International Journal of Business and Society, Vol. 13 No. 3, 2012, 375 - 390

THE EVALUATION OF FIVE-STAR HOTEL: A CASE IN IRAN

I-Shuo Chen♣
Trinity College Dublin

Sarfaraz Hashemkhani Zolfani
Amirkabir University of Technology

Nahid Rezaeiniya
Alghadir Institute of Higher Education

Mohammad Hasan Aghdaie
Shomal University

ABSTRACT

Tourism industry is one of the major factors in the economy of many countries. Iran with historical culture and natural attraction has a good standing in tourism industry. Selecting the most appropriate hotel is a concern for travelers which requires assessment and analysis of several factors. Travelers who seek economical vacation opt for low quality hotels and do not care much about facilities, in the other words hotels with fewer stars. On the hand, the rich look for five-star hotels for whom luxury and facility is a top priority. In this regard, the main aim of this study is to evaluate the performance and to select the optimal five-star hotels in Iran. The results of this case study will benefit both tourism industry and international travelers alike. To do so, an integrated MCDM model based on analytic network process (ANP) and technique for order preference by similarity to ideal solution (TOPSIS) is utilized. We initially extracted critical evaluation indices (e.g. Hotel Facilities, Price, Room and Front desk, Service Quality, Security and Location) and further developed the evaluation structure for hotel industry in accordance with findings of current studies. Four five-star hotels are employed in this study: Esteghlal, Laleh, Homa, Espinas. The ANP is applied to find the weights among the proposed indices and to discover the interdependent relationships among indices. Besides, the TOPSIS is applied to rank four famous five star hotels in Tehran based on the result of ANP. As the results demonstrate, location is the most important index for customers and after that security, price, room and frontdesk, service quality and hotel facilities come respectively. According to there indices the ranking was as follow Esteghlal was first, Espinas came second followed by Homa and Laleh. Findings of this study can also be used for future research on performance evaluation of the hotels in general and can be a guideline for travelers to select the best hotel appropriate to their needs. The results can benefit managers of certain hotels to obtain an intellectual framework and to identify potential travelers.

Keywords: Five-star hotels; Analysis network process (ANP); Technique for Order Preference by Similarity to Ideal Solution (TOPSIS); Multiple criteria decision making (MCDM)

♣ Corresponding author: I-Suo Chen. School of Business, Trinity College Dublin. Room 3.06, School of Business, Aras an Phiarsaigh, Trinity College Dublin, College Green, Dublin 2, Ireland. +353-1-871183597. ch655244@yahoo.com.tw

1. INTRODUCTION

The service industry is the fastest growing industry in the 21st century (Fatma & Timothy, (2005), and tourism is viewed as having excellent prospects, along with high-tech industries. Tourism is a major industry in many countries and an important factor in global economic development (Hung, et al., 2010).

Tourism is one of the most locative business 21st century and it should be pointed out the hotel industry, another words "Hotel Section" plays an important role in this regard. Hotels hold the key role to success and development of Tourism and result in economic growth of a region as a tourist resort (Mahdavinia, 2007). Since this section directly deals with tourists and travelers, hotels play a big role in the tourist satisfaction (Mahdavinia, 2007). On the other hand, there is a boom in construction of luxurious hotels; however, it is absolutely difficult to meet infinitive variety of hotel guest's expectations. To gain a comparative advantage over the rival hotels, hotel managers have to provide their customers with the service quality and meet their expectations (Mahdavinia, 2007). However, during recent years, there is a decrease number in tourist arrival in Iran.

Since the improvement for tourism industry gradually highlighted by the Iran government in 1988 with the beginning of a well political relationship with tourist generating countries, Iran faced an outstanding growth in this industry (Ministry of Islamic guidance, 2006). In 2005 the number of tourists visiting Iran reached up to 1.3 of a million and as predictions showed by the end of the year 2009 we will see an increase in this number by the rate of 24%. So the expectant number will be 4000/000. This fast grown rate in recent years has had strengthening effect on the place of Iran in the word of tourism (Ministry of Islamic guidance, 2008). During 2000 there has not been an appropriate growth in the number of hotels comparing to the growth of arrival tourists. In 2007 the number of rooms summed up to 17147, this number increased to 25th thou sand in the year 2008. In other words in average there was a %7 increase in the number per year. New rooms, generally, belonged to 3 and 4 stars hotels. During these years there was not even a single 5 stars hotel built and According the increase of travelers important thing in mean time is developing the five-star hotels in Iran (Ministry of Islamic guidance, 2008). Since tourism is an important and extremely competitive sector for many countries including Iran and it is the most neglected research area, this evaluation was conducted on Iranian five-star hotels. Iran has many potential attractions and places for global visitors but many factors such as international policies, religious belief etc can negatively impact this industry. Because for almost all travelers a well-equipped accommodation is a basic need, the five-star hotels were studied in this survey. In addition, since visitors would consider many factors for selecting hotels and managers of Iranian hotels enquire to obtain an intellectual framework and to identify potential travelers, it is necessary to explore critical indices that would significantly impact the preference of visitors.

