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Research Article

Cappadocia hotels' website quality evaluation: A multi-criteria Intuitionistic Fuzzy EDAS (IF-EDAS) method application

Kapadokya otelleri web sitesi kalitesi değerlendirmesi: Çok kriterli Sezgisel Bulanık EDAS (IF-EDAS) yöntemi uygulaması

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Abstract

The internet is becoming increasingly common worldwide, and the number of users is rapidly increasing. This condition offers up new business opportunities for online businesses. For online companies, high customer satisfaction corresponds with a competitive advantage. For this reason, it is vital to understand consumer expectations for services provided through corporate websites and assess the website quality from the customer's perspective. The primary goal of this research is to evaluate and rate the websites of Cappadocia hotels in Turkey. A solution proposal comprising the Intuitionistic Fuzzy EDAS (IF EDAS) approach is developed to assess the website quality of these hotels. A sensitivity analysis is also provided to demonstrate how the proposed IF EDAS method yields robust decisions. It has been concluded that the most important criteria in evaluating the quality of a hotel website are security, privacy and hotel facilities information. According to the findings, the top three hotels in terms of website quality are Kapadokya Hill Hotel & Spa, Exedra Hotel Cappadocia and Anatolian House. This study will likely be helpful to both researchers interested in hotel website quality evaluations and holidaymakers contemplating a trip to Cappadocia.

Keywords: Hotel Website, Website Quality, Intuitionistic Fuzzy EDAS (IF-EDAS) Method, MCDM

JEL Codes: C44, C60, L81, L83, M31

Öz

İnternet kullanımı dünya genelinde giderek yaygınlaşmakta ve kullanıcı sayısı hızla artmaktadır. Bu durum, çevrimiçi işletmeler için yeni iş fırsatlarını beraberinde getirmektedir. Çevrimiçi işletmeler için yüksek müşteri memnuniyeti rekabet avantajına karşılık gelir. Bu nedenle kurumsal web siteleri aracılığıyla sunulan hizmetlere yönelik tüketici beklentilerinin anlaşılması ve web sitelerinin kalitesinin müşteri gözüyle değerlendirilmesi hayati önem taşımaktadır. Araştırmanın temel amacı, Türkiye'deki Kapadokya otellerinin web sitelerini değerlendirmek ve derecelendirmektir. Bu otellerin web sitesi kalitesini değerlendirmek için Sezgisel Bulanık EDAS (IF EDAS) yaklaşımını içeren bir çözüm önerisi geliştirilmiştir. Önerilen IF EDAS modelinin tutarlılığını değerlendirmek adına duyarlılık analizi de gerçekleştirilmiştir. Otel web sitesi kalitesinin değerlendiriminde en önemli kriterlerin güvenlik, gizlilik ve otel tesis bilgileri olduğu sonucuna ulaşılmıştır. Bulgulara göre web sitesi kalitesi açısından ilk üç otel Kapadokya Hill Hotel & Spa, Exedra Hotel Cappadocia ve Anatolian House'dur. Çalışmanın hem otel web sitesi kalite değerlendirimi ile ilgilenen araştırmacılara, hem de Kapadokya gezisi planlayan tatilcilere faydalı olacağı düşünülmektedir.

Anahtar Kelimeler: Otel Web Sitesi, Web Sitesi Kalitesi, Sezgisel Bulanık EDAS (IF-EDAS) Yöntemi, ÇKKV

JEL Kodları: C44, C60, L81, L83, M31

Introduction

The internet is being more widely used worldwide, and the number of users is continuously expanding. This condition provides internet enterprises with new business options and a competitive edge. High customer satisfaction is the primary competitive advantage for internet firms. For this reason, it is critical to understand consumer expectations for services provided through company websites and assess the website's quality from the customer's perspective. Customer service of the highest quality is critical to long-term organizational success in the service and hospitality industries (Liang & Wu, 2022). Creating an excellent website is one of the most significant components of increasing hotel customer satisfaction (Ha & Im, 2012).

COVID-19 has emerged as a significant public health concern. COVID-19, which came into our life in 2019, changed how we think about e-commerce, health, economy and technology and made internet usage more prevalent. As a result of this epidemic, the transition of businesses to digital commerce has been dramatically accelerated. Customers are taking precautions due to the pandemic and are increasingly purchasing through the e-commerce platform. This shift in purchasing habits will likely continue in the coming years (Hasanat, Hoque, Shikha, Anwar, Hamid & Tat, 2020).

Over the previous 40 years, the globe has seen several significant epidemics, but none have had the same impact on the global economy as the COVID-19 pandemic. Due to the rapid growth in cases and the possibility of worldwide spread, travel restrictions that began in the Wuhan region on January 23, 2020, were extended to all nations until the end of March. As a result, global tourism has slowed dramatically due to travel restrictions, quarantines and physical barriers (Gossling, Scott & Hall, 2020). According to research issued on April 28, 2020, by the World Travel and Tourism Council (WTTC), the economic impact of the pandemic on tourism is eight times more than the impact of the 2008 global economic crisis. According to the same research, employment in the tourism sector fell by 31% in 2020, with a 30% drop in tourism revenues (World Travel & Tourism Council, 2020).

Since the commencement of the COVID-19 problem, the impact of the pandemic on the travel and tourism sector has been vastly underestimated. Currently, policymakers and tourism practitioners are attempting to foresee the possibilities and effects of the crisis, which will have an unprecedented influence on the tourism sector. Every innovation in healthcare quality will be critical in tackling this pandemic issue (Skare, Soriano & Porada-Rochoń, 2021). In the medium term, presumably during the next two to five (or more) years, governments, the tourism industry, and many travellers eager to reopen their wings to the world will make a "Back to the Past" attempt. Tourism to easily accessible locations is expected to increase significantly once the virus's condition is better recognized and stabilized (Lew, Cheer, Haywood, Brouder & Salazar, 2020).

Following the COVID-19 outbreak, technology usage is expected to increase with a shift toward digital media. For example, hotels are expected to accept reservations via websites, engines or mobile applications and use technology such as digital concierge services, automated check-in/out and keyless access systems (Ozdemir, 2020). In this regard, it is critical that websites, which serve as the consumer's first point of contact with the company, be designed by customer expectations, with excellent quality and performance. In addition, websites must be efficient and effective. In order to assess these qualities, fundamental evaluation indices and procedures must also be determined (Samad, Nilashi & Ibrahim, 2019).

