

Assessing and Ranking the Corporate Social Responsibility Behavior of Five Star Hotels in Tehran Using the AHP and FTOPSIS Methods

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Abstract

Tourism having 11 percent share of our planet's gross product and as the one of largest industry in the world, has become a major force in our international economies, social lifestyles and understanding of environmental protection. Due to the rising importance of our global interdependence, some concepts like corporate social responsibility (CSR) have a significant role in this dynamic and flourishing industry composed of lodging, transportation and so on. This paper aims at analyzing the concept of CSR as a means of selecting the best practices in the five star hotel brands in Tehran. The three major dimensions of CSR like economic, social and environmental are tried to explain. The paper also presents the results of a study carried out on assessing and ranking the "responsibility level" of these lodging centers. The importance of the criteria used in the CSR-based practices is identified by the analytical hierarchy process (AHP). Moreover, the technique for order performance by similarity to ideal solution (TOPSIS) in the fuzzy environment is used to obtain final ranking of the hotel brands. Results show that among five 5 star hotels in Tehran, Home Hotel takes the best CSR practices. On the contrary, Azadi Hotel is the lowest one in ranking.

Keywords: Corporate social responsibility; five star Hotels; Tehran; AHP; Fuzzy TOPSIS

Introduction

Since the 1950s, due to the increasing awareness of people about their rights, the economical, ecological and social activities and practices of corporates had been addressed by private and institutional stakeholders considerably. The people put pressure on the businesses to move on a responsible way and pay more attention to the impact and consequences of their activities. This phenomenon can be explained because of an increased pressure on certain social and economic factors, the greater need for transparency in organizations, and as a reaction to social and environmental disasters [1,2].

In an effort to prevent the negative views, many businesses began using their resources to address social, economic and ecological issues voluntarily and make their own brand more popular. Consequently, the corporates' practices and programs marked the beginning of Corporate Social Responsibility (CSR) if they desire to sustain in the long run.

Corporate social responsibly is the continuing commitment by corporates to behave according to business ethics and contribute to economic development while improving the quality of the life of the workforce as well as the local community and future generations. They need to think for the society, environment, and all stakeholders of it. More specifically, CSR involves a business identifying its stakeholder groups and meeting their needs and values within the strategic and day-to-day decision-making process.

Despite all definitions of CSR, some authors make clear that the meaning of corporate social responsibility may differ among different stakeholders. On the other hand, the measurement of CSR activities is an additional challenge. Unlike the publication of several methods to measure socially responsible activities, almost all of them have some limitations [3]. Therefore, the methodology must be adjusted to provide a more complete understanding of the current state of CSR.

Since the tourism industry has been labelled "the world's largest industry" [4], yet the lack of CSR in the global tourism industry is "astounding" especially given the negative impacts that tourism can have on stakeholders [5].

In this industry, regarding to the heavy interdependent relationships that exist between tourism and environment and social heritage while

contributing to the health and growth of local communities, it is inevitable that all integrated businesses play their responsible role in the long term. As the contemporary tourist becomes aware of the adverse environmental impact, he/she begins to require the tourist product which is used and paid for to be ecologically and socially acceptable.

The development of responsible tourism and the increasing awareness of CSR in the tourism industry causes a strong need to assess and compare the economic, social and ecological performances of tourism companies.

Corporate social responsibility as the micro aspect of sustainable development means integrating environmental, societal and economic concerns into the core business strategy and further into the main business operations. Tourism businesses should behave responsibly in order to contribute to sustainable tourism development [6]. Sustainable development means designing the right mix of economic, social and environmental policies for today and for tomorrow [7].

Therefore, corporates must seek positions that are new, unique, and differentiated from the competitors. In this sense, CSR has become a highly effective attribute for a strategy of differentiation and positioning [8]. Many international initiatives show the growing importance of CSR in the tourism and hotel industry. For instance, Agenda 21 set international guidelines relative to sustainable tourism and was created by the World Travel and Tourism Council (WTTC), the World Tourism Organization (WTO), and the Earth Council [2].

Corporate Social Responsibility (CSR) and its extent has always been a practice usually dictated by the major stakeholders, especially in the industries interconnected closely with the society. As mentioned before, CSR is usually a pledge taken by an establishment or corporation

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to set in place socio-ethically responsible policies in areas of work ethics, human welfare, environment and human rights.

Tourism is assumed as an economic phenomenon, but it is actually a human and social activity. The complexity found in tourism is a reflection of complexity and contradictions of today's society, on the one hand, as a consumer good and as spectacle or culture. Economic dimension should have a special importance, but also the other dimensions must be borne in mind in order to gain objective view of the problems that tourism can cause [9].

In the lodging industry, it is expected that most hotels have now incorporated environmental management into their daily operations and implement numerous CSR activities including energy and water conservation, recycling, reusing, and community involvement.

