RANKING OF TOURIST DESTINATIONS WITH MULTI-CRITERIA DECISION MAKING METHODS IN BOSNIA AND HERZEGOVINA

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ABSTRACT

Developments in communication and transportation technology have increased access to formerly distant destinations in an unprecedented way. Tourist centers develop new strategies to increase their share in this growing market. Travel agencies put up advertisements to keep their present customers and attract the new ones. Because customers have a wide array of alternatives to choose from, appropriate strategies should be developed to persuade customers during their decision-making process. In this study, six tourist centers in Bosnia and Herzegovina (BiH) were analyzed according to the criteria used by customers as they decide on their vacation destinations. The data were collected from four travel agencies by means of focus group interviews. The interview data were analyzed with Fuzzy Analytic Hierarchy Process (FAHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which are methods of multi-criteria decision making (MCDM). The criteria used in the study were determined by the teams in the agencies that were the experts in the local conditions of the country. The aim of the study was to extract the main criteria that influence tourists to visit BiH and provide a ranking of tourist destinations in terms of popularity.

Keywords: *Tourist Centers, Fuzzy AHP, TOPSIS, Multi Criteria Decision Making, Bosnia and Herzegovina*

JEL: C44, C61

1. INTRODUCTION

Millions of people travel abroad for commercial, educational, and tourist purposes among many others. Governments or tourist agencies should provide and afford this kind of request for tourist satisfaction, and tourist companies should show some effort to meet the extreme demand from people in making decision. Moreover, travel agencies are required to prepare a detailed table about all the criteria and alternatives before people make their decisions. According to Bosnia and Herzegovina (BiH) tourism report, approximately four hundred thousand tourists visited the country in 2011, which means tourism is a rising-value in BiH (Agency for Statistics 2012).

The study employed AHP and TOPSIS methods as well as fuzzy logic, owing to the ambiguous structure of tourism and tourist decision making. The obtained data were evaluated by the fuzzy analytic hierarchic process.

Specifically, every tourist has an individual opinion about tourist center selection, and therefore the following factors have been considered: easy transportation, cost, belief and doctrines from history and culture, natural beauty, and entertainment.

The study aimed at ranking tourist destinations in BiH using multi-criteria decision making methods and fuzzy analytic hierarchy process. Fuzzy analytic hierarchy process and other similar methods have been

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employed in the studies regarding the field of tourism. Such methods are considered appropriate for this study as well. Therefore, this study seeks answers to the following questions:

1. What is the ranking of important tourist destinations in BiH?
2. What is the ranking of the criteria considered by visitors in selecting tourist destionations in BiH?

2. LITERATURE REVIEW

Earlier studies used Fuzzy AHP and TOPSIS to determine tourist destinations in the world. In the studied regions, each tourist destination was found to have its own specific properties. This study contributes to the literature by analyzing a region that has not been studied. Some researchers who studied certain regions are presented in the following part of the paper.

Jeo and Kim (2011) developed a *Strategic Plan for a Tourist Destination using AHP*. They used fifteen SWOT factors and examined the relative weight of SWOT groups through focus group interviews with policy-makers in Chuncheona tourist destination in South Korea. They indicated that policy makers should be aware of strategic importance of internal factors in their planning to turn tourism resources into profitable products for the tourism market. In addition, they suggested a new approach to enhance policy makers' decision to obtain a more comprehensive decision making tool for their effective strategic planning than using a traditional method (e.g. SWOT).

Wickramasinghe and Takano's (2009) study *Application of Combined SWOT and Analytic Hierarchy Process (AHP) for Tourism Revival Strategic Marketing Planning* used TOWS matrix to formulate alternative recovery strategies and identified the SWOT factors. They found that proactive communication strategy and isolation strategy with effective marketing promotional strategy are the best strategies for enhancing the tourism revival process.