Another post-pandemic forecast is that people's interests in tourism and the types of hotels they choose will alter. Nature-based tourism, particularly alternative tourism, is expected to develop in rural areas. Demand for small-scale lodging enterprises is expected to increase (Ozdemir, 2020). Chang, McAleer and Ramos (2020) emphasized the importance of turning toward alternative tourism in their research on sustainable tourism after COVID-19. Yacht, camping, caravan, and plateau tourism will be regarded as new options. After COVID-19, it is expected that holiday choices such as boutique hotel preference, villa rental and boat rental would become more popular (Demir, Gunaydin & Demir, 2020).

The Cappadocia region is one of the nature-based tourism options available after the pandemic. Cappadocia is the region formed when rain and wind eroded the soft strata formed by lava and ashes spewed by Erciyes, Hasandag and Golludag 60 million years ago. This area is a location where nature and history coexist. While geological occurrences formed the Fairy Chimneys, people carved houses, churches and monasteries within them, adorned them with paintings and transported the traces of thousands of years of civilizations to the current day. As a result, UNESCO inscribed it on the World Heritage List in the category of natural and cultural assets in 1985, and it was given protection. (en.unesco.org, 2021). In this context, the Cappadocia region, one of Turkey's most important tourism destinations, draws visitors worldwide.

This paper investigates the website quality of boutique hotels, whose demand is expected to rise significantly during the COVID-19 epidemic. The study's primary goal is to assess and rate the websites of Cappadocia hotels. Because numerous quantitative and qualitative factors must be considered in the decision-making process (DMP), a multi-criteria decision-making (MCDM) approach is required. A practical and robust MCDM method can solve such an evaluation problem. Furthermore, it may be stated that applying linguistic factors with the intuitionistic fuzzy (IF) approach leads to significant success in decision-making in uncertain contexts.

So far, the topic of website quality measurement has gotten a lot of attention (Nilashi & Ibrahim, 2014). Various research on website evaluation has been conducted to improve the performance of hotel websites (Stringam & Gerdes, 2019). However, using MCDM methodologies to evaluate website quality is rare (Samad, Nilashi & Ibrahim, 2019). The essential motivation of this research is to create an effective MCDM model for evaluating hotel website quality utilizing the Evaluation Based on Distance from Average Solution (EDAS) approach in an IF environment. This paper, in particular, proposes a decision support model based on Intuitive Fuzzy Sets (IFS), which are preferred over standard fuzzy sets because they consider the ambiguity of decision makers' judgments and their accuracy and inexact character. Contrary to previously published studies in hotel website quality evaluation, this study pioneers a very efficient approach to accounting for experts' degrees of agreement and disagreement and uncertainty in the decision-making environment. A sensitivity analysis is also provided to demonstrate how the proposed IF EDAS method yields robust decisions. There is no research including the IF-EDAS approach to website quality assessment in the literature. This study is expected to fill this gap in the literature. The study involves ten hotels in the Cappadocia region with high customer ratings. This can be defined as the limitation of the research.

This article is divided into five sections. The following section is a survey of the literature on the quality of hotel websites. The third section offers details regarding the research technique. After that, the analysis is given together with the results in the fourth part. The last part discusses the findings and future recommendations.

Literature review

Recently, determining the quality of websites and identifying poor website capabilities has become an essential topic for academic researchers and industry practitioners (Chiou, Lin & Perng, 2010). The following is research aimed at evaluating hotel website quality using various MCDM methodologies. For analyzing the website quality of five-star hotels in Ankara, Turkey, Akincilar and Dagdeviren (2014) utilized a hybrid model that included two well-known MCDM approaches, the Analytic Hierarchy Process (AHP) and Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE). Weighted Total Preferred Performance Levels (WS PLP) and Pivot Pairwise Relative Criteria Importance Evaluation (PIPRECIA) methods were combined in the studies of Liu and Zang (2015) and Stanujkic, Karabasevic and Sava (2018). This integrated method was used to determine the importance levels of hotel website evaluation criteria and rank hotel websites. The Order of Preference by Similarity to Ideal Solution (TOPSIS) approach was used by Samad, Nilashi and Ibrahim (2019) to identify the essential variables in the design of hotel websites. The findings indicated that the essential aspects in evaluating hotel websites are trust, response time, transaction capacity and informational fit-to-task. Ramyar, Hamzah and Halim (2020) used the VlseKriterijumska Optimizacija I Kompromisno Resenje under fuzzy environment (FVIKOR) technique to assess the website quality of four hotels in Iran. Baki (2020) attempted to create a system for assessing hotel websites using the fuzzy analytic hierarchy process (FAHP) and the fuzzy technique for order preference by similarity to ideal scenario (FTOPSIS). Samanlioglu, Burnaz, Dis, Tabas and Adıguzel (2020) used a combination of the Fuzzy best-worst method (FBWM) and FTOPSIS to evaluate and rate the websites of Paloma hotels in Turkey. Mahdi and Esztergár-Kiss (2021) used the FAHP approach to discover the best hotel selection criterion on the booking.com website. Efe and Efe (2021) introduced the Pythagorean fuzzy TOPSIS approach to assess hotel websites. Sezgin and Yurtlu (2021) evaluated Istanbul hotels on the Booking.com website using AHP-based PROMETHEE. Tabaeeian and Fahimi (2021) analysed critical indicators for improving the quality of the websites in the hotel industry by using a Kano questionnaire and a pairwise comparison based on the DEMATEL-based ANP (DANP) model.

Only a few studies in the literature use the IF EDAS method to rank the alternatives in MCDM problems and determine the best alternative. Rogulj, Pamuković, Antucheviciene and Zavadskas (2022) utilized a hybrid model that included IF EDAS to analyze bridge reconstruction priority ranking. Li and Wang (2020) evaluated algorithms for the service quality of wireless sensor networks using the IF EDAS technique. This method was used by Liang (2020) to evaluate green building energy-saving design projects. Schitea, Deveci, Iordache, Bilgili, Akyurt and Iordache (2019) used this technique to select hydrogen mobility roll-up site. Kahraman, Keshavarz Ghorabaee, Zavadskas, Cevik Onar, Yazdani and Oztaysi (2017) employed the IF EDAS method to assess solid waste disposal site options.

Reviewed literature reveals papers using MCDM techniques discussing website quality topics. However, no study has focused on the IF-EDAS technique in the website quality evaluation. This study fills this gap in the literature.

Methodology

Although EDAS is a new method recently proposed in the literature, it is an MCDM approach that has been applied to many decision problems (DPs). The method is based on calculating the distance to the mean solution, which is based on the principle of determining the optimal solution value of the DP and obtaining an evaluation score based on positive and negative deviations from this value (Yildirim & Meydan, 2021).

Although the EDAS method is widely used in research, studies employing the extended EDAS method with IF numbers (IFN) are rare. For this goal, the IF-EDAS method combined with the IF set is proposed in this work for the evaluation of hotel websites.