More and more hotels now follow international "green" standards, such as the Green Globe Company Standard and Leadership in Energy and Environmental Design (LEED), when building and operating their properties. For instance, all Novotel hotels, managed by the multinational chain Accor, plan to obtain Green Globe accreditation [10]. Through engaging in CSR programs, hotels can also strengthen their relationships with government. All of this shows that CSR can bring about various benefits to different parties. A CSR strategy is not only needed but highly recommendable [10]. Although CSR is now a global trend in the hotel industry, it is pointed out that a recently as a decade ago, hoteliers were not familiar with the concept. As a matter of fact, the number of relevant studies in this area is quite limited, with most of them carried out in a western context in the US and Europe.

Hotels are as the basic, functional businesses within the tourism industry. All major five star establishments today are owned and run by giant corporations and most of them have adapted a responsible approach of doing business by recognizing that in order to be successful in this current era they will have to focus on the diverse dimensions of CSR. Five star hotels are all spread worldwide and differ based on their comparative and competitive advantage.

Because the way corporates define, design, and implement their CSR policies depends heavily on the contextual features of the context in which they operate, this paper suggests a new scale for measuring CSR in the tourism sector, and 5 star hotels in particular, based on the theoretical framework proposed by some researchers [11]. It should be noted that the researcher conducted the study on the tourism sector, specifically in the hotel segment. With regard to this, it must be stated that the tourism sector has some special particularities because it is possible to identify several subsectors with different characteristics and problems—such as transportation, travel or accommodation [13] that could potentially distort the results of this research if presented together. Since it is expected that 5 star hotels care about the community more and more. This is the main reason why the author decided to focus on a single tourism subsector the lodging sector and more precisely in the Tehran 5 star hotel sector. The aim of this paper is to assess and rank the responsibility level of five star hotels in Tehran, while using AHP and FTOPSIS model.

This article is divided into four main sections. The first section presents the conceptual framework that forms the structural basis for the study. The second section generally presents the methodology. The third section composes of the proposed model of this paper and its findings, emphasizing the design of the measurement scale. Finally, a brief conclusion arising from this study are included.

Literature Review

Concept of CSR and its three dimensions

Over viewing some last decades' issues, it can be found that the concept of corporate social responsibility was developed in 1953 by Bowen as the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of the society. In Bowen's opinion, businessmen are "responsible for the consequences of their actions in a sphere somewhat wider than that covered by their profit-and-loss statements" [14].

It was stressed by Davis who gave a definition of CSR as businessmen's decisions and actions taken for reasons at least partially beyond the firm's direct economic or technical interest [12]. In 1962 Friedman argued that few trends could so thoroughly undermine the very foundations of our free society as the acceptance by corporate officials of a social responsibility other than to make as much money for their stockholder as possible [14].

In spite of some skepticism, many authors including Druker and Porter and Kramer [15] have stressed the positive relationships between social responsibility and business opportunities in terms of market opportunities, productivity, human competence and improvement of competitive context [15].

Various studies in economic and organizational theory have reviewed the role of business in society [12]. Despite the fact that CSR is a prominent concept in the literature, it is difficult to formulate a precise and comprehensive definition of the term. As Votaw and more recent authors [16], CSR has a meaning, but its meaning is not the same for everyone. One of the main reasons given is that the meaning of CSR varies depending on the perceptions of the stakeholders involved and on the business sector under study [13,17].

The Freeman's [18] seminal book the focus moved from legitimacy and morals towards a new theory of the firm. Social considerations are thus no longer outside an organization but are part of its purpose of being. CSR thus becomes a question of stakeholder identification, involvement, and communication [19].

Many definitions of CSR are based on two fundamental ideas. The first is that companies have responsibilities beyond their profit-making activities and mere legal liability [13,20]. The second is that these responsibilities apply not only to shareholders but to a broader group of stake holders [1,18]. On the other hand, CSR is defined as a concept by which companies integrate social and environmental concerns in their operations and in their interaction with stakeholders on a voluntary basis (the Commission of the European Communities, 2001). The World Business Council for Sustainable Development [21] interprets CSR as the business commitment for contributing to sustainable economic development, employees, their families, the local community and society to improve their quality of life. The WBCSD also explains that CSR is a continuous commitment by business to behave ethically and contribute to economic development by improving the quality of life of workforce and their families, as well as the local community.

Along all definitions is the definition proposed by some authors, who define his construct as a strategic and proactive way of doing business in a specific context with a synergistic philosophy [22]. This concept of CSR emphasizes the need for firms to design their strategies with particular attention to balancing economic, social, and environmental aspects. However, although CSR is a term commonly

used by professionals, methods to formally measure CSR have not been developed among academics [23].

Corporate responsibility is not restricted to financial initiatives, but transcends borders to integrate with an organization's mission and core values to achieve the Triple Bottom-line Approach of Social, Environmental and Financial performance [24]. Corporations need to constantly adapt and adjust to changing environmental dimensions by closely monitoring changing industry trends and dynamics [25].

A basic assumption of CSR is that companies must adapt their behavior to societal expectations [26]. Complications arise when these expectations vary, depending on the context in which a company operates. Contextual features refer to the specific geographic, social, cultural, and economic policies of the places in which companies carry out their activities [27].