Nekooee, Karami and Fakhari (2011) assessed prioritization of urban tourist attractions based on analytical hierarchy process in Iran. They examined various tourist attractions of Birjand in cultural-historical, man-made and natural dimensions through multi-criteria assessment method of analytical hierarchy process (AHP). They emphasized that the main tourist attractions at the international and national levels were cultural attractions such as local music, dance, and lifestyle along with Akbarieh Garden, Rahim Abad Garden, Lanai, Birjand Citadel, Archaeological and Anthropological museum, Forg Fort, Charderakht Jama Mosque. They also indicated that the key influential criteria in assessing and prioritizing tourist attractions in Birjand were economic, infrastructural and tourist products, respectively.

3. DECISION MAKING

Sometimes people with dominant roles in life have to solve a problem because of their missions. Problems may occur when there is a conflict between the intended situation and the actual situation and at that very moment the decision making process runs. Sometimes, if it is possible to make the situation and the decision closer to each other, there may be additional problem solving perspectives. It is the first step of decision making.

Everybody in management positions faces new conditions and is engaged in the problem-solving process to appraise new opportunities. If administrators are able to understand all this before the event occurs they can then make many decisions to solve the problem. Decision making means determining and choosing appropriate options in a short period of time. After any decision, new conditions will bring new needs and operations (Eren 2003).

Decision making is a selecting process for alternative action plans towards aims or targets (Kuruüzüm & Atsan 2001, p. 86). Proper and well-timed decision making will give maximum advantage and benefit to the decision maker.

The first step in decision making is to accept the existence of a problem and then to choose the best solution if there are several of them. Here, the alternatives are evaluated against certain criteria. Some qualifications within options are defined primarily. So three main factors, that is aim, criteria, and qualification, are evaluated together (Topcu 2000).

3.1. Multi Criteria Decision Making (MCDM)

Decision making includes uncertainty and risk, and decision-makers have varying levels of risk aversion. Decision making also includes qualitative and quantitative analyses and some decision makers prefer one form of analysis over the others. Decision making can be affected not only by rational judgment, but also by non-rational factors such as the personality of the decision maker, peer pressure, the organizational situation, and others (Hahn 2003, p. 445).

The aim of MCDM methods is to help decision-makers learn about the problems they face, learn about their own and other parties' personal value systems, learn about organizational values and objectives, and through exploring these in the context of the problem guide them in identifying a preferred course of action (Saydam 2006, p. 47).

MCDM can be applied in the all life segments at every level. For instance, it can be used in micro perspective, when we make personal investment, buy property or make expenditure plan for family. Furthermore, it can be used for commercial or non-commercial strategic decisions at the production and consumption balance of companies as a pre-analysis. In macro perspective, it can be applied in government's budget distribution for maximum economic goals or strategic steps of large international companies (Chen & Hwang 1992).

Triantaphyllou (1998) says "Some of the industrial engineering applications of MCDM contain the use of decision analysis in integrated manufacturing (Putrus, 1990), in the evaluation of technology investment decisions (Boucher & McStravic, 1991), in flexible manufacturing systems (Wabalickis, 1988), layout design (Cambron & Evans, 1991), and also in other engineering problems (Wang & Raz, 1991). As an illustrative application, consider the case in which one wishes to upgrade the computer system of a computer integrated manufacturing (CIM) facility."

Therefore, most commonly used MCDM methods are:

1 - Value-based methods (AHP, TOPSIS, SMARTS)

2 - Superiority methods (ELECTRE, PROMETHEE)

3 - Interactive methods (PRIAM, STEM)

4 - Other methods.

3.2. Fuzzy analytic hierarchic process (FAHP)

The analytic hierarchy process (AHP) is a systematic approach developed by Saaty (1980). It provides better solutions to complex problems and employs hierarchical structures through developing priorities for different alternatives determined by the decision makers (Brushan & Rai 2004, p. 15).

The fuzzy AHP technique is an advanced analytical decision making method developed from the AHP. In most cases, decision makers are unable to judge uncertain preferences. However, fuzzy AHP methods eliminate those difficulties using fuzzy comparisons ratios. In

FAHP, there are several techniques to detect priorities as mentıoned by Kabir and Hasin (2011). Chang's (1992) extended the Fuzzy AHP method and offered formulation of selection problem.

A variety of scales are used for Fuzzy AHP in applications (Göksu & Güngör 2008, p. 8). Triangular fuzzy number scales (TFN) are commonly used by various methods. The following scale in Table 3.1 is used in this study.