EDAS

The EDAS approach was first submitted to the literature by Keshavarz Ghorabaee, Zavadskas, Olfat, and Turskis (2015) as a new MCDM method. Unlike previous distance-based approaches, it determines the criteria's mean values rather than using the distance between the ideal and non-ideal values as the basis. This mean value and positive and negative distance measurements are used to evaluate alternatives (Yildirim & Meydan, 2021). The positive distance from average (PDA) and the negative distance from average (NDA) are the first two measurements in the EDAS approach. These metrics can reveal the differences between each alternative option and the average answer. As a result, higher PDA and lower NDA values indicate the best solution (Kahraman et al., 2017).

The method's steps are listed below.

Step 1: Select the most relevant features for describing decision alternatives for a particular DP.

Step 2: If x_{ij} is the performance rating of the i^{th} alternative ($A = \{A_1, A_2, \dots \dots A_n\}$) in terms of the j^{th} criterion ($C = \{C_1, C_2, \dots \dots C_m\}$). As a result, the following table and factors should be taken into account when constructing the interval decision matrix X and determining the weight of each criterion:

$$X = [x_{ij}]_{m\times n} \quad (1)$$

$$W = [w_j]_{1\times m} \quad (2)$$

for $i = (1,2,\dots,n)$ and $(j = 1,2,\dots,m)$, where w_j denotes the weight of the criterion j^{th}.

Step 3: According to the EDAS method's description, the average solution for all criteria must be computed using the formulas below:

$$AV_J = \frac{\sum_{i=1}^{n} x_{ij}}{n} \quad (3)$$

Step 4: In this phase, you must calculate PDA and NDA matrices based on the lower and upper values of the matrix, as shown:

$$PDA_{iJ} = \frac{\max(0,(x_{ij} - AV_j)}{AV_j} \quad (4)$$

$$NDA_{iJ} = \frac{\max(0,(AV_j - x_{ij})}{AV_j} \quad (5)$$

PDA_{iJ} and NDA_{iJ} represent the positive and negative distances of the i^{th} alternative from the average solution in terms of the j^{th} the criterion for the lower level of the decision matrix, respectively.

Step 5: From the average matrices, compute the weighted sum of the positive/negative distances:

$$SP_i = \sum_{j=1}^{m} w_j PDA_{ij} \quad (6)$$

$$SN_i = \sum_{j=1}^{m} w_j NDA_{ij} \quad (7)$$

Step 6: Calculate the normalized SP_i and SN_i values for each choice, as indicated below:

$NSP_i = \frac{SP_i}{Max_i(SP_i)}$ (8)

$NSN_i = 1 - \frac{SN_i}{Max_i(SN_i)}$ (9)

Step 7: Calculate the appraisal score AS for each option, as illustrated below:

$AS_i = \frac{1}{2}(NSP_i + NSN_i)$ where $0 \le AS_i \le 1.$ (10)

Step 8: Sort the options by assessment score AS_i in decreasing order. The candidate with the highest AS_i is the best pick among the candidate alternatives.

IF set

Zadeh's FS theory (Zadeh, 1965) has inspired extensive interest in various domains, particularly those where traditional mathematical methodologies fail, such as biological and social sciences, linguistics, psychology, economics and soft sciences. Variables are challenging to measure in such fields, and variable dependencies are so ill-defined that exact characterisation using algebraic, difference or differential equations is almost impossible. Therefore, applying fuzzy rather than crisp techniques to arrive at a solution may be required or preferred, even in fields with well-defined variable relationships. Atanassov's IF sets (Atanassov, 1986) are particularly well suited to coping with vagueness among higher-order fuzzy sets. The concept of an IF set can be considered an alternate technique for creating an FS when available knowledge is insufficient to define an imprecise term using a regular FS (Li, 2004). IF set's are an expansion of Zadeh's concept of fuzzy sets (FS). It helps us with unknown model data by adding a degree to the equation (Liu & Wang, 2007).

In Atanassov's IF set theory, in addition to the degree of membership defined in the range [0,1], the degree of non-membership defined in the range [0,1] is defined. In traditional FS theory, membership and non-membership degrees exist. Therefore, the total is calculated to be one. However, in IF set theory, the total of these two values can be less than 1. As a result, a third parameter called hesitancy degree is used to equalize the total to 1 (Yildirim & Meydan, 2020).

The IF set A in X is expressed as $A = \{(x, \mu_A(x), \nu_A(x)) | x \in\}$ when X is a non-empty set. It defined the degree of belonging of the element x to the set A as $\mu_A(x)$, the degree of non-belonging as $\nu_A(x)$, and the hesitation index as $\pi_A(x)$ in IF set theory. According to IF set theory, the total of the degrees of belonging and not belonging takes a value in the range [0,1]. $0 \le \mu_A(x) + \nu_A(x) \le 1$. The level of hesitation is whether any element x belongs to set A or not. The equation is used to calculate it (Koc, 2020).

$\pi_A(x) = 1 - \mu_A(x) - \nu_A(x)$ (11)

Below are the arithmetic operators for IFN.

Definition 1: Let $A = (\mu_x, \nu_x)$ and $B = (\mu_y, \nu_y)$ be two IFN with parameters and λ a constant number greater than zero. Operations with IFN are given below.

$A \oplus B = (\mu_x + \mu_y - \mu_x.\mu_y, \nu_x.\nu_y)$ (12)

$A \otimes B = (\mu_x.\mu_y, \nu_x + \nu_y - \nu_x.\nu_y)$ (13)

$\lambda. A = \left(1 - (1 - \mu_x)^\lambda, {\nu_x}^\lambda\right),\ \lambda > 0$ (14)

$A^\lambda = \left({\mu_x}^\lambda, 1 - (1 - \nu_x)^\lambda\right),\ \lambda > 0$ (15)

Definition 2: Let $\partial_x = (\mu_x, \nu_x)$) be an IFN with parameters.

$S(\partial_x) = (\mu_x - \nu_x), h(\partial_x) = (\mu_x + \nu_x)$ (16)

are called the IFN ∂_x's scoring function and accuracy function, respectively, where $S(\partial_x) \in [-1,1]$ and $h(\partial_x) \in [0,1]$ represent net membership and accuracy degree, respectively. Later, in Definition 3, Xu, Wan and Xie (2015) altered the score function and defined the new score function.

Definition 3: Let $\partial_x = (\mu_x, \nu_x)$ be an IFN. Then

$S^*(\partial_x) = \frac{1}{2}(S(\partial_x) + 1), h(\partial_x) = \frac{1}{2}(\mu_x + \nu_x)$ (17)

$S^*(\partial_x) \in [0,1]$ and $h(\partial_x) \in [0,1]$ are obvious.