In order to respond in an adequate way to the pressures coming from the society of which companies form integral part, firms should pursue economic, social and environmental goals on the basis of a coordinated approach [28]. Moreover, the EU underlines the need for a holistic approach towards CSR integrated management in order to include social and environmental aspects into corporate planning, measuring and controlling of processes and to define a long-term strategy which minimizes the risks linked to uncertainty.

The dimensions of CSR can be identified from the conceptual framework provided by the theoretical models proposed by some researchers [11]. These authors conceptualize CSR based on sustainable development, establishing that corporate responsibility is a multidimensional construct consisting of economic, social, and environmental dimensions. The United Nations Industrial Development Organization emphasizes each of these facets. The economic dimension is based on ensuring viable economic activities in the long term so that all stakeholders receive appropriately distributed socioeconomic benefits. The social dimension refers to a respect for the cultural authenticity of host communities, the preservation of their architectural and living cultural assets and traditional values, and a contribution to intercultural understanding and tolerance. The environmental dimension refers to the optimal use of environmental resources, which is an essential element of tourism development, protecting essential ecological processes and helping to conserve natural resources and biodiversity [29]. Therefore, in this paper, the scope of CSR include economic, social, and environmental factors.

CSR practices in the lodging industry

Despite the fact that tourism represents a very important industry, which contributes to global GDP and creates jobs, it also produces negative and serious impacts at economic, social, and environmental levels, due to uncontrolled development [5,30] which generates a volume of flows higher than the destination carrying capacity [30]. As a consequence, at the beginning of the 1980s, at the same time as the spread of sustainable tourism, the concept of responsible tourism started to emerge.

Since the late 1980s, traditional mass tourism has been gradually replaced by alternative forms of tourism (Timothy and Teye, 2009 cited in [31]). The negative impacts of tourism lead the emergence of new forms of tourism. Many different names has been given to these new forms of tourism such as responsible, soft, green, etc., but in more generic terms, "alternative tourism".

According to the Cape Town Declaration, later reviewed by the Kerala Declaration in 2008, responsible tourism takes a variety of

forms, but it always refers to travel and tourism that minimize negative environmental, social, and cultural impacts; that generate greater economic benefits for local people by improving working conditions and access to the industry; that involve local people in decisions that affect their lives and life chances; that make positive contributions to the conservation of natural and cultural heritage and to the maintenance of the world's diversity; that provide more enjoyable experiences for tourists through more meaningful connections with local people and a greater understanding of local cultural and environmental issues; that provide access for physically challenged people; and that are culturally sensitive and engender respect between tourists and hosts [32].

In the hotel industry CSR is still an emerging concept. As part of the tourism industry, the accommodation sector has also put considerable effort into CSR programs over the last twenty years. Understanding the role of hotels in tourism industry can be a crucial factor to the planning of the authorities involved in tourism especially in determining the marketing strategies of lodging sector. Corporate Social Responsibility is a prerequisite for a good and healthy community. The hotel industry's use of CSR in its corporate strategy and daily activities is imperative due to the symbiotic nature of its relationship with the surrounding natural, economic, social and cultural environment [33].

Successful selection and implementation of an integrated CSR program can effectively identify costs and differentiate competitive advantages while contributing benefits to society and other stakeholders [31]. Finally, a hotel's CSR program can be part of its reputation management. To illustrate, innovative green practices have a visible marketing advantage and can be used as a public relations tool. Burke and Logsdon point out that this is one of the strategies derived from the visibility dimension of CSR, which they define as "observable, recognizable credit by internal and/or external stakeholders for the firm" [31].

Some researches explores the kind of information considered by tourists when choosing their holiday destinations and finds that "consumers are already making decisions based on environmental, social and economic quality for day-to-day products and are keen to transfer these habits to the purchase of tourism products" (Miller 2000). Recent research also supports the proposition that both business and leisure travelers have become more aware of environmental attributions when searching for accommodation products.

The reputational scale method usually asks business corporate staffers or managers to evaluate a sample of five star hotels in the form of questionnaire. The focus lies on those institutions that are operating with a combined analytical scheme integrating social, economic and ecologic criteria. On this basis, the primary objective of the survey was to gather descriptive data and information on CSR awareness and the attitude to it shown by 5 Star Hotels in Tehran. By the revised scale consisted of 54 items the respondent indicates his/her opinion on a five-point Likert type questionnaire ranging from "strongly disagree" (1) to "strongly agree"(5).

According to Chen and Fan, the problem with measuring CSR is very similar to a multiple-criteria decision making (MCDM) problem with many quantitative and qualitative attributes [34]. Arrington, Wokutch and Fahey have suggested the use of the AHP for measuring social performance.