Table 3.1. Triangular Fuzzy Conversion Scale

Definition	Triangular fuzzy scale	Triangular reciprocal scale
Just equal	(1,1,1)	(1,1,1)
Equally important	(2/3, 1 , 3/2)	(2/3 , 1 , 3/2)
Weakly important	(3/2, 2 , 5/2)	(2/5, 1/2, 2/3)
Moderately important	(5/2, 3 , 7/2)	(2/7, 1/3, 2/5)
Strongly important	(7/2, 4 , 9/2)	(2/9, 1/4, 2/7)

(Source: Lee et al., 2013, p. 350)

3.2.1. Chang's Extent Analysis

In the traditional AHP method, each criteria is normalized and their weights identified. Chang (1992) proposed the extent analysis to apply the process depending on this hierarchy for each criteria, *gi*, so that *m extent* analysis values for each criteria can be obtained by using the following formula

$$M_{g_i}^1, M_{g_i}^2, M_{g_i}^3, ..., M_{g_i}^m \qquad (1)$$

Where g_i is the goal set $(i = 1,2,3,..,n)$ and all the $M_{g_i}^1 (j = 1,2,3,..,n)$ are Triangular Fuzzy Numbers *(TFNs)*.

The steps of Chang's analysis are:

Step 1:

$$s_i = \sum_{j=1}^{m} M_{g_i}^j \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j \right]^{-1} \qquad (2)$$

$$\sum_{j=1}^{m} M_{g_i}^j , \qquad (3)$$

Perform the "fuzzy addition operation" of *m* extent analysis values for a particular matrix and new *(l, m, u)* set is obtained as follows:

$$\sum_{j=i}^{m} M_{g_i}^j = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j \right) \qquad (4)$$

Where *l* is the lower limit, *m* is the most promising and *u* is the upper limit value.

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j \right]^{-1} \qquad (5)$$

And apply the "fuzzy addition operation" of $M_{g_i}^j (j = 1,2,3,..,m)$ as follows;

$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j = \left(\sum_{i=1}^{n} l_i, \sum_{i=1}^{n} m_{i,} \sum_{i=1}^{n} u_i \right) \qquad (6)$$

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j \right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i} \right) \qquad (7)$$

Step 2:

The degree of possibility of $M_2 = (l_2, m_2, u_2) \geq M = (l_1, m_1, u_1)$ is defined as:

$$V(M_2 \geq M_1) = \sup_{y \geq x} \left[\min (\mu_{M1}(x), \mu_{M_2}(y)) \right] \qquad (8)$$

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d)$$

$$= \begin{cases} 1, & m_2 \geq m_1 \ ise \\ 0, & l_1 \geq u_2 \quad ise \\ \dfrac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} & in \ others \end{cases} \qquad (9)$$

Both the values of $V(M_1 \geq M_2)$ and $V(M_2 \geq M_1)$ are needed to compare M_1 and M_2

3. Step: The degree possibility is given by

$$V(M \geq M_1, M_2, ..., M_k) = V[\ ((M_1 \geq M_2) ve (M \geq) and ... and (M \geq M_k)^- = \min_i V(M_1 \geq M_2),\ i = 1,2,3,.....,k \quad (10)$$

$$d'(A_1) = \min V(S_1 \geq S_k) \quad (11)$$

For k=1,2,…,n ; k≠i the weight vector is

$$W' = (d'(A_1), d'(A_2), ..., d'(A_n)^T \quad (12)$$

Where A_i *(i=1, 2,..,n)* are n elements.

4. Step

The normalized weight vectors are

$$W = (d(A_1), d(A_2), ..., d(A_n)^T \quad (13)$$

Where W is a non fuzzy number (Kahraman et al., 2004, p. 171).

3.3. TOPSIS METHOD

The TOPSIS (Technique for Order Performance by Similarity to Ideal Solution) was introduced by Hwang and Yoon (1981). They indicate that the best alternative solution is the one that is closest to the positive ideal solution (PIS) and farthest from the negative ideal solution (NIS). The positive ideal solution maximizes the benefit criteria and minimizes the cost criteria. Also, the negative ideal solution maximizes the cost criteria and minimizes the benefit criteria (Wang & Elhag, 2006, pp. 309-319).