In this regard, four top five-star hotels in Tehran are selected for evaluation. After identifying the criteria for evaluation ANP is used to find weight of criteria that can help to considering relation between them and finally TOPSIS is used for selecting the best hotel. This study start with literature review in section one. In section two we describe methodology of research and in section three we have the calculation of proposed model and finally discussion and conclusion are presented.

2. LITERATURE REVIEW

Hotel industry is an appropriate part of service industry. Hotels are so important for travelers in the entire world. Selecting a hotel sometimes is complicated for travelers because they have to consider many factors in their mind and it can cause problem for them. In meantime managers of hotel must be know their potential of their hotels and identify potential travelers. From a managerial viewpoint, the hotel's performance is the aggregated efforts of different departments, involving both the front of the house and the back of the house (Renner, 1994; Soriano, 1999; Stutts, 2001). The performance of a hotel is determined by the aggregated efforts of the main activities and support activities under a hierarchy structure (Hsieh & Lin, (2010). Over the years numerous research projects have been undertaken to measure the factors that influence the selection of accommodation by guests. Hotel management has become brand managers dedicated to the maintenance of the hotel brand. One implication of this has sometimes been to minimize the discretion of hotel managers to identify the specific demands of customers and develop strategies to meet them (Grieveson Grant, 1986).

Ian Buick (1998) discussed on operational aspects of providing room service to hotel guests in Edinburgh's principal hotels and the results shown that to attract a four or five-crown classification hotels must provide room service of drinks and snacks between 7.00 a.m. and 11.00 p.m.. The majority of hotels in the survey (94.4%) go far beyond this by providing room service on a 24 h basis. The majority of hotels (72.2%) did not operate room service as a separate department and most guests contact room service via reception (60%). Ngai and Wat (2003) Design and development of a fuzzy expert system for hotel selection. Wilkins et all (2007), discussed on Towards an understanding of total service quality in hotels that their research addresses this in the context of the luxury and first class hotel sectors and the paper provides understanding of how consumers package aspects of the service experience together in defined bundles to provide a coherent mix of service attributes. Callan (1996) identified 166 hotel attributes under the headings of: (1) Location, (2) Image, (3) Price/value, (4) Competence, (5) Access, (6) Security, (7) Additional services, (8) Tangibles-bedroom, (9) Tangibles-other, (10) Leisure facilities and (11) Service provider.

Hsieh and Lin (2010) working on a performance evaluation model for international tourist hotels in Taiwan that they applied DEA for evaluating that at first The different production processes within the hotel are evaluated, as well as the relationships between efficiency, effectiveness, and overall performance. Finally, based on the results, they recommend ways of enhancing the overall performance of the hotel industry in Taiwan. Urtasun and Gutierrez (2006) presented a research about Hotel location in tourism cities. To determine how the positioning of new hotels is affected by the distribution of similar incumbent competitors, this paper investigates geographic location, price, size, and services. With data on all 240 hotels operating in the city of Madrid between 1936 and 1998, a model of geographic and product location at the time of the hotels' founding's estimated based on the above mentioned variables. Although previous studies attempted to measure hotel assessment, few studies address efficiency and effectiveness.

Although the importance of service quality in hotels has been recognized (Callan and Bowman, 2000; Callan and Kyndt, 2001; Danaher and Mattsson, 1994; Min, et al., 2002) there has been limited research that has addressed the structure and antecedents of the concept. Wang et al (2006a, b) incorporated service quality criteria into the CCR model in an attempt to understand the relationship between service quality and hotel efficiency. The room pricing decision is one of most important aspects of hotel marketing strategies, since hotel price is one of the main influences on accommodation selection decisions (Lockyer, 2005). Room prices influence consumer perceptions of service quality (Lewis & Shoemaker, 1997; Oh, 2003; Mattila & O'Neill, 2003) and consumer satisfaction (Voss et al., 1998). Collins and Parsa (2006) also identify numerous influences on pricing decisions, including star rating, management type, location, size and amenities. Oh (2003) investigates the influence of price fairness on overall price, quality and valued judgments. Yuksel, et al. (2003) discussed the lodging service quality on the island of Crete using the modified SERVQUAL. The result of the study suggested to British authorities that consumers place more value on the intangible service qualities than the tangible. Moreover, the factor most valued by the consumers when choosing hotel lodging is the location of the hotel, followed by the hotel facilities, service quality, consumption prices, hotel reputation, exterior appearance and hotel security. Raymond & Chu (2000) discussed on importance-performance analysis of hotel selection factors in the Hong Kong hotel industry and introduce six factors for hotel selection consist of: service quality, business facilities, value, room and front desk, food and recreation and security.