However, the measuring and ranking five star hotels in Tehran is a multistep process in decision making and it involves three major dimensions. This resulted the introduction of Multi Criteria Decision Making (MCDM) models such as Analytic Hierarchy Process (AHP)

and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) in fuzzy environment as tools in solving the decision making process. The AHP method was developed by Saaty [35] involves a hierarchical form of the problems that in three levels, which are the goal, the criteria and the alternatives. The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is also one of the well-known techniques in MCDM developed by Hwang and Yoon [36] where the method lies on the concept that the selected alternatives should have the shortest distance from the positive ideal solution (PIS) and the farthest distance from the negatives ideal solutions (NIS) in Euclidean distance [36].

In many problems of decision making that involve human participation, one has to deal with uncertainty and subjectivity since information is normally in the form of perception. Fuzzy approaches have been widely used in decision making when subjectivity and uncertainty are the concerned constraint in the study. The use of fuzzy set theory [37] allows the decision-makers to incorporate unquantifiable information, incomplete information, non-obtainable information and partially ignorant facts into decision model [38].

Research Methodology

Sampling and data collection

The analysis and evaluation of the CSR of hotels was performed through a quantitative study. The 5 star hotel managers and employees with at least five years of experience were considered to be the analysis unit of the study. Each respondent was asked to answer the questionnaire in accordance to the existing actions and behaviors in his/her own business. The sample consisted of 25 respondents from all five star market in Tehran which is five hotels including Laleh International Hotel, Espinas Hotel, Azadi Parsian Hotel, Esteghlal Parsian Hotel, and Homa Hotel Group. In such a sample size, about 48% of respondents were employees and other 52% were managers. Further, regarding gender, 60% of the respondents were men and 40% were women. Over half of the respondents were aged 26-35 and approximately 96% had been educated to undergraduate degree level or above. The socio-demographic profile of respondents is summarized in Table 1.

Furthermore, in order to weight the three major factors of CSR, another questionnaire was developed and distributed among six academics and experts in the tourism area. The multidimensionality of the scale was conceptualized based on both a literature review and a qualitative exploratory researches. In this step, three domains were identified as relevant for the CSR of a hotel company: economic,

Gender	%
Male	60
Female	40
Occupation	%
Manager	52
Employee	48
Age	%
26-35	56
36-45	36
46-55	8
Education	%
Diploma	4
BA	80
MA or higher	16

Table 1: Frequency table of demographic profile of respondents (N=25).

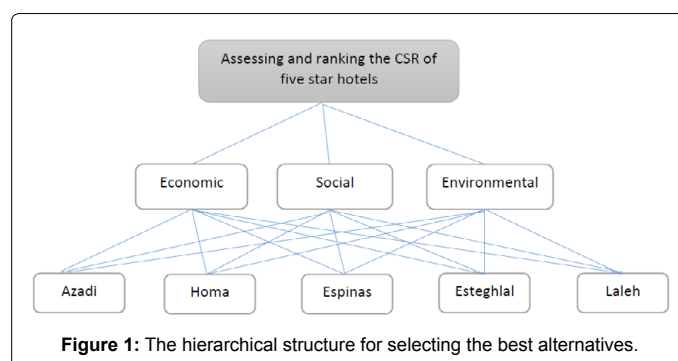


Figure 1: The hierarchical structure for selecting the best alternatives.

social, and environmental factors. According to Martínez and et al [2], these dimensions match up with those defined theoretically by the sustainable development theory [11].

The measurement scale included 54 items. The first twenty two items related to activities aimed at the economic dimension of CSR. The next nineteen items related to the social dimension of CSR. The last thirteen items related to the environmental dimension of CSR. All of the items were measured using a 5-point Likert scale, in which a score of 1 indicate strongly disagree with the statement, and a score of 5 signifies total agreement with the statement. The research has several steps. First, the content of the questionnaire was further enhanced by the literature review and by consulting some experts to enhance the content validity. Second, the questionnaire had been formulated and the sampling method selected. Finally, mathematical computing were conducted to meet the research objectives. In the statistical analysis, descriptive analysis was used to illustrate demographic information about the respondents (Table 1). All the data analysis was carried out using Excel. Figure 1 illustrates the hierarchical structure. Initially, the overall goal of the decision, evaluating the best hotel brand in assuming CSR, is presented in the top level of the hierarchy. The second level consists of three major criteria that are identified to achieve the overall goal. The third level contains the alternative hotels.

AHP model

The AHP is a multi-attribute decision tool that allows financial and non-financial, quantitative and qualitative measures to be considered and trade-offs among them to be addressed. The AHP is aimed at integrating different measures into a single overall score for ranking decision alternatives.

AHP model has the advantage of highlighting the main attributes, strengths and weaknesses of every alternative. This mathematical method stresses the key role of selecting the main criteria and the decision about their importance. In AHP model the priorities are determined by comparing each option with all the others, i.e. making relative comparisons, not absolute assessments.

This section provides an explanation of the AHP model, in particular of the calculation of weights, starting from the paired comparison technique, and of the consistency verification. Determining the weights of each alternative signifies a numerical value that shows the importance compared to each of the criteria. In other words, AHP answer this question whether one criteria is preferable to another and if so, to what extent. The operation has to be entrusted to some experts familiar with the subject, who have been asked to express their personal preferences according to a scale developed by Saaty.