There are plenty of studies in the literature which employ TOPSIS for MCDM problems. Shyur and Shih (2006) recommend the following steps for TOPSIS method;

Step 1: To establish the following decision matrix for the ranking.

$$D = \left[f_{ij} \right] = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_J \end{array} \begin{array}{c} \begin{array}{cccc} F_1 & F_2 & \dots & F_n \end{array} \\ \begin{pmatrix} f_{11} & f_{12} & \dots & f_{1n} \\ f_{21} & f_{22} & \dots & f_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ f_{J1} & f_{J2} & \dots & f_{Jn} \end{pmatrix} \end{array} \quad (14)$$

Step 2: To calculate the following normalized decision matrix R ([r_{ij}]).

$$r_{ij} = \frac{f_{ij}}{\sqrt{\sum_j^n = j_{ij}^2}} \qquad (j = 1,2,..,J; i = 1,2,...,n) \quad (15)$$

Step 3: To calculate the following weighted normalized decision matrix using its associated weights.

$$v_{ij} = w_i \times r_{ij}\ (j = 1,2,..,J; i = 1,2,..,n) \quad (16)$$

Where w_i indicates the weight of the i^{th} criteria.

Step 4: To determine the following positive and negative ideal solutions.

$$A^* = \{v_1^*, v_2^*, ..., v_i^*\} = \{(\max_j v_{ij} | i \in A^*), (\min_j v_{ij} | i \in A^-)\} \quad (17)$$

$$A^- = \{v_1^-, v_2^-, ..., v_i^-\} = \{(\max_j v_{ij} | i \in A^*), (\min_j v_{ij} | i \in A^-)\} \quad (18)$$

Where A^* indicates the benefit criteria, and A^- indicates the cost criteria.

Step 5: To calculate the following separation measures, from the positive ideal solution (D^*_j)

$$D_j^* = \sqrt{\sum_{i=1}^n (v_{ij} - v_i^*)^2}\ , (j=1,2,3,....,J) \quad (19)$$

From the negative ideal solution (D_j^-) :

$$D_j^- = \sqrt{\sum_{i=1}^n (v_{ij} - v_i^-)^2}\ , (j=1, 2, 3,....,J) \quad (20)$$

Step 6: To calculate the following relative closeness of the alternative, A_j can be expressed as

$$CC_j^* = \frac{D_j^-}{D_j^* + D_j^-}, (j = 1,2,3,..., J) \quad (21)$$

CC^*_j index value lies between 0 and 1. The larger the index value,the better the importance of the alternatives.

4. TOURISM OF BIH

BiH is a country that has experienced fast development about tourism in recent years. It is situated in the southeast of Europe and at the intersection of roads connecting Europe, the Middle East, and North Africa. BiH has a suitable climate and geographic features, natural beauty, and rich cultural and historical heritage (FİPA 2012).

Until the 1992 war in BiH, the country had many sports facilities, infrastructure and sports areas with developed transportation. Sarajevo, the capital of the country, successfully hosted the 14th Winter Olimpic Games in 1984. The war of 1992-1995 affected BiH tourism very negatively (Malcolm 2002).

According to the World Tourism Organization, BiH will have the third highest tourism growth rate in the period between 1995 and 2020. Depending on this thriving tourism, BiH needs domestic and foreign investments in the tourism sector (TKB 2010).

BiH is certainly attractive to new entrepreneurs, thanks to its intact nature, attractive rivers and lakes, available summer and winter seasons, and historical, religious, and cultural aspects. It is assumed to be one of favorite tourist destinations with these features. Moreover, BiH has many religious and ethnic sacred sites along with all kinds of sport, entertainment, and festival places. Time will show the adequacy of BiH for demands of tourism (Biggins & Crayne 2000).

After the 1992 war, official institutions accepted tourism as a basis for strategic growth, since the country already has winter tourism, eco tourism, spa tourism, religious and cultural tourism, and so on. From year to year, hotel and restaurant incomes are on the rise in gross national product (TKB 2010).