Let $\partial_y = (\mu_y, \nu_y)$ and $\partial_z = (\mu_z, \nu_z)$ be two IFN with parameters.

If $S^*(\partial_y) < S^*(\partial_z)$, then $\partial_y < \partial_z$ (18)

If $S^*(\partial_y) = S^*(\partial_z)$, then $\partial_y = \partial_z$ (19)

IF-EDAS method

The correctness of the decision maker's (DM) evaluations is critical to the decision process' effectiveness. However, as the number of criteria and alternatives in the choice process grows, as does the DM's level of expertise, the way they perceive the situation and other factors, the process begins to appear unclear. There is uncertainty and ambiguity in the decision-making process (DMP). To get around this, intuitive fuzzy numbers are employed. For this purpose, the EDAS method is integrated with IFN in this study. The steps of the IF-EDAS method are given below. (Yildirim & Meydan, 2021).

Step 1: Determine the DMs' weights. The evaluations made by each member of the decision-making expert group are used to create the decision matrix. Using linguistic variables aids each expert's evaluation of alternatives based on criteria. Linguistic variables in the table are transformed into IFN and written into the decision matrix.

To rate the kth DM, let $D_k = [\mu_k, \nu_k, \pi_k]$ be an IFN. The weight of the kth DM can then be calculated using the following equation (Boran, Genc, Kurt & Akay, 2009):

$$\lambda_k = \frac{(\mu_k+\pi_k\left(\frac{\mu_k}{\mu_k+\nu_k}\right))}{\sum_{k=1}^{l}(\mu_k+\pi_k\left(\frac{\mu_k}{\mu_k+\nu_k}\right))} \text{ and } \sum_{k=1}^{l}\lambda_k = 1 \quad (20)$$

Step 2: Create the combined IF decision matrix based on DMs' perspectives. To establish a combined IF decision matrix in a group DMP, all personal decision views must be combined into a group opinion. As a result, the Intuitive Fuzzy Weighted Average (IFWA) operator proposed by Xu (2007) is used.

$$r_{ij} = IFWA_\lambda(r_{ij}^{(1)}, r_{ij}^{(2)}, \ldots \ldots . r_{ij}^{(l)}) = r_{ij}^{(1)}\lambda_1 \oplus r_{ij}^{(2)}\lambda_2 \oplus \ldots \ldots \oplus r_{ij}^{(l)}\lambda_l$$

$$= \left[1 - \prod_{k=1}^{l}\left(1-\mu_{ij}^{(k)}\right)^{\lambda_k}, \prod_{k=1}^{l}\left(\nu_{ij}^{(k)}\right)^{\lambda_k}, \prod_{k=1}^{l}\left(1-\mu_{ij}^{(k)}\right)^{\lambda_k} - \prod_{k=1}^{l}\left(\nu_{ij}^{(k)}\right)^{\lambda_k}\right] \quad (21)$$

Here $r_{ij} = \left(\mu_{Ai}(x_j), \nu_{Ai}(x_j), \pi_{Ai}(x_j)\right)$ $(i = 1,2 \ldots . m; j = 1,2 \ldots . n)$

Step 3: Determine the average solution values (AV)

The IF weighted arithmetic mean IWAM (Tikhonenko-Kedziak & Kurkowski, 2016) operator is used to calculate the mean solution values.

$$AV_J = \text{IWAM}(x_{ij}) = \left[1 - \prod_{k=1}^{l}\left(1-\mu_{ij}\right)^{1/l}, \prod_{k=1}^{l}\left(\nu_{ij}\right)^{1/l}\right] \quad (22)$$

Step 4: Determine the distances from the mean that are positive (PDA) and negative (NDA).

Score function values are used to determine PDA and NDA values. This computation is done using the equation below.

$$PDA_{iJ} = \left[PDA_{iJ}\right]_{mxn} \frac{\max\left(0, \left(S(x_{ij}) - S(AV_j)\right)\right)}{S(AV_j)} \quad (23)$$

$$NDA_{iJ} = \left[NDA_{iJ}\right]_{mxn} = \frac{\max\left(0, \left(S(AV_j) - S(x_{ij})\right)\right)}{S(AV_j)} \quad (24)$$

Step 5: Determine the criteria's weights. Not all criteria may be equally important. For example, W stands for a collection of elementary grades. To get W, all of the various DMs' perspectives on the relevance of each criterion must be combined.

Let $W_j^{(k)} = [\mu_j^{(k)}, \nu_j^{(k)}, \pi_j^{(k)}]$ be an IF number assigned by the kth DM to criterion Xj. The weights of the criterion are then determined using the IFWA operator Xu (2007):

$$W_j = IFWA_\lambda(W_j^{(1)}, W_j^{(2)}, \ldots \ldots . W_j^{(l)}) = \lambda_1 W_j^{(1)} \oplus \lambda_2 W_j^{(2)} \oplus \ldots \ldots \oplus \lambda_l W_j^{(l)}$$

$$= \left[1 - \prod_{k=1}^{l}\left(1-\mu_j^{(k)}\right)^{\lambda_k}, \prod_{k=1}^{l}\left(\nu_j^{(k)}\right)^{\lambda_k}, \prod_{k=1}^{l}\left(1-\mu_j^{(k)}\right)^{\lambda_k} - \prod_{k=1}^{l}\left(\nu_j^{(k)}\right)^{\lambda_k}\right] \quad (25)$$

$W = [W_1, W_2, W_3 \ldots . . W_j]$ here$W_j = (\mu_j, \nu_j, \pi_j)$ $(j = 1,2 \ldots . n)$

Step 6: Normalized weighted distances are calculated.

First, the criteria weights, PDA and NDA calculated in the previous step are used in conjunction with equations 6-7 to calculate the SP_i and SN_i values. Using the given SP_i and SN_ivalues, equation 8-9 is applied to get normalized weighted distances.

Step 7: Determining the assessment score (AS) and ranking

In the final step, each alternative's assessment score (AS) is calculated using Equation (10). Sorting the AS values from most significant to most minuscule yields the rank of the alternatives.

Application

Ten hotels in the Cappadocia region are chosen to study hotel websites. The top 10 hotels that obtained five stars in 2021, according to the customer reviews on the website http://www.boutiquesmallhotels.com/ are included in the evaluation. In addition, 16 criteria are selected based on past website evaluation research in the literature (Ip, Law, & Lee, 2012; Akincilar & Dagdeviren, 2014; Ostavara & Shahraki, 2019; Roy, Sharma, Kar, Zavadskas & Saparauskas, 2019; Baki, 2020; Ramyar et al.,2020; Mahdi & Esztergár-Kiss, 2021). Table 1 shows the criteria determined. Every criterion is regarded as a benefit criterion.

