Comparative Evaluation Study of Websites of China-based Luxury Hotels and International Luxury Hotels

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Abstract

Practitioners in the hotel industry constantly seek ways to improve their online and offline presence to improve their competitiveness and profitability. Consumers from different countries differ in their preferences for color, pictures, navigation, and site structure, which affect the performance of hotel websites. To connect industry efforts with consumer requirements, this study adopts a website usefulness framework to compare the websites of China-based luxury hotels with those of international luxury hotels. A fuzzy model is applied to analyze the data collected from online users. Findings of this study will be utilized to assess the perceptions of Chinese and international users and to compare the performance of the websites of China-based luxury hotels with those of international luxury hotels. Results show that Chinese and international consumers significantly differ in their perception of the usefulness performance of China-based and international luxury hotel websites.

Keywords: consumer online preference, China-based hotel, hotel websites, fuzzy evaluation, website performance

Introduction

Information and communication technologies influence human activities. With the formation of various online societies, these technologies have revolutionized the tourism industry and the purchasing behavior of tourists toward travel-related products (Buhalis, 2003; Bai, Law, & Wen, 2008). Hotel consumers seek great value, cheap price, and hotel-related recommendations by using numerous distribution and recommender sites on the Internet. Various distribution channels, including the hotel's own website, affiliates of Online Travel Agencies (OTAs), and review sites (e.g., TripAdvisor), offer hotel consumers numerous options within their chosen segment and location (Tan & Dwyer, 2014). With the rapid development of the Internet, online platforms have become popular distribution channels for hotels (Sun, Law, Schuckert, & Fong, 2015). Further, adopting more distribution channels enhances the potential of hotels in increasing their room reservation rate (O'Connor & Murphy, 2008). However, hoteliers have to face the challenge of controlling the multitude of distribution and sales channels (Dev & O'Connor, 2015). Direct channels (e.g., hotel website) provide hoteliers a direct control over lowering transaction costs compared with other indirect channels (e.g., OTAs) (Beritelli & Schegg, 2016). In addition, direct engagement with consumers increases loyalty through better customer service. Therefore, attracting bookings to hotel websites seems an ideal mechanism for taking control of online distribution channels. Thus, providing a high-quality and friendly interface and supplementing it with appropriate service in the hotel website is the first step in attracting online bookings. Although hotel websites are globally accessible, users from different regions may have different preferences and perceptions.

The globalization and localization of consumer preferences are challenging hotel developments (Liu, Guillet, Xiao, & Law, 2014). Ting et al. (2013) stated that cross-regional comparative studies are necessary because of the effect of cultural factors on the online behavior of consumers. To show that culture affects consumer web preference, Idler (2013) applied the cross-cultural research of Hofstede (2001) in determining the influence of cultural differences on values according to website design. To attract consumers from different countries, many business websites have been carefully designed with different cultural values in mind (Idler, 2013). However, most studies that assessed the performance of hospitality websites have focused on developing a new process, framework, or measurement and often used a single country (often Western) as the context (Morrison, Taylor, Morrison, & Morrison, 1999; Frey, Schegg, & Steiner, 2002; Escobar-Rodŕguez & Carvajal-Trujilli, 2013; Dickinger & Stagl, 2013, Akincilar & Dagdeviren, 2014). By contrast, few studies have compared consumer perceptions on the quality of hotel websites in two countries (Law, Ho, & Cheung, 2004; Schmidt, Cantallops, & Santos, 2008). The findings of these studies reveal the basic performance of websites and answer whether hotel websites perform differently based on their regional setting.

The present study attempts to fill the research gap by conducting a comparative study that determines the differences in the website usefulness performance between the websites of China-based and international luxury hotels based on the perceptions of Chinese and international consumers. Luxury hotels are accommodation establishments that offer expensive and elegant choices of accommodations, such as rooms with high-quality furnishings, linens, and amenities. The websites of luxury hotels were selected because, compared with economy or budget hotels, luxury hotels often have stronger financial background and are likely to provide high-standard

services. The term "China-based hotel" implies that the hotel is owned and managed by a Chinese company and represents the uniqueness of the Chinese market (Law & Cheung, 2008). By contrast, "international hotel" refers to an internationally owned hotel or a hotel that is operated by an overseas organization (Kong & Cheung, 2009). The selection of these two types of luxury hotel aims to stress the uniqueness of website management in different regions.