3. FUNDAMENTALS OF ANP AND TOPSIS METHOD

3.1. The ANP method

The ANP, also introduced by Saaty, is a generalization of the AHP (Saaty 1996). Whereas AHP represents a framework with a unit-directional hierarchical AHP relationship, ANP allows for complex interrelationships among decision levels and attributes. Saaty (1996) suggested the use of AHP to solve the problem of independence on alternatives or criteria, and the use of ANP to solve the problem of dependence among alternatives or criteria. The basic assumptions of AHP are that it can be used in functional independence of an upper part or cluster of the hierarchy from all its lower parts and the criteria or items in each level (Meade and Sarkis 1999). Many decision-making problems cannot be structured hierarchically because they involve the interaction and dependence of higher level elements on lower level elements (Saaty and Takizawa 1986; Saaty 1996). Structuring a problem involving functional dependence allows for feedback among clusters. This is a network system. The major difference between AHP and ANP is that ANP is capable of handling interrelationships between the decision levels and attributes by obtaining the composite weights through the development of a super matrix (Shyur 2006). The super matrix is actually a partitioned matrix, where each matrix segment represents a relationship between two components or clusters in a system (Saaty 1996).

The process of ANP involves three sub steps and shown as follows (Shyur 2006):

Step 1: Without assuming the interdependence among criteria, the decision makers are asked to evaluate all proposed criteria pair wise. They responded questions such as: "which criteria should be emphasized more in personnel, and how much more?" The responses were presented numerically and scaled on the basis of Saaty's 1–9 scale. Each pair of criteria is judged only once. A reciprocal value will be automatically assigned to the reverse comparison. Once the pair wise comparisons are completed, the local weight vector W1 is computed as the unique solution to

$$AW_1 = \lambda_{MAX} W_1 \quad (1)$$

Where λ_{max} is the largest eigenvalue of pair wise comparison matrix A. The obtained vector is further normalized by dividing each value by its column total to represent the normalized local weight vector W_2.

Step 2: Next to resolve the effects of the interdependence that exists between the evaluation criteria. The decision makers examine the impact of all the criteria on each other by using pair wise comparisons as well.

Questions such as: "which criterion will influence criterion 1more: criterion 2 or criterion 3? and how much more?" are answered. Various pair wise comparison matrices are formed for each of the criterion.

These pair wise comparison matrices are needed to identify the relative impacts of criteria interdependent relationships. The normalized principal eigenvectors for these matrices are calculated and shown as column component in interdependence weight matrix of criteria B, where zeros are assigned to the eigenvector weights of the criteria from which a given criterion is given.

Step 3: Now we can obtain the interdependence weights of the criteria by synthesizing the results from previous two steps as follows:

$$W_C = BW_2^T \,. \quad (2)$$

There are many studies in the literature using ANP to solve decision making problems (Da˘gdeviren 2008). Meade and Sarkis (1998, 1999) used ANP in two of their studies. In the first study, alternative projects for agile manufacturing are evaluated via ANP and logistics and supply chain management analysis is performed in the second. Also in two separate studies performed by Lee and Kim (2000, 2001), ANP is used in the interdependent information system project selection process. Besides, Karsak et al. (2002) and Partovi and Corredoira (2002) used ANP in quality function deployment process, while Meade and Presley (2002) used ANP to evaluate alternative research development projects. ANP is used by Yüksel and Da˘gdeviren (2007) for SWOT analysis and by Da˘gdeviren et al. (2008) to determine faulty behavior risks in work systems.

3.2. The TOPSIS Method

The TOPSIS was first developed by Hwang and Yoon (1981). According to this technique, the best alternative would be the one that is nearest to the positive ideal solution and farthest from the negative ideal solution (Ertugrul and Karakasoglu 2009). The positive ideal solution is a solution that maximizes the benefit criteria and minimizes the cost criteria, whereas the negative ideal solution maximizes the cost criteria and minimizes the benefit criteria (Wang & Elhag 2006). In short, the positive ideal solution is composed of all best values attainable of criteria, whereas the negative ideal solution consists of all worst values attainable of criteria (Wang 2007). The TOPSIS method consists of the following steps (Shyur and Shih 2006):

Step 1: Establish a decision matrix for the ranking. The structure of the matrix can be expressed as follows:

$$D = \begin{matrix} & F_1 & F_2 & F_j & F_n \\ A_1 & f_{11} & f_{12...} & f_{1j...} & f_{1n} \\ A_2 & f_{12} & f_{22...} & f_{2j...} & f_{2n} \\ \vdots & \vdots & \vdots \cdots & \vdots \cdots & \vdots \cdots \\ A_i & f_{i1} & f_{i2...} & f_{ij...} & f_{in} \\ \vdots & \vdots & \vdots \cdots & \vdots \cdots & \vdots \cdots \\ A_m & f_{m1} & f_{m2...} & f_{mj...} & f_{mn} \end{matrix} \quad (3)$$

where A_i denotes the alternatives i, i = 1, 2, . . ., m; F_i represents jth attribute or criterion, j = 1, 2, . . . , n, related to ith alternative; and f_{ij} is a crisp value indicating the performance rating of each alternative A_i with respect to each criterion F_j .