The description is developed in three steps [35].

Step 1: Compose a pair-wise comparison decision matrix (A)

$$A = [a_{im}] = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{a_{1n}} & \frac{1}{a_{2n}} & \dots & 1 \end{bmatrix} \quad i, m = 1, 2, \dots, n \quad (1)$$

Let C_p, C_2, \dots, C_n denote the set of elements, while aim represents a quantified judgment on a pair of elements, C_i and C_m . Saaty constitutes a measurement scale for pair-wise comparison. Hence, verbal judgments can be expressed by degree of preference: Equally preferred with 1, Moderately preferred with 3, Strongly preferred with 5, Very strongly preferred with 7 and Extremely preferred with 9; 2, 4, 6 and 8 are used for compromise between the above values.

Step 2: Normalize the decision matrix. Each set of column values is summed. Then, each value is divided by its respective column total value. Finally, the average of rows is calculated and the weights of the decision-maker's objectives are obtained. A set of n numerical weights w_1, w_2, \dots, w_i are obtained.

Step 3: Do consistency analysis.

$$A * W_i = \lambda_{\max} * w_i, \quad i = 1, 2, \dots, n \quad (2)$$

Then consistency index (CI) is calculated as:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (3)$$

The consistency index of a randomly generated reciprocal matrix shall be called to the random index (RI), with reciprocals forced. An average RI for the matrices of order 1-15 was generated by using a sample size of 100. The table of random indexes of the matrices of order 1-15 can be seen in.

The last ratio that has to be calculated is CR (consistency ratio). Generally, if CR is less than 0.1, the judgments are consistent, so the derived weights can be used. The formulation of CR is:

$$CR = \frac{CI}{RI} \quad (4)$$

FUZZY TOPSIS model

The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) is a multi-criteria decision analysis method, which was originally developed by [36] with further developments by Yoon, Lai and Liu in 1993 [35]. TOPSIS is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution. It is a method of compensatory aggregation that compares a set of alternatives by identifying weights for each criterion, normalizing scores for each criterion and calculating the geometric distance between each alternative and the ideal alternative, which is the best score in each criterion. An assumption of TOPSIS is that the criteria are monotonically increasing or decreasing. In this paper, the approach of TOPSIS is extended to develop a methodology for solving multi-attribute decision making problems in fuzzy environments.

Considering the fuzziness in the decision data, linguistic variables are used to assess the weight of each criterion and the rating of each alternative with respect to each criterion. The decision matrix is converted into a fuzzy decision matrix and constructed a weighted normalized fuzzy decision matrix once the decision makers' fuzzy

ratings have been pooled. The lower bound value of alternatives has been designed to obtain the distance value of the corresponding alternatives for detecting the fuzzy positive ideal solution (FPIS) and the fuzzy negative ideal solution (FNIS). Then, the fuzzy similarity degree of each alternative is calculated from FPIS and FNIS, respectively. Finally, a closeness coefficient is defined for each alternative to determine the rankings of all alternatives. The higher value of closeness coefficient indicates that an alternative is closer to FPIS and farther from FNIS simultaneously. Some important basic definitions of fuzzy sets and numbers based on recent work by [38] is provided:

Definition 1: A fuzzy set \tilde{a} in a universe of discourse X is characterized by a membership function $\mu_{\tilde{a}}(x)$ which associates with each element x in X , a real number in the interval $[0,1]$. The function value $\mu_{\tilde{a}}(x)$ is termed the grade of membership of x in \tilde{a} .

Definition 2: A fuzzy number is a fuzzy subset of the universe of discourse X that is both convex and normal. Figure 2 shows a fuzzy number \tilde{a} in the universe of discourse X that conforms to this definition.

The triangular fuzzy numbers is used. A triangular fuzzy number \tilde{a} can be defined by a triplet (a_1, a_2, a_3) . Its conceptual schema and mathematical form are shown by Eq (5).

$$\mu_{\tilde{a}}(x) = \begin{cases} 0, & x \leq a_1 \\ \frac{x - a_1}{a_2 - a_1}, & a_1 < x \leq a_2 \\ \frac{a_3 - x}{a_3 - a_2}, & a_2 < x \leq a_3 \\ 0, & x > a_3 \end{cases} \quad (5)$$

Definition 3: Assuming that both $\tilde{a} = (a_1, a_2, a_3)$ and $\tilde{b} = (b_1, b_2, b_3)$

are real numbers, then the basic operations on fuzzy triangular numbers are as follows:

$$\begin{aligned} a \times i a &= \times b_1, a_2 \times \\ (a_1 \quad b_2, a_3 \quad \times b_3) &\text{ for multiplication;} \\ a + a &= \\ (a_1 \quad + b_1, a_2 + b_2, a_3 + b_3) &\text{ for addition.} \end{aligned} \quad (6, 7)$$

Definition 4: A linguistic variable is a variable values of which are linguistic terms [37]. The concept of linguistic variable is very useful in dealing with situations which are too complex or too ill- defined to