The current study is structured as follows. An overview of related literature on online information search and hotel website evaluation is presented. An introduction of the market in China follows. Then, the Methodology section discusses the data collection and analysis. The main findings of this study are then presented, followed by the discussion and conclusion. The conclusion comprises the summary of the main findings, contribution to the literature, and suggestions for future studies.

Literature Review

Hotel websites, which provide the most comprehensive official information among all the other online channels, play an essential role in hotel marketing and online booking (Ting, Wang, Bau, & Chiang, 2013). Hotel promotions are currently distributed throughout various Internet platforms, such as official hotel websites, travel intermediaries, national tourism boards, and online social media (O'Connor, 2010; Sun, Fong, Law, & Luk, 2015). Online social media differs from traditional channels because it provides a new start for the promotion of hotel products online (Sun, Fong, Law, & Luk, 2015). Online promotion plays an important role in the "pre-trip" and "post-trip" stages of information gathering, decision making for purchasing, and

sharing travel experience (Leung, Law, van Hoof, & Buhalis, 2013; Xiang, Magnini, & Fesenmaier, 2015; Xiang & Gretzel, 2010). Consumers value the information from online social media because of the unique consumer-generated information from other travelers (Gretzel, 2006; Pan, MacLaurin, & Crotts, 2007). Despite its popularity, online social media platforms still serve as sources of information. An official hotel website, which represents the hotel itself, maintains competitiveness among hotel companies in the industry and strives to improve website performance to deliver the best online service to their consumers (Baloglu & Pekcan, 2006; Paraskevas, Katsogridakis, Law, & Buhalis, 2011).

Quality of Hotel Websites

Hotel website quality has been extensively investigated in the past decade and has been recognized as the most popular topic in the assessment of tourism-related website performance (Law, Qi, & Buhalis, 2010). A qualified and well-performing hotel website should be efficient, informative, and user friendly (Jeong & Lambert, 2001). Thus, the usefulness of hotel websites is gauged by the effectiveness of their performance in terms of functionality and usability (Lu & Yeung, 1998). Bai, Law, and Wen (2008) reported that customer satisfaction can be influenced by website functionality and usability, which consequently affect purchase intention. *Website functionality* is the most critical element that contributes to the usefulness of a website (Ip, Law, & Lee, 2012). It is described as the ability of a website to provide comprehensive information on a hotel and its features (Lu & Young, 1998). Several published articles have assessed the content and features of hospitality-related websites (Morrison et al., 1999; Wan, 2002; Huang & Law, 2003; Baloglu & Pekcan, 2006; Schmidt et al., 2008; Xiong, Cobanoglu, Cummings, & DeMicco,

2009; Ip, Law, & Lee, 2012). *Website usability* is also important to a hotel website, which can be described according to the level of user friendliness of the website design (Lu & Young, 1998). Park, Gretzel, and Sirakaya-Turk (2007) discovered that the ease of use is the most important dimension in determining consumer willingness to use a site. Ease of use significantly contributes to the overall attractiveness of websites because most consumers leave a website when they find difficulty in navigating or searching for information (Roy, Dewit, & Aubert, 2001; Nielsen & Norman, 2000). Most published articles invite potential consumers as evaluators to measure the effectiveness, user friendliness, and attractiveness of a website (Frey et al., 2002; Kline et al., 2004; Essawy, 2006; Akincilar & Dagdeviren, 2014).

Perceived hotel website performance from consumer perceptions

Consumer's needs and requirements on a website are often determined by website evaluation, which is the most frequently used method to reflect the website performance (Lu & Yeung, 1998; Faba-Perez & Moya-Anegon, 2005). Most of the website evaluation studies focused on developing new evaluation methods or modified the existing websites using various frameworks (Law, Qi, & Buhalis, 2010). Table 1 listed the major studies that focus on the hotel consumers' perceptions and intentions based on the results of the hotel website evaluation. The studies are categorized into four types.