Step 2: Calculate the normalized decision matrix **R** (= [r_{ij}]). The normalized value r_{ij} is calculated as:

$$r_{ij} = \frac{f_{ij} =}{\sqrt{\sum_{j=1}^{n} f_{ij}^2}} \qquad \text{j - 1,2,} \quad ..., n\ ; i = 1,2, ..., m. \quad (4)$$

Step 3: Calculate the weighted normalized decision matrix by multiplying the normalized decision matrix by its associated weights. The weighted normalized value v_{ij} is calculated as:

$$v_{ij} = w_j \text{x} \quad r_{ij}, \quad \text{j} = 1,2, \quad ..., n; i = 1,2, ..., m. \quad (5)$$

where W_j represents the weights of the jth attribute or criterion.

Step 4: Determine the positive-ideal and negative-ideal solutions.

$$V^+ = \{v_1^+, v_2^+, ..., v_n^+\} = \{(max_i\ v_{ij} \mid j \in J),\ (min_i\ v_{ij} \mid j \in J')\}, \quad (6)$$
$$V^- = \{v_1^-, v_2^-, ..., v_n^-\} = \{(max_i\ v_{ij} \mid j \in J),\ (min_i\ v_{ij} \mid j \in J')\}$$

where J is associated with the benefit criteria, and J' is associated with the cost criteria.

Step 5: The separation of each alternative from the positive-ideal solution (D_i^+) is given as

$$D_i^+ = \sqrt{\Sigma_{j=1}^{n} (v_{ij} - v_i^+)^2} , \ i = 1,2, ..., m. \tag{7}$$

Similarly, the separation of each alternative from the negative-ideal solution (D_i^-) is as follows:

$$D_i^+ = \sqrt{\Sigma_{j=1}^{n} (v_{ij} - v_i^-)^2} , \ i = 1,2, ..., m. \tag{8}$$

Step 6: Calculate the relative closeness to the idea solution and rank the performance order. The relative closeness of the alternative A_i with respect to V$^+$ can be expressed as

$$C_i = \frac{D_i^-}{D_i^- + D_i^+} , \ i = 1,2, ..., m. \tag{9}$$

where the C_i index value lies between 0 and 1. The larger the index value means the better the performance of the alternatives.

In the aggregation process, a set of alternative candidate is to be compared with respect to predefined criteria (Shyur 2006): The performance rating of each candidate for each criterion is assigned and formed as a decision matrix. In addition, the normalization formula as shown in Eq. 4 is used to transform the various scales into a comparable scale. The normalized decision matrix is weighted by multiplying each column of the matrix by its associated criteria weight in the above process. Then the overall performance of an alternative candidate is then determined by its Euclidean distance to V^+ and V^- (Shyur 2006). However, Shipley et al. (1991) points out that this distance is interrelated with the criteria weights and should be incorporated in the distance measurement (Shyur 2006). This is because all alternatives are compared with V^+ and V^-, rather than directly among themselves. Deng et al. (2000) presents the weighted Euclidean distances to instead of creating a weighted decision matrix. In this process, Shyur (2006) defined the positive ideal solution (V^+) and the negative-ideal solution (V^-), which are not depended on the weighted decision matrix, as

$$\begin{aligned} R^+ &= \{r_1^+, r_2^+, ..., r_n^+\} = \{(max_i \ r_{ij} | j \in J), \ (min_i \ r_{ij} | j \in J')\}, \\ R^- &= \{r_1^-, r_2^-, ..., r_n^-\} = \{(max_i \ r_{ij} | j \in J), \ (min_i \ r_{ij} | j \in J')\} \end{aligned} \tag{10}$$

The weighted Euclidean distances, between A_i and R^+, and A_i and R^-, are calculated, respectively, as

$$D_i^+ = \sqrt{\Sigma_{j=1}^{n} w_j (r_{ij} - r_j^+)^2} , \quad D_i^- = \sqrt{\Sigma_{j=1}^{n} w_j (r_{ij} - r_j^-)^2} , \ i = 1,2, ..., m. \tag{11}$$

where the value of w_j (j = 1 to n) is the element of vector w_c which is calculated by Eq. 2.

Then closeness coefficient can obtained for each alternative based on Eq. 9. Finally, a set of alternative candidate can be preference ranked according to the descending order of closeness coefficient.

There are some studies in the literature which consider the TOPSIS. Deng et al. (2000) used the TOPSIS method in the comparison inter-company with objective weights. Shyur (2006) developed a decision making model for COTS evaluation with TOPSIS. In addition to these studies Shyur and Shih (2006), for strategic vendor selection; Tsou (2008), Multi objective inventory planning; Onüt and Soner (2008) in the transshipment site selection.