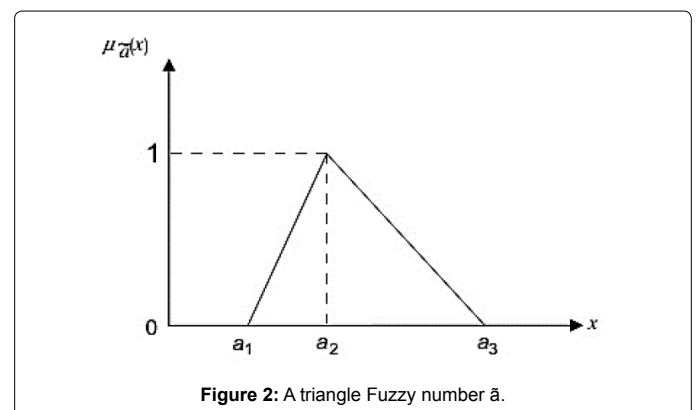


Figure 2: A triangle Fuzzy number \tilde{a} .

be reasonably described in conventional quantitative expressions [37]. For example, "weight" is a linguistic variable; its values are very low, low, medium, high, very high, etc. These linguistic values can also be represented by fuzzy numbers.

Definition 5: Let $\tilde{a} = (a_1, a_2, a_3)$ and $\tilde{b} = (b_1, b_2, b_3)$ be two triangular fuzzy numbers, then the vertex method is defined to calculate the distance between them.

$$d(\tilde{a}, \tilde{b}) = \sqrt{\frac{1}{3}[(a_1 - b_1)^2 + (a_2 - b_2)^2 + (a_3 - b_3)^2]} \quad (8)$$

Definition 6: Considering the different importance values of each criterion, the weighted normalized fuzzy-decision matrix is constructed as.

$$\tilde{V} = [\tilde{v}_{ij}]_{n \times J}, \quad i = 1, 2, \dots, n, j = 1, 2, \dots, J \quad (9)$$

Where

$$\tilde{v}_{ij} = \tilde{x}_{ij} \times w_i.$$

A set of performance ratings of A_j ($j = 1, 2, \dots, J$) with respect to criteria C_i ($i = 1, 2, \dots, n$) called

$$\tilde{x} = \{\tilde{x}_{ij}, i = 1, 2, \dots, n, j = 1, 2, \dots, J\}.$$

A set of importance weights of each criterion w_i ($i = 1, 2, \dots, n$). (10)

According to briefly summarized fuzzy theory above, fuzzy TOPSIS steps can be outlined as follows:

- Step 1: Choose the linguistic values ($x_{ij} = 1, 2, \dots, n, j = 1, 2, \dots, J$) for alternatives with respect to criteria. The fuzzy linguistic rating (\tilde{x}_{ij}) preserves the property that the ranges of normalized triangular fuzzy numbers belong to $[0, 1]$; thus, there is no need for normalization.
- Step 2: Calculate the weighted normalized fuzzy decision matrix. The weighted normalized value \tilde{v}_{ij} calculated by Eq. 9.
- Step 3: Identify positive-ideal (A^+) and negative ideal (A^-) solutions. The fuzzy positive-ideal solution (FPIS, A^+) and the fuzzy negative-ideal solution (FNIS, A^-) are shown in the following equations:

$$A^+ = \left\{ \tilde{v}_1^+, \tilde{v}_2^+, \dots, \tilde{v}_i^+ \right\} = \left\{ \left(\max_j v_{ij} \mid i \in I' \right), \right. \\ \left. \times \left(\min_j v_{ij} \mid i \in I'' \right) \right\}, i = 1, 2, \dots, n, j = 1, 2, \dots, J, \quad (11)$$

$$A^- = \left\{ \tilde{v}_1^-, \tilde{v}_2^-, \dots, \tilde{v}_i^- \right\} = \left\{ \left(\min_j v_{ij} \mid i \in I'' \right), \right. \\ \left. \times \left(\max_j v_{ij} \mid i \in I' \right) \right\}, i = 1, 2, \dots, J,$$

where I' is associated with benefit criteria and I'' is associated with cost criteria.

- Step 4: Calculate the distance of each alternative from A^+ and A^- using the following equations:

$$D_j^+ = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_i^+) j = 1, 2, \dots, J \quad (12)$$

$$D_j^- = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_i^-) j = 1, 2, \dots, J \quad (13)$$

- Step 5: Calculate similarities to ideal solution.

$$CC_j = \frac{D_j^-}{D_j^+ + D_j^-} j = 1, 2, \dots, J. \quad (14)$$

- Step 6: Rank preference order. Choose an alternative with maximum $CC+j$ or rank alternatives according to $CC+j$ in ascending order.

The proposed model and findings

The methodology applied in this paper is to assess and rank the CSR practices of all five star hotels in Tehran city. The proposed model for assessing and ranking CSR practices in five star hotels in Tehran, composed of AHP and fuzzy TOPSIS methods, consists of three basic stages: (1) identify the criteria to be used in the model, (2) AHP computations, (3) evaluation of alternatives with fuzzy TOPSIS and determination of the final rank.

