of the region with respect to each criterion are as presented in Table 3.

Table -3 Weightage (W) and ranking (R) of the region with respect to criteria

	C1		C2		C3		C4		C5		C6	
	W	R	W	R	W	R	W	R	W	R	W	R
R1	0.3557	1	0.3298	2	0.2780	2	0.1808	3	0.2412	2	0.2315	3
R2	0.0488	5	0.0556	5	0.0558	5	0.4158	1	0.0822	5	0.1055	5
R3	0.3277	2	0.3627	1	0.2472	3	0.0667	5	0.4091	1	0.2748	1
R4	0.1185	4	0.0910	4	0.0976	4	0.2612	2	0.1264	4	0.1338	4
R5	0.1493	3	0.1609	3	0.3214	1	0.0755	4	0.1411	3	0.2544	2

The final analysis was to determine the ranking of a tourism destination that has been selected by the respondents. The aggregation process of individual decisions that derive the overall ranking of the region is presented in Table 4.

Table -4 Weightage and ranking of the region for tourism destination in Malaysia

Region	Weightage	Rank
R1 (Northern)	0.2626	2
R2 (Central)	0.1095	5
R3 (East Coast)	0.3014	1
R4 (Southern)	0.1334	4
R5 (East Malaysia)	0.1931	3

From the analysis in Table 4, respondents selected ‘East Coast Region’ as their most preferred region. The result indicates that ‘East Coast Region’ has the highest overall weightage for the ‘Safety’, ‘Historical and Cultural Sites’ and ‘Adventure Expedition’ as shown in Tables 3. In this case, the second most preferred region turns out to be ‘Northern Region’, followed by ‘East Malaysia Region’ and ‘Southern Region’. ‘Central Region’ has the lowest overall score since ‘Central Region’ has the lowest overall weightage for all criteria except for ‘Entertainment’ as shown in Tables 3.

IV.CONCLUSION

In conclusion, the results found that ‘value for money’ was the most influential criteria in the selection of tourism destination. ‘East Coast Region’ happens to be the most favourable destination in Malaysia. ‘East Coast Region’ is preferred due to a safe region and many historical cultural sites to be visited as well as many adventure expedition tourism locations to be explored. It can be concluded that ‘East Coast Region’ has a lot to offer from the perspective of the students. The findings of this study may assist relevant authorities and travel agencies to enhance and improve the quality of their services cater to different tourists' preferences. Future work will continue with the AHP technique will be further analyzed. It will be integrated with other MCDM techniques such as Technique for Order Preference by Similarity to Ideal Situation (TOPSIS), Max-Min, Max-Max, Simple Additive Weight (SAW), Preference Ranking Organization Method for Enrichment (PROMETHEE) and Elimination et Choice Translating Reality (ELECTRE).

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