4. PROPOSED MODEL

The hybrid model composed of ANP and modified TOPSIS methods, for the hotel selection problem consists of four basic stages: (1) Identification of necessary criteria for hotel selection, (2) Recognition of the dependence among criteria and calculate the weights of criteria, (3) Evaluation of candidates, (4) Determine the final rank. The first step is to identify the necessary criteria then, the degree of interdependent relationship between different criteria is determined by the expert team, and the interdependence will affect the final weights of criteria. After constructing the relationship of a criteria network structure, the criteria weights can be calculated by applying ANP. For, to avoid an unreasonably large number of pairwise comparisons, the modified TOPSIS approach employed to achieve the final ranking results.

4.1. A numerical application

The proposed hybrid model was applied to four five-star selected hotel in Tehran, Iran. Selection of the most appropriate hotel is a concern for travelers which requires assessment and analysis of several factors. The proposed hybrid model was applied to this problem and the computational procedure is summarized as follow:

4.1.1. Identification of necessary criteria for hotel selection

To determine the criteria, we used literature review and selected six criteria: the hotel facilities (Hsieh, et al 2008, Ngai & Wat 2003) (C_1), price (Hsieh et al 2008; Ngai & Wat 2003; Lockyer 2005) (C_2), room and front desk (Raymond K.S. Chu, Tat Choi 2000) (C_3) , service quality (Hsieh et al 2008 , Raymond K.S. Chu, Tat Choi 2000) (C_4) , security (Hsieh et al 2008, Raymond & Chu 2000) (C_5), Location (Callan 1996) (C_6). The next step was selecting hotels (Esteghlal hotel (A1), Laleh hotel (A3), Homa hotel (A3), Espinas hotel (A4) that are five-star hotels in Tehran, were evaluated using the hybrid selection model.

4.1.2. Calculate the weights of criteria

First, criteria weights were determined by avoiding the interdependence among criteria (Da˘gdeviren 2008). To this end, a pairwise comparison matrix was formed and pairwise comparisons were defined by a group of travelers, on the basis of Saaty's 1–9 scale. The resulting pairwise matrix is presented in Table 1, together with pairwise comparison values and calculated weights. The degree of consistency of the pairwise comparison matrix is measured with the use of the consistency ratio (CR) index. It is considered logically consistent if the CR is less than or equal to 0.1. The CR value for this pairwise comparison matrix is 0.089, which is acceptable.

At the end of pairwise comparisons, criteria weights were calculated, these values constituted the normalized local weight vector, explained in section "Fundamentals of ANP and TOPSIS method".

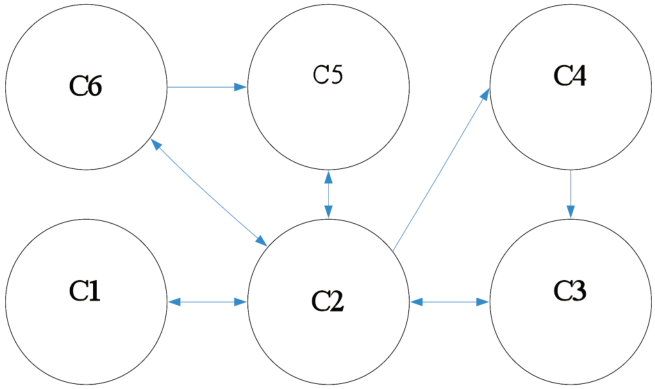
Table 1: The pair wise comparison matrix for criteria

	C1	C2	C3	C4	C5	C6	Weights
C1	1	1/5	1/2	3	1/5	1/5	0.062
C2	5	1	2	9	1/3	1	0.216
C3	2	1/2	1	4	1/3	1/2	0.112
C4	1/3	1/9	1/4	1	1/5	1/5	0.036
C5	5	5	3	5	1	4	0.388
C6	5	1	2	5	1/4	1	0.185

Therefore: $w_2^T = (C_1, C_2, C_3, C_4, C_5, C_6)^T = (0.062, 0.216, 0.112, 0.036, 0.388, 0.185)^T$

Next, in order to determine the interdependence between the criteria and for identify the exact relationship in a network structure of ANP, we made a group of expert and defined the dependence among criteria in a brain storming session. Dependence among criteria is presented in Fig.1.

Figure 1: Dependence among criteria



The normalized eigenvectors matrix of this structure is presented in Table 2. a value of "zero" in Table 2 indicates that there is no dependence between two criteria and the numerical values show the relative impact between two criteria

Table 2: Degree of relative impact for criteria

	C_1	C_2	C_3	C_4	C_5	C_6
C_1	0.400	0.077	0	0	0	0
C_2	0.600	0.154	0.250	0.250	0.250	0.167
C_3	0	0.231	0.500	0	0	0
C_4	0	0	0.250	0.750	0	0
C_5	0	0.231	0	0	0.500	0
C_6	0	0.308	0	0	0.250	0.833