In the first stage, alternative hotels and the criteria which will be used in their evaluation are determined and the decision hierarchy are formed. AHP model is structured such that the objective is in the first level, criteria are in the second level and alternative hotels are on the third level.

After the first stage, criteria used in CSR are assigned weights using AHP in the second stage. In this phase, pair wise comparison matrices are formed to determine the criteria weights. The experts from decision-making team make individual evaluations using the scale provided in Table 2 to determine the values of the elements of pair wise comparison matrices.

Computing the geometric mean of the values obtained from individual evaluations, a final pair wise comparison matrix on which there is a consensus is found. The weights of the criteria are calculated based on this final comparison matrix. The final matrix can be observed in Tables 3 and 4.

The economic factor is determined the first most important criterion in the computing process by using AHP model. The environmental and social factors are ranked as the second and the third criteria respectively.

Definition	Degree of preference
Equally preferred	1
Moderately preferred	3
Strongly preferred	5
Very strongly preferred	7
Extremely preferred	9
2, 4, 6 and 8 are used for compromise between the above values	

Table 2: Nine-point degree of preference scale and its description.

Linguistic values	Fuzzy numbers
Very low (VL)	(0, 0.05, 0.2)
Low (L)	(0.1, 0.25, 0.4)
Medium (M)	(0.3, 0.5, 0.7)
High (H)	(0.6, 0.75, 0.9)
Very high (VH)	(0.8, 0.95, 1)

Table 3: Membership functions of linguistic values for criteria rating.

Normalizing	Economic	Social	Environmental	average	rank
Economic	0.49	0.54	0.46	0.50	1
Social	0.17	0.19	0.22	0.19	3
Environmental	0.34	0.27	0.32	0.31	2

Table 4: Results obtained with AHP.

On the other hand, hotel ranks are determined by using fuzzy TOPSIS method in the third stage. Linguistic values are used for evaluation of alternative hotels in this step. The membership functions of these linguistic values are shown at Figure 3 [39].

The hotel brand having the maximum CC_j^+ value is determined as the optimal brand according to the calculations by Fuzzy TOPSIS. Schematic diagram of the proposed model for hotel brands selection is provided in Figure 4 (Table 3).

The results obtained from the computations based on the pair wise comparison matrix provided before this step are presented in Table 4.

At the stage of evaluating the alternatives and determining the final rank, the decision matrix by comparing alternatives under each of the criteria is established separately. Fuzzy Evaluation Matrix developed by the evaluation of alternative hotels by linguistic variables in Table 4, is presented in Table 5.

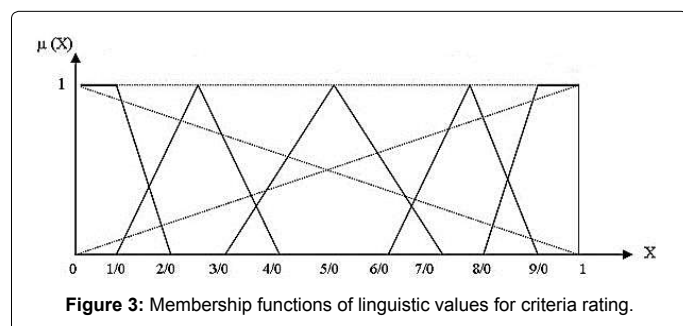


Figure 3: Membership functions of linguistic values for criteria rating.

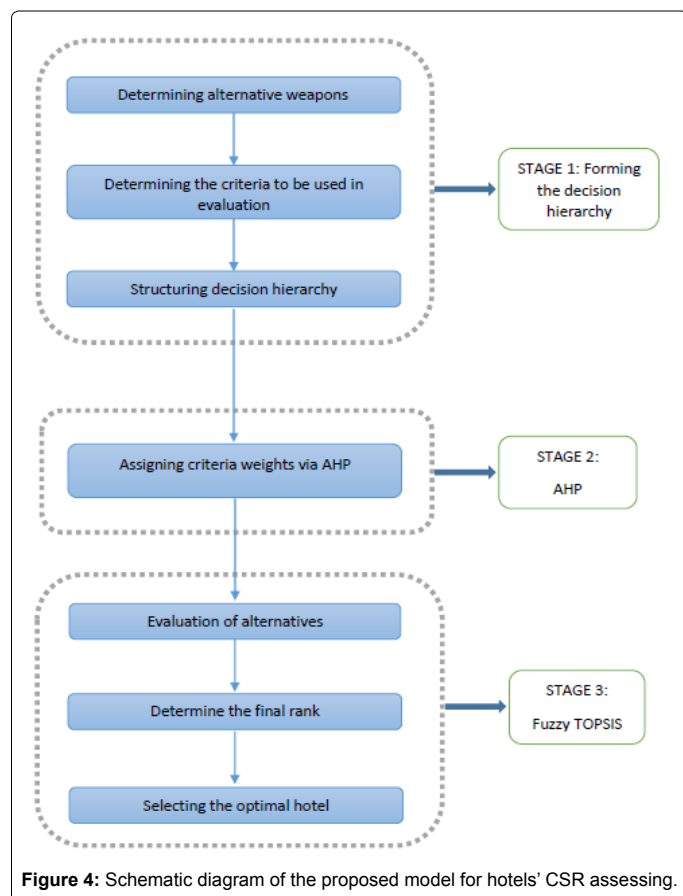


Figure 4: Schematic diagram of the proposed model for hotels' CSR assessing.