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The first category is the studies that focus on assessing the performance of hotel website content and functions based on consumers' online satisfaction (Liang & Law, 2003). Ting, Kuo, and Li (2012) stated that website content and its functions can directly influence customer preferences

and decisions. Website functionality represents a website's comprehensiveness and its features. Law and Cheung (2005) conducted the first study that introduced the list of hotel website functionalities to the literature. They categorized website functionality into four dimensions: hotel general information, reservation information, website management, and surrounding information. "Hotel general information" refers to the mechanism through which a hotel introduces products and services to potential consumers (Jayakumar & Mukhopaghayay, 2013). "Reservation information" refers to the functions and information about hotel room booking (Ip, Law, & Lee (2012). "Website management" refers to online services and features that help hotels to communicate with potential consumers (Escobar-Rodríguez & Carvajal-Trujillo, 2013). A well-managed hotel website can impress consumers through its effectiveness in providing valuable information on webpages (Nysveen, Methlie, & Pedersen, 2003). "Surrounding information" refers to the means that hotels use to introduce a destination prior to their arrival (Zafiropoulos & Vrana, 2006).

Previous studies attempted to obtain consumer requests on the functionality of hotel websites. Liang and Law (2003) adopted the functionality list in the study of Law and Cheung (2005) and evaluated the functionality performance of China-based hotel websites based on consumer satisfaction. They found that the performance of China-based hotel websites is poor and that no significant difference is observed on the website performance scores among the different categories of China-based hotels (Liang & Law, 2003). Hsu, Zhu, and Agrusa (2004) tested the language capability, the travel-related information, and the transaction capability of five-star hotels in China. The results also show that while a high percentage of Chinese hotels offer bilingual or multilingual information on their websites, most of the online reservation systems

are only available in English. This lack of consistency between the front-end of the website and the back- end (transaction processing) can hinder the effectiveness of a hotel website from generating revenue from non -English-speaking customers. Ting, Kuo, and Li (2012) evaluated 158 hotel websites in Taiwan and China according to three dimensions: feature breadth, stage of website development, and feature enrichment. They found that these hotels emphasize features on their websites differently and that the degree of website robustness ranks as follows: Taiwanese international tourist hotels, Taiwanese ordinary tourist hotels, Chinese five-star hotels, and Chinese four-star hotels.

The second category focuses on assessing the communication between hotel website and its users. The design of website usability is often used to determine consumers' experience and the interaction on hotel websites (Schmidt, Cantallops, & Santos, 2008). Au Yeung and Law (2006) developed a comprehensive usability list and adopted a heuristic algorithm to evaluate 77 Hong Kong hotel websites. In their study, website usability has five aspects, namely, *navigation*, *website friendliness*, *language*, and *overall layout and appearance*. *Navigation* refers to the ease of navigation and finding the desired products (Schmidt et al., 2008; Panda, Swain, & Mall, 2015). *Website friendliness* is the ease of understanding the structure of a website, its functions, interface, and the contents that can be observed by the user (Belanche, Casaló, & Guinalíu, 2012). Douglas and Mills (2004) stated that consumers' online satisfaction is influenced by the ease of exploring webpages for information searching and that a good user-friendly system of a web site leads to a positive first impression (Yang, Li, Kim, & Kim, 2015). *Language* refers to the number of available languages, which denotes perceptions of a wide range of potential customers from different geographical regions (Scharl, Wöber, & Bauer, 2004; Lee & Kozar, 2012).

Overall layout and appearance refers to the manner by which a web site displays information and the ability of users to control the usage of the website (Flavia'n, Guinalı, & Gurrea, 2006).