Relative importance of the criteria on the basis of interdependence can be calculated by using the data given in Tables 1 and 2 as follows:

$$w_c = \begin{bmatrix} C_1 \\ C_2 \\ C_3 \\ C_4 \\ C_5 \\ C_6 \end{bmatrix} = \begin{bmatrix} 0.400 & 0.077 & 0 & 0 & 0 & 0 \\ 0.600 & 0.154 & 0.250 & 0.250 & 0.250 & 0.167 \\ 0 & 0.231 & 0.500 & 0 & 0 & 0 \\ 0 & 0 & 0.250 & 0.750 & 0 & 0 \\ 0 & 0.231 & 0 & 0 & 0.500 & 0 \\ 0 & 0.308 & 0 & 0 & 0.250 & 0.833 \end{bmatrix} \times \begin{bmatrix} 0.062 \\ 0.216 \\ 0.112 \\ 0.036 \\ 0.388 \\ 0.185 \end{bmatrix} = \begin{bmatrix} 0.041 \\ 0.236 \\ 0.106 \\ 0.055 \\ 0.244 \\ 0.318 \end{bmatrix}$$

According to the calculation made, C_6, C_5, and C_2, were three of the most important considering criteria.

4.1.3. Evaluation of candidates

At this stage of the application, the group of travelers, evaluated each candidate according to each criterion and developed a decision matrix. Evaluation showed that all the criteria except of C_2 are "benefit criteria". The group of travelers used crisp numbers from 1 to 10 so as to evaluate the candidates on the basis of these criteria. After the decision matrix was developed, this matrix was normalized with Eq. 4. Normalized decision matrix is presented in Table 3.

Table 3: Normalized decision matrix for candidates

	C_1	C_2	C_3	C_4	C_5	C_6
A_1	0.645	0.591	0.557	0.577	0.560	0.593
A_2	0.322	0.403	0.348	0.449	0.498	0.462
A_3	0.403	0.473	0.418	0.449	0.436	0.528
A_4	0.564	0.515	0.627	0.513	0.498	0.396

4.1.4. Determine the final rank

At the final ranking stage, positive and negative ideal solutions were calculated by using the data in Table 3. Positive ideal and negative ideal solutions were calculated by Eq. 10 as follows:

$$R^{+} = (0.645, 0.403, 0.627, 0.577, 0.560, 0.593)$$

$$R^{-} = (0.322, 0.591, 0.348, 0.449, 0.436, 0.396)$$

In the following stage, the weighted Euclidean distances, between A_t and R^+, and between A_t and R^- are calculated by Eq. 11. In this calculation, criteria weights obtained by using ANP (w_c) were used. Related results are shown in Table 4.

Table 4: Separation distances for candidates

	D(+)	D(-)
A_1	0.094	0.161
A_2	0.141	0.103
A_3	0.119	0.098
A_4	0.130	0.115

Using Eq. 9 the relative closeness to the idea solution of each candidate is then calculated. Calculated values are listed in Table 5.

Table 5: Final rank of the candidates

Rank	Alternative	Closeness coefficient
1		0.632
2		0.469
3		0.450
4		0.422

According to the closeness coefficient, the ranking order of the four hotels is A_1, A_4, A_3, and A_2. Hybrid approach results indicate that A_1 is the best candidate with closeness coefficient value of 0.632.

5. DISCUSSION

So far, there has not been any research on five-star hotels evaluation that is useful for top managers, economic policy formulators and travelers. In other words, this is an unprecedented research utilizing MCDM to evaluate the performance of five-star hotels in Iran. The result of this research stresses the importance of location over security and price. However location and price should be balanced out reasonably. Moreover security must not be neglected either since it ensures having fun and being relaxed. Furthermore, respect from hotel staff and frontdesk also plays a key role followed by quality and hotel facilities. The result of the survey can benefit Five-star hotels to improve facilities according to their customers' needs. Finally travelers can also use this research for selecting the best hotels according to their needs in a respective city.

6. CONCLUSION

Hotel assessment has become one of the most important challenges for Iranian hotels to develop new strategies and planning which could help to improve their performance within their limited resources and could help to identify potential customers. Nevertheless, few applicable models have been addressed that concentrates on the hotel evaluation and selection.

This paper identified six major indices from customer perspectives to select a hotel including: the hotel facilities, price, room and front desk, service quality, security and Location. In this study, we proposed an effective model for the hotel selection problem using both ANP and modified TOPSIS methods. The ANP method was used to obtain dependence weights of the criteria and the modified TOPSIS method was adopted to rank the cases. The ANP results revealed that location is the most important factor followed by security, price, room and front desk, service quality and hotel facilities for the potential customers. Due to results of ANP, investigators that interest in tourism industry should be attended to select hotel location in Iran. Iranian hotels managers should consider criteria of this research and prioritizing of them that calculated in this research. Results of ANP section can be useful for managers to make decision according to a scientific framework.