In this study, we selected six different tourist destinations to be evaluated by AHP and TOPSIS methods. The destinations selected are Sarajevo, country's capital , for its tourist facilities, Mostar for its famous Old Bridge, Travnik for its splendid fortress, house of Ivo Andrić, and Islamic madrasah, Jajce for its amazing waterfall, Srebrenica for being a place of Bosnian war genocide, and the Olympic mountains Bjelašnica, Igman and Jahorina for their winter tourism attractions.

Sarajevo

Sarajevo is the capital and largest city of BiH. The estimated population of Sarajevo is over 435,000. Nestled within the greater Sarajevo valley of Bosnia, it is surrounded by the Dinaric Alps and situated along the Miljacka River in the heart of southeastern Europe and the Balkans. The city is historically famous for its traditional cultural and religious diversity, with adherents of Islam, Orthodoxy, Catholicism and Judaism coexisting there for centuries. It was, until recently in the 20th century, the only major European city with a mosque, cathedral, church and synagogue within the same neighborhood.

Mostar

Mostar is 126 kilometers far from Sarajevo. It lies in the southeast of BiH. The population is approximately 128,000. Mostar is the fifth biggest city on the banks of the Neretva River in BiH. The Mostar Bridge goes by the name of the Old Bridge and is the symbol of Mostar (Benac et al., 1966).

Travnik

Travnik is 96 kilometers away from Sarajevo to the north-west, with the population of 75.000. It was once the capital of Bosniaduring the Ottoman period of reign.

There is a river that runs through the center of Travnik, which is 514 meters above sea level. The natural resource that stands out is the mountain Vlašić with a height of 1933 meters, and it is one of the highest mountains in BiH.

The Travnik climate is continental and it snows every year (Kresevljakovic 2007).

Jajce

Jajce is 164 kilometers away from Sarajevo with the population of 25,000. Jajce is located in central BiH, at the estuary of the river Pliva into the river Vrbas. It was established in the 14th century. Moreover, it had once become the capital of the Bosnian Kingdom. It looks like a castle city because of the surrounding walls. It was conquered in 1527 by the Ottoman state. When the city was conquered, it moved to the Komotin castle. It is accepted as the last city that the Ottomans conquered in BiH (Mottahedeh & Pinson 1996).

Srebrenica

Srebrenica is a border city and 164 kilometers away from Sarajevo. The population of the city is 36,000. The mining of the salt stands out as an economic value. It looks like a small mountain town. There is a thermal spa, the water of which is known to be useful for anemia, and skin disease.

The Potočari region was an important place during the Bosnian war. There were civil people who were under protection by Netherlands Peace Corps of the United Nations. A memorial place was built here for the victims of the 1995 genocide. Every year, on July 11th, the missing dead bodies that are found and identified after the genocide are buried in Potočari cemetery. Many tourists come to Srebrenica to see the memorial center and signs of the Srebrenica genocide every year. Most visited places are: the memorial center, Franciscan church, thermal spring spa, and White Mosque (Bijela džamija) (Malcolm 2002).

Bjelašnica, Igman and Jahorina Mountains

Bjelašnica and Igman mountains are 25 kilometers away from Sarajevo city center. Jahorina is 12 kilometers away from the city. Bjelašnica and Igman mountains of the Dinaric Alps are 1,502 and 2,067 meters high respectively. The mountains attract many tourists and winter sport lovers, due to its closeness to the city, which is only 20 minute-drive away.

Jahorina mountain of the Dinaric Alps is 1916 meters high. The region is appropriate for outdoor and winter sports. (Gomez 2005). Bjelašnica, Igman and Jahorina mountains hosted the 14th Winter Olympic Games in 1984. The games lasted 11 days and 49 countries with 1,272 players took part.

5. EMPIRICAL ANALYSIS

The method of Chang's extent analysis on fuzzy AHP is used to analyze the data regarding multi-criteria decision making problems.

To determine the most preferred tourist destinations in BiH, four travel agencies were interviewed. Travel agencies were selected according to their share in the sector. The focus group interviews were conducted for these travel agencies to investigate what criteria are important for their customers.

Three experts from each travel agency, a total of 12 people, have responded to the interview questions carefully.