Table 1: Criteria Set

Website Evaluation Criteria	**Criteria Abbreviation**
Hotel introduction	C1
Hotel facilities information	C2
Location information	C3
Transportation information	C4
Reservation information	C5
Security	C6
Privacy	C7
Site design	C8
Accessibility	C9
Interactivity	C10
Personalization	C11
Usability	C12
Fulfillment	C13
Response time (speed)	C14
Online forum	C15
Links to other related businesses	C16

Table 2 lists the web addresses of the ten hotels chosen http://www.boutiquesmallhotels.com/.

Table 2: Hotel Web Address

Hotel Name	Hotel Abbreviation	Web Address
Kaya Evler by Esbelli Evi	Ka1	https://www.kayaevler.com/tr/en
Kapadokya Hill Hotel & Spa	Kh2	https://www.kapadokyahill.com/
Tafana Cave & Stone Lodge	Tc3	https://www.tafanacsl.com/
Magic Cave House Hotel	Mc4	http://www.magiccavehouse.com/
Phocas Cave Suites	Pc5	http://phocascavesuites.com/
Marvel of Cappadocia	Ma6	https://www.marvelofcappadocia.com/
Anatolian House	Ah7	https://www.anatolianhouses.com.tr/en
Lunar Cappadocia Hotel	Lc8	https://lunarcappadocia.com/
Exedra Hotel Cappadocia	Ec9	https://www.exedracappadocia.com/tr/en
Hotel Karlıkevi	Hk10	https://www.karlikevi.com/

The EDAS method, recently proposed in the literature and successfully used in many decision-making issues, has been chosen to evaluate hotel websites. The EDAS approach is combined with IF numbers, allowing linguistic considerations in the decision-making process and flexibility for the decision-maker to deal with the inherent uncertainty in the decision-making process. It is required to organize a decision-making group before advancing with the IF-EDAS phases. An expert group of academics working in this field has been constituted for this aim. According to their years and expertise, the instructors have been classed as extremely important or moderate using the language phrases in Table 3. The importance weights in the evaluation are calculated for each decision-maker using Equation 20, and the results are shown in Table 4. This expert weight number represents how much each expert's opinion will be represented in the composite decision matrix.

Table 3: Linguistic Terms used to Determine the Importance Levels of the Expert Team

LT	IFN
Very Important	0.80-0.10
Important	0.50-0.30
Medium	0.50-0.50
Unimportant	0.30-0.50
Very Unimportant	0.20-0.70

The expert weights are given in Table 4.

Table 4: Expert Group's Importance Ratings

EG	Importance Ratings	IF Numbers	Λ
Ex1	Very Important	0.80-0.10	0.428
Ex2	Important	0.50-0.30	0.332
Ex3	Medium	0.50-0.50	0.240

The expert group graded the websites of 10 hotels based on 16 criteria. Table 6 shows the outcomes of the evaluation. To ensure that each expert's judgments are more successful, the language terms given in Table 5 are applied.

Table 5: Linguistic Terms and IF Numbers

Linguistic Terms	Linguistic Terms	IF Numbers
Very Important	Very Good	0.75-0.10-0.15
Important	Good	0.60-0.25-0.15
Medium	Medium	0.50-0.50-0.00
Unimportant	Bad	0.25-0.60-0.15
Very Unimportant	Very Bad	0.10-0.75-0.15

Table 6: Evaluation Results

	Criteria	Ex1	Ex2	Ex3		Criteria	Ex1	Ex2	Ex3
	C1	G	G	G		C1	G	VG	VG
	C2	VG	M	G		C2	G	G	VG
	C3	G	VG	M		C3	G	G	VG
	C4	VG	VG	B		C4	G	G	VG
	C5	M	VG	VB		C5	VG	VG	G
	C6	G	M	M		C6	VG	VG	M
	C7	G	VG	VB		C7	VG	G	M
Ka1	C8	M	VG	M	**Kh2**	C8	M	VG	VG
	C9	M	M	M		C9	M	G	G
	C10	M	VG	B		C10	M	VG	G
	C11	M	M	B		C11	M	B	G
	C12	G	B	M		C12	M	G	G
	C13	G	B	M		C13	M	G	M
	C14	G	G	G		C14	G	VG	VG
	C15	G	M	VB		C15	G	VG	B
	C16	B	G	VB		C16	M	G	M
	Criteria	**Ex1**	**Ex2**	**Ex3**		**Criteria**	**Ex1**	**Ex2**	**Ex3**
	C1	M	M	B		C1	VG	M	G
	C2	M	M	G		C2	VG	G	G
	C3	M	M	M		C3	VG	VG	G
	C4	M	M	G		C4	VG	G	VB
	C5	G	VG	G		C5	G	G	B
	C6	M	M	M		C6	G	M	B
	C7	M	VG	M		C7	G	G	M
Tc3	C8	M	G	VB	**Mc4**	C8	VG	G	M
	C9	G	G	VB		C9	G	B	M
	C10	M	B	G		C10	G	B	B
	C11	M	M	VB		C11	G	M	B
	C12	M	VG	M		C12	G	B	M
	C13	M	B	M		C13	G	B	M
	C14	M	M	M		C14	G	M	M
	C15	M	G	B		C15	VG	G	B
	C16	M	VG	VB		C16	G	G	M
	Criteria	**Ex1**	**Ex2**	**Ex3**		**Criteria**	**Ex1**	**Ex2**	**Ex3**
	C1	VG	G	VG		C1	VG	G	G
	C2	VG	G	VG		C2	VG	M	G
	C3	VG	VG	G		C3	VG	G	G
Pc5	C4	VG	B	M	**Ma6**	C4	VG	B	M
	C5	VG	M	G		C5	VG	VG	G
	C6	G	M	G		C6	G	B	M
	C7	G	M	G		C7	G	B	M
	C8	VG	VG	G		C8	VG	G	G
	C9	G	G	G		C9	G	G	G