Furthermore the TOPSIS ranked the hotels as follow: Esteghlal hotel, Espinas hotel, Homa hotel and Laleh hotel. Results can help customers to select the best hotel which really meets their needs and it can help hotel managers to identify their potential customers in order to attract them. This application has indicated that the model can be efficiently used in ranking cases. Besides, proposed model has significantly increased the efficiency of decision-making process in hotel selection. The advantage of modified TOPSIS over ANP is eliminating many procedures and enabling to come to a conclusion in a shorter time. This research can be useful as a general framework for another countries and societies.

Although the application of the proposed model in this study is specific to hotels, it can also be used with slight modifications in decision-making process. To increase the efficiency of the proposed model, software such as MS Excel can be used. In such cases, fuzzy numbers can be used to obtain the evaluation matrix and the proposed model can be generalized by using fuzzy numbers.

REFERENCES

Buick, I (1998), A Preliminary study of the operational aspects of providing room service to hotel guests in Edinburgh's principal hotels. *Hospitality Management, 17*(1), 49 – 64.

Callan, R. J. (1996). An appraisement of UK business travelers' perceptions of important hotel attributes. *Hospitality Research Journal, 19*(4), 113–127.

Callan, R. J., & Bowman, L. (2000). Selecting a hotel and determining salient quality attributes: a preliminary study of mature British travelers. *International Journal of Tourism Research, 2*(2), 97–118.

Callan, R. J., & Kyndt, G. (2001). Business travelers' perception of service quality: a prefatory study of two European city centre hotels. *International Journal of Tourism Research, 3*(4), 313–323.

Collins, M., Parsa, H. G. (2006). Pricing strategies to maximize revenues in the lodging industry. *International Journal of Hospitality Management, 25*(1), 91–107.

Da˘gdeviren, M. (2008) A hybrid multi-criteria decision-making model for personnel selection in manufacturing systems. *Journal of Intelligent Manufacturing,* DOI 10.1007/s10845-008-0200-7.

Da˘gdeviren, M., Yüksel, ˙I, & Kurt, M. (2008). A fuzzy analytic network process (ANP) model to identify faulty behaviors risk (FBR) in work systems. *Safety Science, 34,* 96–107.

Danaher, P. J., & Mattsson, J. (1994). Cumulative encounter satisfaction in the hotel conference process. *International Journal of Service Industry Management, 5*(4), 69–81.

Deng, H., Yeh, C. H., & Wilis, R. J. (2000). Inter-company comparison using modified TOPSIS with objective weights. *Computers & Operations Research, 27,* 963–973.

Ertugrul, ˙I., & Karakasoglu, N. (2009). Performance evaluation of Turkish cement firms with fuzzy analytic hierarchy process and TOPSIS methods. *Expert Systems with Applications, 36*(1), 702-715.

Fatma, P, & Timothy, N. H. (2005). Patient satisfaction in a preoperative assessment clinic: an analysis using SERVQUAL dimensions. *Total Quality Management, 16*(1), 15–30.

Grieveson Grant (1986). *Hotel Companies in the U.K., Spring 1986,* 6-7. Grieveson Grant, London.

Hsieh, L. F., & Lin, L. H. (2010). A performance evaluation model for international tourist hotels in Taiwan- An application of the relational network DEA. *International Journal of Hospitality Management, 29,* 14–24.

Hsieh, L. F., Lin, L. H., & Lin, Y. Y. (2008). A service quality measurement architecture for hot spring hotels in Taiwan. *Tourism Management, 29,* 429–438.

Hung, W. T., Shang, J. K., & Wang, F. C. (2010). Pricing determinants in the hotel industry: Quantile regression analysis. *International Journal of Hospitality Management, 29,* 378–384.

Hwang, C. L., & Yoon, K. (1981). *Multiple attribute decision making methods and applications: A state of the art survey.* NY: Springer-Verlag.

Karsak, E. E., Sozer, S., & Alptekin, S. E. (2002). Production planning in quality function deployment using a. combined analytical network process and goal programming approach. *Computers & Industrial Engineering, 44,* 171–190.

Lee, J. W., & Kim, S. H. (2000).Using analytic network process and goal programming for interdependent information system project selection. *Computers & Operations Research, 27,* 367–382.

Lee, J. W., & Kim, S. H. (2001). An integrated approach for independent information system project selection. *International Journal of Project Management, 19,* 111–118.

Lewis, R. C., & Shoemaker, S. (1997). Price-sensitivity measurement: a tool for the hospitality industry. *Cornell Hotel and Restaurant Administration Quarterly, 38*(2), 44–54.

Lockyer, T. (2005). The perceived importance of price as one hotel selection dimension. *Tourism Management, 26*(4), 529–537.

Mahdavinia, S, H. (2007), Customer satisfaction in four star Isfahan hotels: An Application of SERVQUAL model, Master thesis, Lulea university of technology, 2008: 059 – ISSN 1653 – 0187.

Mattila, A., & O'Neill, J. (2003). Relationship between hotel room pricing, occupancy and guest satisfaction: a longitudinal case of a midscale hotel. *Journal of Tourism and Hospitality Research, 27*(3), 328–341.