Determination of comparisons and weights is made through the following steps:

- Evaluation of seven main criteria according to the main goal
- Evaluation of sub-criteria regarding the main criteria
- Evaluation of alternatives for all sub-criteria (Başlıgil, 2005)

The following criteria and alternatives are determined based on the similar studies in the literature and travel agencies' comments.

Main Criteria: Transportation, Natural Beauty, History, Culture, Belief, Doctrine, Entertainment, Spa, Cost.

Sub-Criteria: Lake, River, Mountain, Forest, the Roman Period, the Ottoman Period, the 20th century period, Islam, Catholicism, Orthodoxy, Judaism, Atheism, Hunting, Climbing, Skiing, Rafting, Paragliding, Quietness, View, Hygiene.

Alternatives: Sarajevo, Mostar, Travnik, Jajce, Srebrenica, Bjelašnica, Igman and Jahorina mountains.

The method of Chang's extent analysis on fuzzy AHP is used in the analysis. Fuzzy synthetic values are obtained by using the consistent fuzzy comparison matrix. Then, the overall goal is calculated with respect to the value of fuzzy synthetic extent. All calculations are made by Microsoft Excel. The priority weights are obtained from the results of criteria, sub-criteria, and alternatives by using Fuzzy AHP. The TOPSIS related computations have been conducted by using obtained weights.

According to table in APPENDIX 2, the criteria of Natural Beauty and History-Culture have the highest values with *0.18*. The criteria of Transportation and Entertainment follow them. The criteria of Belief-Doctrine and Spa have equal values. Cost criteria has the lowest value.

The comparisons of main criteria and sub-criteria are given as follows:

- The criteria of River-Lake and Mountain-Forest have equal values.
- The criteria of the Ottoman period has the highest value with *0.42*. The 20th century period has the second highest value. The Roman period has the lowest value.
- The criteria of Hygiene has the highest value with *0.36*. Quietness has the second highest value. View has the lowest value.
- The criteria of Islam has the highest value with *0.30*. Catholicism, Orthodoxy, Atheism follow respectively. Judaism has the lowest value.
- Skiing criteria has the highest value with *0.26*. Hunting and Climbing have equal values and Paragliding follows them. Rafting has the lowest value.

The Comparisons of sub-criteria and alternatives is given as follows:

- Sarajevo is the most important alternative with *0.22* considering river and lake criteria. Mostar, Jajce, and Travnik alternatives follow respectively. Srebrenica and Bjelašnica, Igman and Jahorina mountains are less important alternatives equally.

The comparison of the Roman period sub-criteria with alternatives:

- Sarajevo is the most important alternative with *0.29* considering the Roman period criteria. Mostar, Travnik, Jajce, and Srebrenica alternatives follow respectively. Bjelašnica, Igman and Jahorina mountains are less important alternatives.

The comparison of the Ottoman period sub-criteria with alternatives:

- Sarajevo is the most important alternative with *0.37* regarding the Ottoman period criteria. Mostar, Travnik, Jajce, and Srebrenica alternatives follow, respectively. Bjelašnica, Igman and Jahorina mountains are less important alternatives.

The degrees of importance obtained through computations are summarized in Table 5.1 and Table 5.2.

Table 5.1. TOPSIS Results

Alternative	Weight
Sarajevo	0.70
Mostar	0.41
Bjelašnica-Igman-Jahorina	0.39
Jajce	0.38
Travnik	0.37
Srebrenica	0.34

As Table 5.1 shows, Sarajevo is the most preferred tourist destination in BiH.

Table 5.2. Fuzzy AHP Results

Alternative	Weight
Sarajevo	0.32
Mostar	0.16
Travnik	0.15
Bjelašnica-Igman-Jahorina	0.14
Jajce	0.13
Srebrenica	0.10

According to the results presented in Table 5.1 and Table 5.2, Sarajevo and Mostar take the first two ranks and Srebrenica takes the last rank when compared by the Fuzzy AHP and TOPSIS analysis results.

6. RESULTS AND CONCLUSION

In economic terms, BiH is a developing country. The destroyed infrastructure during the war slows down its development.