NFDM	Economic			Social			Environment		
Azadi	0.251	0.479	0.680	0.249	0.473	0.695	0.102	0.374	0.609
Homa	0.742	0.902	1.000	0.650	0.836	0.981		0.881	1.000
Espinas	0.299	0.518	0.708	0.227	0.457	0.668	0.173	0.393	0.594
Esteghlal	0.670	0.835	0.964	0.661	0.837	1.000	0.557	0.737	0.912
Laleh	0.332	0.585	0.769	0.243	0.513	0.729	0.282	0.538	0.736
w	0.50	0.50	0.50	0.19	0.19	0.19	0.31	0.31	0.31

Table 5: Fuzzy evaluation matrix for the alternative hotels.

NFDM	Economic			Social			Environment		
Azadi	0.125	0.237	0.237	0.048	0.048	0.133	0.032	0.117	0.191
Homa	0.368	0.447	0.496	0.124	0.16	0.188	0.226	0.276	0.313
Espinas	0.148	0.257	0.351	0.043	0.088	0.128	0.054	0.123	0.186
Esteghlal	0.332	0.414	0.478	0.127	0.16	0.192	0.174	0.23	0.285
Laleh	0.165	0.29	0.381	0.047	0.098	0.14	0.088	0.168	0.23
I+	0.368	0.447	0.496	0.127	0.16	0.192	0.226	0.276	0.313
I-	0.125	0.29	0.337	0.043	0.088	0.128	0.032	0.117	0.186

Table 6: Weighted evaluation and similarities for the alternative hotels.

	D+	D-	CC	Rank
Rank				
5	0.469294	0.008737	0.018277	Azadi
1	0.004219	0.471549	0.991131	Homa
4	0.436228	0.040736	0.085406	Espinas
2	0.090244	0.391288	0.812589	Esteghlal
3	0.359366	0.119697	0.249856	Laleh

Table 7: Fuzzy TOPSIS results.

After the fuzzy evaluation matrix was determined, the second step is to obtain a fuzzy weighted decision table. Using the criteria weights calculated by AHP (Table 4) in this step, the Weighted Evaluation Matrix is established. The resulting fuzzy weighted decision matrix is shown in Table 6.

The fourth step solves the similarities to an ideal solution by Eq. (14) [40]. The results can be observed as follows in Table 6. Similar calculations are done for the other alternatives and the results of fuzzy TOPSIS analyses are summarized in Table 7. Based on CC_j values, the ranking of the alternatives in ascending order are Homa, Esteghlal, Laleh, Espinas and Azadi Hotel respectively.

Considering the criteria of CSR, the partial ranking demonstrates that Homa Hotel obtain the greatest CC^+ . This means that Homa Hotel takes the best CSR practices. Homa has the highest fuzzy number grade in economic and environmental factors. On the contrary, Azadi Hotel shows the lowest CC^+ in the Table 7. So it indicates that Azadi Hotel may be unable to manage their activities in a economically, socially and environmentally responsible manner.

Conclusion

A strong current trend is the use of sustainable development theory to propose a new dimensioning of CSR composed of not only economic but also social and environmental aspects [11]. Furthermore, as argued in the literature, the application of the principles of CSR is highly conditioned by the contextual features of the sectors to which it is applied [13].

This paper has looked at the concept of CSR in terms of the hotel industry. It adopted a qualitative approach to assessing and ranking the CSR practices in the five star hotels in Tehran, with a view to addressing three major dimensions of CSR i.e. economic, social and

environmental factors. For this reason, the study, after underlining the meaning and significance of CSR and its dimensions, has focused on the analysis of the practices of hotels responsibility. Therefore, an effective evaluation approach is essential to improve decision quality. This study, presenting a scientific framework to assess and rank the CSR dimensions using the analytical hierarchy process (AHP) and the triangular fuzzy numbers to express linguistic values that consider the subjective judgments of evaluators. The proposed model is based on the comparisons of hotel brand alternatives according to identified criteria. AHP and fuzzy TOPSIS compound decision-making method has been used in proposed model. AHP is used to assign weights to the criteria to be used in CSR factors, while fuzzy TOPSIS is employed to determine the priorities of the alternatives. The weights obtained from AHP are included in decision-making process by using them in fuzzy TOPSIS computations and the alternative priorities are determined based on these weights. Proposed model has significantly increased the efficiency of decision-making process in hotel rankings. Definitely, this paper may suffer some setbacks. Consequently, some limitations like time and so on should be taken into account. These limitations can be overcome in the direction of the future research.

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