The third category comprise studies that concentrate on developing new evaluation frameworks or models for hotel websites. Zafiropoulos and Vrana (2006) proposed an evaluation framework for hotel websites, which categorizes web information services into six information dimensions: facilities, guest contact, reservation/price information, surrounding area, management of website, and company profile. Ting, Wang, Bau, and Chiang (2013) analyzed the top 100 independent hotels on 4 continents. Their study demonstrated the application of a modified extended Model of Internet Commerce Adoption technique for technical depth and content analysis for breadth as well as inferential statistics and perceptual mapping. The results of the website evaluation modeling suggest that Asia-based hotel websites emphasize on real-time interaction services and privacy policies with more features than those of the other continents, Europe-based hotel websites emphasize online and multi-language support, Africa-based hotel websites emphasize travel tips and weather information services, and US-based hotel websites have advanced Web 2.0 features.

The fourth category comprises studies that focus on applying marketing models in hotel website evaluations. Murphy, Forrest, Wotring, and Brymer (1996) analyzed the marketing performance of US-based hotel websites and offered suggestions for improvement on providing comprehensive information online. Huang and Law (2003) applied 8Ps and 4Cs theories to assess the promotions on China-based hotel websites. Schegg, Steiner, Frey, and Murphy (2002) used a benchmark method to test the website quality and their online strategies. Essawy (2006)

applied a protocol analysis to determine consumers' purchase intention, revisit intention, and recommendations.

Previous studies provided good examples on establishing comprehensive website evaluation measurements and frameworks. The current research adopted the evaluation measurements from previous studies; both website functionality and usability criteria were selected to reflect the overall usefulness performance of a hotel website. With the continuous development of websites, such studies only managed to present snapshots of the current performance of the selected websites. More importantly, only a few studies paid attention to the difference in consumer perceptions and website performance across different regions. Previous studies are often limited in terms of the presentation of website quality in one region. The comparison of their views on different hotel websites in different regions was generally ignored. Asia, the USA, and certain European countries are major regions for hospitality-related website evaluations (Ip, Law, & Lee, 2011). Nonetheless, studies have yet to compare the performances of hotel websites in different regions. The rapid growth of the outbound and inbound tourism market in China has demonstrated huge potential in its domestic and international tourism industry. Therefore, the current study aims to determine the difference in the website usefulness performance between China-based and international luxury hotels.

Hotel website development in China

Studies on eTourism in China started to increase in 2006 (Zhong, Leung, Law, & Wu, 2013). An increasing number of studies focused on assessing the content comprehensiveness, usability, and effectiveness of travel-related websites (Lian, 2007a; Wu, Lu, & Liu, 2004; Hu, Cheung, & Law,

2008). In spite of the growing importance of the Chinese hospitality industry and of Internet applications on hotel promotions, Liang and Law (2003) found that the performance of China-based hotel websites is poor and that no significant difference is observed on the website performance scores among the different categories of China-based hotels. Basic information about the hotel and its facilities are provided on a typical Chinese hotel website; most of the hotel websites do not have other value-added links, such as travel partners, local attractions, or other sites, that will provide travelers with a one-stop travel-related shopping site (Hsu, Zhu, & Agrusa, 2004).

Cultural factors have been found to strongly affect website presentation and content (Robbins & Stylianou, 2003), as well as the online preferences of consumers (Liao, Proctor, & Salvendy, 2009). Ting, Wang, Bau, and Chiang (2013) stated that Asia-based hotel websites emphasize on real-time interaction services and privacy policies with more features than those of the other continent. However, existing studies merely compared consumer perceptions of Chinese consumers and those from other regions (Liao et al., 2009; Fong & Burton, 2008). Nevertheless, few studies have compared the functionality of luxury hotels in Hong Kong and Mainland China and found that hotels in Hong Kong are selected for direct comparison with their China-based counterparts because the former are generally regarded as having an international standard (Huang & Law, 2003).