Meade, L. M., & Presley, A. (2002). R&D project selection using the analytic network process. *IEEE Transactions on Engineering Management, 49,* 59–66.

Meade, L. M., & Sarkis, J. (1998). Strategic analysis of logistics and supply chain management systems using the analytical network process. *Transportation research Part E: Logistics and Transportation Review, 34,* 201–215.

Meade, L. M., & Sarkis, J. (1999). Analyzing organizational project alternatives for agile manufacturing processes: An analytical network approach. *International Journal of Production Research, 37,* 241–261.

Min, H., Min, H., & Chung, K. (2002). Dynamic benchmarking of hotel service quality. *Journal of Services Marketing, 16*(4), 302–322.

Ministry of Islamic guidance, Research and center of tourism (2008), "Investigation on hoteling industry in Iran", 2008.

Ministry of Islamic guidance, Research and study center of tourism (2006), "Investigation on hoteling industry in Iran", 2006.

Ngai, E. W. T., & Wat, F. K. T. (2003). Design and development of a fuzzy expert system for hotel selection. *Omega, 31,* 275 – 286.

Oh, H. (2003). Price fairness and its asymmetric effects on overall price, quality, and valued judgments: the case of an upscale hotel. *Tourism Management, 24,* 387–399.

Onüt, S., & Soner, S. (2008). Transshipment site selection using the AHP and TOPSIS approaches under fuzzy environment. *Waste Management, 28*(9), 1552-1559.

Partovi, F. Y., & Corredoira, R. A. (2002). Quality function deployment for the good of soccer. *European Journal of Operational Research, 137,* 642–656.

Raymond, K. S., & Chu, T. C. (2000). An importance-performance analysis of hotel selection factors in the Hong Kong hotel industry: a comparison of business and leisure travelers. *Tourism Management, 21,* 363-377.

Renner, P. F. (1994). *Basic hotel front office procedures*. NJ: John Wiley & Sons, Inc.

Saaty, T. L. (1996). *Decision making with dependence and feedback: The analytic network process*. Pittsburgh: RWS Publications.

Saaty, T. L., & Takizawa, M. (1986). Dependence and independence from linear hierarchies to nonlinear Networks. *European Journal of Operational Research, 26,* 229–237.

Shipley, M. F., Korvin, D. K., & Obit, R. (1991). A decision making model for multi-attribute problems incorporating uncertainty and bias measures. *Computers & Operations Research, 18,* 335–342.

Shyur, H. J. (2006). COTS evaluation using modified TOPSIS and ANP. *Applied Mathematics and Computation, 177,* 251–259.

Shyur, H. J., & Shih, H. S. (2006). A hybrid MCDM model for strategic vendor selection. *Mathematical and Computer Modeling, 44,* 749–761.

Soriano, D. R. (1999). Total quality management: Applying the European model to Spain's urban hotels. *Cornell Hotel and Restaurant Administration Quarterly, 40*(1), 54–59.

Stutts, A. T. (2001). *Hotel and lodging management*. NJ: JohnWiley & Sons, Inc.

Tsou, C. H. (2008). Multi-objective inventory planning using MOPSO and TOPSIS. *Expert Systems with Applications, 35*(1-2), 136-142.

Urtasun, A., & Gutierrez, I. (2006), Hotel location in tourism cities Madrid 1936–1998, *Annals of Tourism Research, 33*(2), 382–402.

Voss, G., Parasuraman, A., & Grewal, D. (1998). The role of price and quality perceptions in repurchase and post purchase evaluation of services. *Journal of Marketing 62*(4), 46–61.

Wang, F. C., Hung, W. T., Shang, J. K. (2006a). Measuring the cost efficiency of international tourist hotels in Taiwan. *Tourism Economics, 12*(1), 65–85.

Wang, F. C., Shang, J. K., Hung, W. T. (2006b). Productivity and service quality changes in international hotels in Taiwan. *Annals of Tourism Research, 33*(2), 571–574.

Wang, Y. J. (2007). Applying FMCDM to evaluate financial performance of domestic airlines in Taiwan. Expert Systems with Applications, 34(3), 1837-1845.

Wang, Y. M., & Elhag, T. M. S. (2006). Fuzzy TOPSIS method based on alpha level sets with an application to bridge risk assessment. *Expert Systems with Applications, 31,* 309–319.

Wilkins, Merrilees, B., & Herington, C. (2007). Towards an understanding of total service quality in hotels, *Hospitality Management, 26*(4), 840–853.

Yüksel, ˙I, & Da˘gdeviren, M. (2007). Using the analytic network process (ANP) in a SWOT analysis-A case study for a textile firm. *Information Sciences, 177,* 3364–3382.

Yuksel, E., Popi, P., & Cihan, C. (2003). Service quality in Cretan accommodations: Marketing strategies for the UK holiday market. *International Journal of Hospitality Management, 22*(1), 47–66.