	C10	G	G	G		C10	G	G	G
	C11	G	G	M		C11	G	B	M
	C12	G	B	G		C12	VG	G	G
	C13	G	VG	G		C13	G	VG	M
	C14	G	M	G		C14	G	G	M
	C15	B	M	B		C15	M	M	B
	C16	VG	M	VG		C16	G	G	VB
Ah7	**Criteria**	**Ex1**	**Ex2**	**Ex3**	Lc8	**Criteria**	**Ex1**	**Ex2**	**Ex3**
	C1	VG	G	VG		C1	VG	VG	G
	C2	G	M	VG		C2	VG	G	VG
	C3	G	VG	G		C3	VG	B	G
	C4	G	G	M		C4	VG	B	M
	C5	G	M	VG		C5	G	G	G
	C6	G	VG	M		C6	G	VG	M
	C7	G	B	M		C7	G	M	M
	C8	G	B	VG		C8	G	VG	B
	C9	G	B	G		C9	G	VG	G
	C10	VG	G	M		C10	G	B	M
	C11	G	G	G		C11	G	VG	B
	C12	VG	VG	G		C12	G	M	M
	C13	G	M	G		C13	G	G	G
	C14	G	M	G		C14	G	M	G
	C15	G	VG	G		C15	M	M	B
	C16	G	G	M		C16	M	G	VB
Ec9	**Criteria**	**Ex1**	**Ex2**	**Ex3**	Hk10	**Criteria**	**Ex1**	**Ex2**	**Ex3**
	C1	VG	VG	VG		C1	VG	M	G
	C2	VG	M	VG		C2	VG	M	G
	C3	VG	M	G		C3	VG	G	M
	C4	VG	VG	M		C4	G	M	B
	C5	VG	M	G		C5	G	M	G
	C6	VG	G	M		C6	VG	G	M
	C7	VG	VG	M		C7	G	M	M
	C8	G	VG	G		C8	G	M	M
	C9	G	VG	G		C9	G	M	G
	C10	G	G	M		C10	G	B	M
	C11	G	B	M		C11	G	B	M
	C12	G	M	G		C12	G	M	M
	C13	G	M	M		C13	G	G	M
	C14	G	G	G		C14	G	G	G
	C15	M	G	B		C15	G	VG	B
	C16	G	G	B		C16	G	M	B

To avoid information loss in expert evaluations, the findings of the evaluations are integrated as group thinking. A combined decision matrix is obtained using the IFWA operator (Xu, 2007). As a result, DMs with varying degrees of competence and knowledge are appropriately involved in the process (Aloini, Dulmin, Mininno, Pellegrini & Farina, 2018). Finally, the information provided by the three experts and the IFWA operator is merged to create the combined decision matrix in Table 7.

Table 7: The Combined Decision Matrix

	C1			C2			C3			C4		
Ka1	(0.600	0.250	0.150)	(0.666	0.212	0.122)	(0.639	0.218	0.143)	(0.656	0.162	0.182)
Kh2	(0.692	0.163	0.145)	(0.642	0.221	0.137)	(0.642	0.221	0.137)	(0.642	0.221	0.137)
Tc3	(0.450	0.522	0.028)	(0.526	0.423	0.051)	(0.500	0.500	0.000)	(0.526	0.421	0.051)
Mc4	(0.666	0.212	0.122)	(0.673	0.169	0.158)	(0.718	0.125	0.157)	(0.603	0.219	0.178)
Pc5	(0.708	0.149	0.143)	(0.708	0.149	0.143)	(0.718	0.125	0.157)	(0.480	0.395	0.125)
Ma6	(0.673	0.169	0.158)	(0.666	0.212	0.122)	(0.673	0.169	0.158)	(0.575	0.247	0.178)
Ah7	(0.708	0.149	0.143)	(0.615	0.288	0.097)	(0.653	0.184	0.163)	(0.577	0.295	0.128)
Lc8	(0.718	0.125	0.157)	(0.708	0.149	0.143)	(0.597	0.226	0.177)	(0.575	0.247	0.178)
Ec9	(0.750	0.100	0.150)	(0.686	0.188	0.126)	(0.660	0.212	0.122)	(0.730	0.148	0.122)
Hk10	(0.666	0.212	0.122)	(0.666	0.212	0.122)	(0.655	0.195	0.146)	(0.499	0.388	0.113)
	C5			C6			C7			C8		
Ka1	(0.536	0.323	0.141)	(0.545	0.353	0.102)	(0.602	0.228	0.170)	(0.597	0.293	0.110)
Kh2	(0.718	0.125	0.157)	(0.730	0.148	0.122)	(0.655	0.199	0.146)	(0.661	0.219	0.210)
Tc3	(0.653	0.184	0.163)	(0.500	0.500	0.000)	(0.621	0.293	0.086)	(0.465	0.439	0.096)
Mc4	(0.535	0.308	0.157)	(0.499	0.388	0.113)	(0.577	0.295	0.128)	(0.655	0.199	0.146)
Pc5	(0.666	0.212	0.122)	(0.569	0.298	0.133)	(0.569	0.298	0.133)	(0.718	0.125	0.157)
Ma6	(0.718	0.125	0.157)	(0.480	0.395	0.125)	(0.480	0.395	0.125)	(0.673	0.169	0.158)
Ah7	(0.615	0.288	0.097)	(0.639	0.218	0.143)	(0.480	0.395	0.125)	(0.559	0.295	0.146)
Lc8	(0.600	0.250	0.150)	(0.639	0.218	0.143)	(0.545	0.353	0.102)	(0.602	0.228	0.170)
Ec9	(0.666	0.212	0.122)	(0.655	0.195	0.146)	(0.730	0.148	0.122)	(0.653	0.184	0.163)
Hk10	(0.569	0.298	0.133)	(0.655	0.195	0.146)	(0.545	0.353	0.102)	(0.545	0.353	0.102)
	C9			C10			C11			C12		
Ka1	(0.500	0.500	0.000)	(0.556	0.306	0.138)	(0.450	0.522	0.028)	(0.480	0.395	0.125)
Kh2	(0.560	0.336	0.104)	(0.661	0.219	0.120)	(0.516	0.397	0.087)	(0.560	0.336	0.104)
Tc3	(0.514	0.325	0.161)	(0.516	0.397	0.087)	(0.450	0.522	0.028)	(0.621	0.293	0.086)
Mc4	(0.480	0.395	0.125)	(0.427	0.413	0.160)	(0.499	0.388	0.113)	(0.480	0.395	0.125)
Pc5	(0.600	0.250	0.150)	(0.600	0.250	0.150)	(0.577	0.295	0.128)	(0.507	0.334	0.159)
Ma6	(0.600	0.250	0.150)	(0.600	0.250	0.150)	(0.480	0.395	0.125)	(0.673	0.169	0.158)
Ah7	(0.507	0.334	0.159)	(0.655	0.199	0.146)	(0.600	0.250	0.150)	(0.718	0.125	0.157)
Lc8	(0.653	0.184	0.163)	(0.480	0.395	0.125)	(0.602	0.228	0.170)	(0.545	0.353	0.102)
Ec9	(0.653	0.184	0.163)	(0.577	0.295	0.128)	(0.480	0.395	0.125)	(0.569	0.298	0.133)
Hk10	(0.569	0.298	0.133)	(0.480	0.395	0.125)	(0.480	0.395	0.125)	(0.545	0.353	0.152)
	C13			C14			C15			C16		
Ka1	(0.480	0.395	0.125)	(0.600	0.250	0.150)	(0.477	0.409	0.114)	(0.364	0.473	0.163)
Kh2	(0.525	0.397	0.078)	(0.692	0.163	0.145)	(0.602	0.228	0.170)	(0.525	0.397	0.078)
Tc3	(0.428	0.531	0.036)	(0.500	0.500	0.000)	(0.465	0.439	0.096)	(0.621	0.298	0.086)
Mc4	(0.480	0.395	0.125)	(0.545	0.353	0.102)	(0.620	0.208	0.172)	(0.577	0.295	0.128)
Pc5	(0.653	0.184	0.163)	(0.569	0.298	0.133)	(0.345	0.449	0.206)	(0.708	0.149	0.143)
Ma6	(0.639	0.218	0.143)	(0.577	0.295	0.128)	(0.450	0.522	0.028)	(0.577	0.295	0.128)
Ah7	(0.569	0.298	0.133)	(0.569	0.298	0.133)	(0.653	0.184	0.163)	(0.577	0.295	0.128)
Lc8	(0.600	0.250	0.150)	(0.569	0.298	0.133)	(0.450	0.522	0.028)	(0.465	0.439	0.096)
Ec9	(0.545	0.353	0.102)	(0.600	0.250	0.150)	(0.465	0.439	0.096)	(0.577	0.295	0.128)
Hk10	(0.577	0.295	0.128)	(0.600	0.250	0.150)	(0.602	0.228	0.170)	(0.499	0.388	0.113)