In sum, the existing literature fails to explain whether factors from a Western perspective are applicable to the Chinese context. The differences between the websites of China-based and international luxury hotel remain unexplored. To fill these research gaps, the current study

presents an extended website usefulness list to simultaneously evaluate hotel website usability and functionality and to calculate evaluation results by using the fuzzy TOPSIS method. As opposed to traditional website evaluation studies, the present study develops an approach that integrates a fuzzy mathematical model with a set of measurements for the evaluation of hotel websites. The findings are expected to provide hotel practitioners with a deeper understanding of webpage design and development and to allow them to provide better service to their consumers from different backgrounds and regions.

Methodology

To evaluate and compare China-based and international luxury hotel websites, this study adopted a fuzzy TOPSIS method for data analysis. Different from the models, which collect consumers' perceptions by numbers, fuzzy set theory represents the consumers' perspectives by fuzzy linguistic variables in fuzzy numbers. Fuzzy linguistic variables is used to capture the evaluators' judgments, including their preference for linguistic terms (Zadeh, 1965). Human judgments and preferences are often vague. Hsu and Chen (1997) suggested that linguistic assessments should replace numerical values to accurately identify ratings and weights. The fuzzy TOPSIS and the analytic hierarchy process (AHP) are frequently used fuzzy methods to solve multi-attribute decision-making problems. Fuzzy AHP utilizes pair comparisons to determine the weight of the evaluation attributes, which hardly maintains the accuracy of the result (Kahraman, Çevik, Ates, & Gülbay, 2007). Additionally, the fuzzy TOPSIS approach has been extensively applied by researchers to determine certain aspects, such as hotel service quality evaluation (Benítez, Martín, & Román, 2007), plant location (Chu, 2002), aggregation of production planning (Wang & Liang, 2004), and the performance of traffic police centers (Sadi-Nezhad & Khalili-Damghani,

2010). However, the performance of these studies is limited by their weighting of the hierarchical framework and their inability to produce simple and readable findings. The method applied in this study can thus be described as identifying and applying multiplicity criteria to assess the performance of China-based and international luxury hotel websites. The present study adopted the modified fuzzy TOPSIS proposed by Chu and Lin (2003) and used triangular fuzzy numbers to determine the degree of importance of each criterion and to quantify the performance of each hotel website. The methodology flow chart of this study is presented in Figure 1, and the calculation process of this model is explained in Appendix A.

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Data collection

Both quantitative and qualitative approaches were adopted to collect the perceptions of respondents on the websites of China-based and international luxury hotel. A quantitative approach anchored on a questionnaire was developed to collect the perceived importance of website usefulness. The responses of the participants were recorded through a set of prepared questions. The original questionnaire was developed in English and was translated to Chinese through a translation-back-translation process to ensure the accuracy of translation for Chinese-speaking respondents. The questionnaire was divided into three sections. The first section was composed of a qualifying question that asked the respondents whether they have visited luxury hotel websites. Only customers who have visited luxury hotel websites were qualified as respondents. The second section was designed to determine the respondents' perceived importance of the functionality and usability attributes of luxury hotel websites. The respondents were instructed to scale importance by using linguistic terms that range from "very important" to "very unimportant." These terms are represented by the triangular fuzzy numbers (Figure 2). The

third section collected demographic data, such as age, gender, monthly household income, and educational attainment. This study used purposive sampling of nonprobability design and selected consumers who had searched luxury hotel information in the past 24 months. The questionnaire was distributed at the reception areas of luxury hotels or tourism attractions in Mainland China, USA, and Hong Kong. All of the questionnaires were personally collected by the researcher. Consumers were informed that answering the questionnaire is voluntary. Upon accomplishment of the survey, a pen was given as a gift.

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A qualitative approach was adopted to evaluate the usefulness of China-based and international luxury hotel websites. Travelers who go online have high expectations from high-level hotels. However, Law and Cheung (2005) found that consumers have different perceptions on the website performance of independent and chain hotels (Liang & Law, 2003). Therefore, only chain and independent hotels were selected in the present study. Independent hotels are hotels that are managed independently and are not franchised nor affiliated with a member organization. In addition, the evaluation of luxury hotel websites could reflect the maximum requirements of consumers for hotel websites and allow hoteliers to review their objectives and modify their own websites.