In recent years, tourism has emerged as an opportunity to utilize the natural workpower potential of the country. The satisfaction of tourists will surely attract the new ones. Therefore, tourists' desires should strictly be considered in order to increase their satisfaction. The country encompasses plenty of historical, natural, and cultural assets, and its small size enables tourists to visit these comfortably.

To extract the criteria and find their relative effect, FAHP and TOPSIS methods are applied to the data obtained from travel agencies. As expected, Sarajevo has the highest score with *0.32* and Srebrenica has the lowest with *0.10* in FAHP results, whereas the scores of the centers are *0.70* and *0.34* respectively in TOPSIS results. This situation clearly shows that both methods have calculated the scores in accordance.

The advantages of the combined FAHP and TOPSIS are that FAHP can collect the qualitative and quantitative data effectively and analyze the vague values with fuzzy logic and gives the rank of the alternatives, while the TOPSIS method gives the rank by comparing each alternative to the ideal solution. In other words, the difference of TOPSIS is to provide a relative score to each alternative with respect to the ideal solution. An alternative can have the first rank but may not have a satisfactory TOPSIS score.

The key findings of this study can be summarized as follows.

- Firstly, all tourist destinations have different alternatives and tourists have different demands. Matching the demands and alternatives will increase the circulation. Therefore, what tourists want and what the alternatives are should be analyzed in detail.
- Secondly, these results indicate that the government and travel agencies should know the strategic importance of internal and external factors for future tourist marketing and planning in BiH.
- Thirdly, instead of traditional methods that analyze the factors affecting tourism, scientific methods like FAHP, TOPSIS, Delphi, ANP, DEA, ANN etc. should be used.
- Fourthly, natural beauty and historical and cultural criteria are the most significant factors for attracting tourists.

The major limitation of this study is that the samples were collected for only six tourist destinations in BiH. Thus, the results cannot be generalized to other tourist destinations.

Therefore, the indicators from the limited area and the experts will be applicable to this case

study area or other tourist destinations which have similar environments with selected destinations. Future studies should be conducted with different tourist destinations to generalize or compare the findings of this study. Finally, all alternatives and all criteria could not be analyzed in this study. In further studies, other alternatives and criteria can be added.

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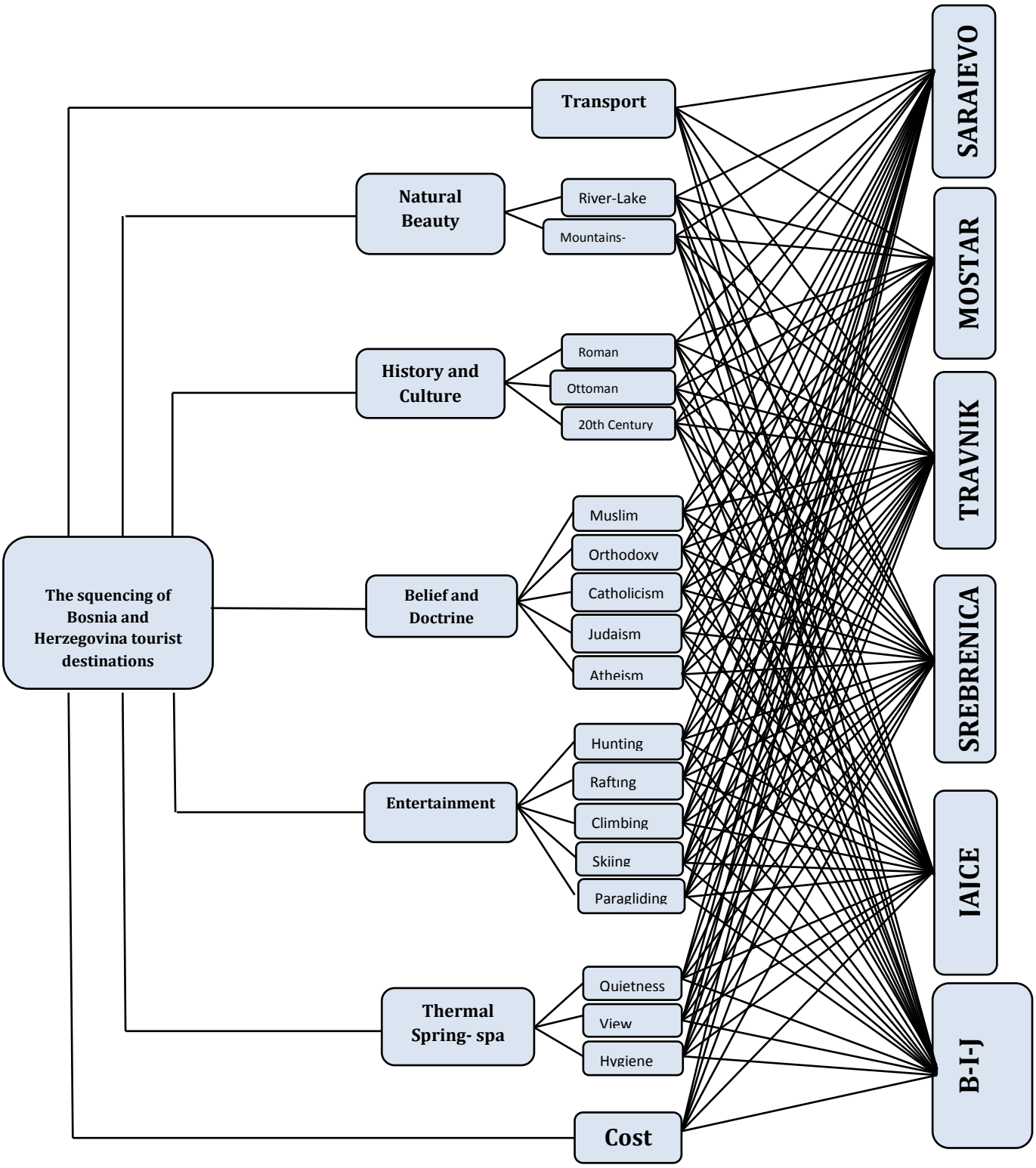
APPENDIX 1: Analytic Hierarchy Process (AHP) Tree