The weight of each criterion in the decision issue is not equal. In addition, the importance of the criteria varies depending on the DM. As a result, the IF values assigned to the criteria by each DM should be combined. Decision-makers use the language phrases in Table 5 to assess the value of the criterion. Table 8 shows the importance levels assigned to the criterion by each DM.

Table 8: DM' Importance Levels

Criteria	Ex1	Ex2	Ex3
C1	VI	M	I
C2	VI	M	VI
C3	I	VI	I
C4	I	VI	I
C5	I	I	I
C6	VI	I	VI
C7	VI	M	VI
C8	M	M	M
C9	I	VI	I
C10	M	M	I
C11	I	B	M
C12	M	M	I
C13	I	I	M
C14	M	M	I
C15	I	B	M
C16	I	B	B

The IFWA operator and calculations in Equation 21 are used to obtain the weight values of the criteria. Table 9 shows converting the values to real numbers using the determined weights score function.

Table 9: Weight Values of Criteria

W	Obtained values	S(W)
W1	(0.666 0.212 0.122)	0.727
W2	(0.686 0.188 0.126)	0.749
W3	(0.653 0.184 0.163)	0.735
W4	(0.653 0.184 0.163)	0.735
W5	(0.600 0.250 0.150)	0.675
W6	(0.708 0.149 0.143)	0.780
W7	(0.686 0.188 0.126)	0.749
W8	(0.500 0.500 0.000)	0.500
W9	(0.653 0.184 0.163)	0.735
W10	(0.526 0.423 0.051)	0.552
W11	(0.480 0.395 0.125)	0.543
W12	(0.526 0.423 0.051)	0.552
W13	(0.577 0.295 0.128)	0.641
W14	(0.526 0.423 0.051)	0.552
W15	(0.480 0.395 0.125)	0.543
W16	(0.427 0.413 0.160)	0.507

The IF weighted arithmetic mean (IWAM) (Tikhonenko-Kedziak & Kurkowski, 2016) operator is used to calculate the average solution values and the operations in Equation 22. Table 10 shows the calculated average solution values transformed to exact numbers using the scoring function.

Table 10: The Average Solution Values

	C1	C2	C3	C4	C5	C6	C7	C8
S(AV)	0.573	0.565	0.575	0.574	0.573	0.565	0.565	0.573
	C9	C10	C11	C12	C13	C14	C15	C16
S(AV)	0.570	0.569	0.559	0.567	0.564	0.565	0.570	0.562

The PDA and NDA distances from the average solution are determined individually using Equations 21 and 22 and are shown in Table 11.

Table 11: PDA and NDA Distances

PDA																
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
Ka1	0.178	0.287	0.236	0.301	0.058	0.055	0.216	0.138	0.000	0.098	0.000	0.000	0.000	0.195	0.000	0.000
Kh2	0.334	0.258	0.236	0.238	0.390	0.400	0.288	0.258	0.074	0.267	0.001	0.079	0.000	0.353	0.205	0.004
Tc3	0.000	0.000	0.000	0.000	0.282	0.000	0.175	0.000	0.043	0.000	0.000	0.171	0.000	0.000	0.000	0.177
Mc4	0.269	0.331	0.385	0.206	0.071	0.000	0.135	0.271	0.000	0.000	0.000	0.000	0.000	0.055	0.239	0.141
Pc5	0.360	0.380	0.385	0.000	0.269	0.125	0.125	0.390	0.184	0.186	0.147	0.034	0.302	0.125	0.000	0.387
Ma6	0.312	0.287	0.308	0.157	0.390	0.000	0.000	0.312	0.184	0.186	0.000	0.326	0.260	0.135	0.000	0.141
Ah7	0.360	0.174	0.277	0.117	0.158	0.258	0.000	0.103	0.029	0.279	0.208	0.405	0.127	0.125	0.289	0.141
Lc8	0.390	0.380	0.192	0.157	0.178	0.258	0.055	0.199	0.289	0.000	0.229	0.051	0.197	0.125	0.000	0.000
Ec9	0.440	0.326	0.259	0.378	0.269	0.292	0.400	0.282	0.289	0.127	0.000	0.121	0.057	0.195	0.000	0.141
Hk10	0.269	0.287	0.270	0.000	0.109	0.292	0.055	0.040	0.115	0.000	0.000	0.051	0.137	0.195	0.205	0.000
NDA																
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
Ka1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.123	0.000	0.169	0.043	0.038	0.000	0.063	0.207
Kh2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tc3	0.190	0.023	0.130	0.037	0.000	0.115	0.000	0.105	0.000	0.016	0.169	0.000	0.205	0.115	0.100	0.000
Mc4	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.048	0.108	0.005	0.043	0.038	0.000	0.000	0.000
Pc5	0.000	0.000	0.000	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.214	0.000
Ma6	0.000	0.000	0.000	0.000	0.000	0.040	0.039	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.186	0.000
Ah7	0.000	0.000	0.000	0.000	0.000	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Lc8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.000	0.186	0.086
Ec9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.100	0.000
Hk10	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.046	0.029	0.000	0.000	0.000	0.000	0.011

The SP_i and SN_i values are generated using Equations 6-7, and the criteria weights acquired using the IFWA operator are combined with the PDA and NDA calculated in the preceding phase. AS_i are determined by averaging the NSP_i and NSN_i values, which were calculated by proportioning the SP_i and SN_i values to their highest values using Equations 8-9. The websites of 10 hotels are ranked from highest to lowest in evaluation scores. Table 12 shows the SP, NSP, SN, NSN and assessment scores (AS) acquired during the analysis.