The Aim ↓ Criteria ↓ Sub-Criteria ↓ Alternatives ↓



APPENDIX 2: Fuzzy AHP Priority Weights

Main Criterion ▲	Transportation	Natural Beauty		History-Culture			Belief-Doctrine						Entertainment						Thermal Spring SPA			Cost
Weight	0.15	0.18		0.18			0.13						0.14						0.13			0.09
◄ Alternatives	Sub-Criterion ▲	Lake&River	Mountain&Forest	Rome Period	Ottoman Period	20thCentury Period	Islamism	Catholicism	Orthodoxy	Judaism	Atheism	Hunting	Rafting	Climbing	Skiing	Paragliding	Quietness	View	Hygiene			
Weight		0.5	0.5	0.34	0.42	0.24	0.3	0.21	0.18	0.15	0.16	0.2	0.16	0.21	0.26	0.17	0.33	0.31	0.36			
Sarajevo	0.55	0.22	0.19	0.29	0.37	0.35	0.3	0.24	0.3	0.28	0.29	0.17	0.18	0.16	0.2	0.15	0.26	0.27	0.28	0.46		
Mostar	0.04	0.19	0.13	0.23	0.25	0.21	0.2	0.29	0.24	0.24	0.25	0.15	0.29	0.1	0.13	0.2	0.16	0.16	0.14	0.08		
Travnik	0.06	0.16	0.18	0.19	0.17	0.18	0.18	0.16	0.18	0.17	0.15	0.21	0.22	0.17	0.15	0.08	0.18	0.13	0.11	0.11		
Jajce	0.03	0.17	0.16	0.16	0.11	0.15	0.16	0.14	0.15	0.15	0.14	0.12	0.14	0.15	0.14	0.18	0.3	0.23	0.26	0.06		
Srebrenica	0.03	0.13	0.14	0.13	0.1	0.11	0.13	0.11	0.1	0.13	0.13	0.14	0.12	0.14	0.1	0.14	0.1	0.1	0.12	0.06		
B-I-J	0.27	0.13	0.2	0	0	0	0.03	0.06	0.03	0.03	0.04	0.21	0.05	0.28	0.28	0.25	0	0.11	0.09	0.23		