Table 12: Results and Rank

Hotels		SP	NSP	SN	NSN	AS	Rank
Ka1	Kaya Evler by Esbelli Evi	1.214	0.496	0.369	0.520	0.508	9
Kh2	**Kapadokya Hill Hotel & Spa**	2.258	0.924	0.000	1.000	**0.962**	**1**
Tc3	Tafana Cave & Stone Lodge	0.537	0.220	0.770	0.000	0.110	10
Mc4	Magic Cave House Hotel	1.392	0.569	0.159	0.793	0.681	8
Pc5	Phocas Cave Suites	2.192	0.897	0.157	0.797	0.847	4
Ma6	Marvel of Cappadocia	1.933	0.791	0.177	0.770	0.781	5
Ah7	**Anatolian House**	1.931	0.790	0.029	0.962	**0.876**	**3**
Lc8	Lunar Cappadocia Hotel	1.846	0.755	0.170	0.779	0.767	6
Ec9	**Exedra Hotel Cappadocia**	2.445	1.000	0.070	0.909	**0.955**	**2**
Hk10	Hotel Karlıkevi	1.390	0.569	0.070	0.909	0.739	7

According to the findings, Kapadokya Hill Hotel & Spa has the best hotel website performance, followed by Exedra Hotel Cappadocia and Anatolian House. Tafana Cave & Stone Lodge, Kaya Evler by Esbelli Evi and Magic Cave House Hotel are the last three on the list. Tafana Cave & Stone Lodge had the lowest hotel website rating.

Sensitivity analysis

The criterion weights have a considerable impact on the ordering of the alternatives. As a result, it's worth looking into how potential changes in relative weights would affect the final ranking because the criteria weights are determined by decision-maker opinion. In this case, it's vital to examine how the findings alter if each criterion's weight is increased or decreased. A sensitivity study is performed to see how changing criteria weights affects ranking. A case is constructed, so one criterion's linguistic phrases are modified while the others remain unchanged. Table 13 shows the changed criteria and the resulting rankings.

Table 13: Sensitivity Analysis

Case Number	Ex1	Ex2	Ex3	Ranking
CN1	M	M	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN2	I	I	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN3	M	I	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN4	VI	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN5	M	I	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN6	M	M	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN7	I	I	I	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN8	VI	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN9	M	I	M	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN10	I	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN11	M	I	I	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN12	VI	VI	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN13	I	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN14	VI	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN15	M	I	VB	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.
CN16	VI	I	VI	Kh2 >Ec9>Ah7>Pc5>Ma6>Lc8>Hk10>Mc4>Ka1>Tc3.

As shown in Table 13, the performance of hotel websites is calculated for 16 different scenarios. When the findings are examined, it is discovered that the specified criteria weight changes do not affect the ranking of the options. The results demonstrate the consistency of the proposed model.

Conclusions and discussion

Websites have evolved into a tool for hotels to provide their services online. Travellers benefit from online bookings such as quick price comparisons and reduced travelling costs (Xue, Jo & Bonn, 2020). Throughout the pandemic, consumers' excitement for online buying has risen even more. As a consequence, assessing the quality of hotel websites is crucial. In the context of the hotel industry, website quality evaluation is also a very appealing and vital topic. The current study used an efficient IF-EDAS technique to analyze and rank hotel websites of Cappadocia Hotels in Turkey.

It's sometimes impossible to make decisions based on precise numbers. It is more appropriate to express the assessment values as FNs due to the inherent ambiguity of human preferences and the fuzziness and unpredictability of things. Expert attribute weights are offered through approaches which cannot always avoid subjective unpredictability in the expert's preference. Furthermore, due to time constraints and a lack of data, it is becoming increasingly difficult for experts to provide precise and complete preference information in many real-life decision circumstances. One of the reasons for this is that fuzziness and uncertainty are not adequately considered in the DMP. In order to account for the fuzziness and ambiguity in the DMP, this study employs IF numbers.

Based on the calculated criteria weight values, it has been determined that security, privacy and hotel facility information are the most critical factors in evaluating the hotel website quality. The following three criteria in the ranking, which are location information, transportation information and accessibility criteria, are equally important. The criterion of site design is deemed to be the least important. The relevance of security and privacy criteria is high in the evaluation. In contrast, site design criteria are low, which is consistent with the findings of the Akincilar and Dagdeviren (2014), Samad, Nilashi and Ibrahim (2019) and Baki (2020) studies. The top three hotels in terms of website quality are Kapadokya Hill Hotel & Spa, Exedra Hotel Cappadocia and Anatolian House. Tafana Cave & Stone Lodge, Kaya Evler by Esbelli Evi and Magic Cave House Hotel are the hotels at the bottom of the ranking. It may be inferred that the websites of these hotels need to be improved. The consistency of the proposed model is also demonstrated with the sensitivity analysis. It has been discovered that the criteria weight alterations do not affect the ranking of the options.

This research makes three contributions: it provides the most appropriate evaluative criteria for analyzing hotel website quality, applies the IF-EDAS approach in the hotel industry context, and proposes an IF decision approach for assessing hotel website quality. This study will likely be helpful to both researchers interested in hotel website quality evaluations and holidaymakers contemplating a trip to Cappadocia.

Ten hotels in the Cappadocia region are chosen for the study based on customer ratings of 5 stars on http://www.boutiquesmallhotels.com/. Based on various studies in the literature, 16 criteria are developed to evaluate hotel websites. These can be considered the study's limitations.

Changes in the criteria used in the analysis and their significance will cause the ranking results to change. From this perspective, the topic might be researched further in future studies using various criteria groups. Various fuzzy or intuitionistic fuzzy MCDM may be used in the following studies. The obtained ranking results can be compared to the current study's findings. The levels of correlation between ranking results can be investigated, and combined ranking results can be generated.

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