To reach the minimum sample size for a normal sampling distribution required for completing the independent *t*-test, 30 China-based and 30 international luxury hotels were selected (Mendenhall & Beaver, 1995). International luxury hotels were randomly selected from the publication, "The Leading Hotels of the World" (pages 9, 12, and 15 to 96) (Romanella & Chung,

2007); both independent and chain hotels were selected. China-based luxury hotels were chosen from the top 30 Chinese cities that received more than 200,000 inbound tourists (CNTA, 2013). The hotels were randomly selected from Ctrip.com, which is the top online travel operator website in China that provides a star-related hotel list. The hotel section in the Ctrip website was selected, and the name of each city was entered. The third China-owned and China-managed hotel in the five-star hotel list of each city was then selected, and the English versions of these websites were assessed.

The researcher adopted the nonprobability convenient sampling method by inviting a sufficient number of student evaluators. The basic requirement for evaluators is experience in online hotel booking. An English test result is an important element for entry into postgraduate study in China. Therefore, all of the Chinese evaluators had educational backgrounds that were higher than postgraduate level to ensure their proficiency in evaluating hotel websites in the English language. The collection of evaluation results was completed in 2013; two participant groups were formed to avoid personal bias. When evaluators were unable to decide, they could discuss with their peers prior to decision making. The 60 websites selected for evaluation were categorized into 12 evaluation groups, comprising six Chinese and six international groups. Each group was assigned five hotel websites. Responses to questions were represented by linguistic terms, ranging from “very good” to “very poor” (Figure 2). The researcher was present to answer questions specific to the questionnaire. Some attributes reflected objective aspects that cannot be tested using the perspective of the consumers. These attributes are “Option for different browser versions or design for common browsers” and “Download/response speed of website page or function.” Therefore, these two attributes were dropped during the evaluation process. In

addition, online reservation was tested during the evaluation process. The evaluators were instructed to make an actual room reservation online. The reservation process was halted at the stage of filling personal information and submitting payment.

Findings

The importance of the functionality attributes is presented in Table 2. Findings demonstrated that most functionality attributes received relatively high scores from both Chinese and international consumers. However, some attributes were perceived as less important than others. These items included "Online forum (BBS or providing a link to a third-party website)," "Staff directory search function," "Create or modify personal profile for customers," "Links to other related businesses," and "Availability of virtual tours/video files of the hotel." Considering the low-level importance of these attributes, hotel website designers may consider spending less effort on them. Nonetheless, the two groups held different perspectives on functionality attributes. The score for the attribute "Room availability" from international consumers was higher than the score from Chinese consumers. Chinese consumers were more concerned about attributes, such as "Price ranges of different products/services," "Online forum (BBS or providing a link to a third-party website)," "Links to other related businesses," and "Product warranty/legality."

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Table 3 shows the respondents' perceptions of website usability attributes in Chinese and international respondents. The findings imply that international consumers were more concerned about exploring a website, given that the attribute, "Structure is easy to understand," received a

higher score than the other usability attributes. Chinese consumers considered "Website information credibility (update/accurate information)" to be important.

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Functionality performance of China-based and international luxury hotel websites

A hotel website is expected to present basic information, such as introduction, location, facilities, and contact information (Law & Hsu, 2006). Tables 4 and 5 show the performance of the hotel website functionality based on the perceptions of Chinese and international evaluators.

The functionality performance perceived by Chinese users is displayed in Table 4. Results indicate that international luxury hotels received high scores from Chinese evaluators. By contrast, China-based luxury hotels performed poorly in most of the listed attributes. The attributes, "Online forum (BBS or providing a link to a third-party website)" and "Staff directory search function," received the lowest scores. Statistical results showed that significant differences were found between these two groups of hotel websites. "Hotel description (hotel introduction)," "Hotel facilities (guest rooms, restaurants, and meeting facilities)," "Room rate," "Staff directory search function," "Links to other related businesses," "Product warranty/legality," and "Airport information" were found to be differently presented on China-based and international luxury hotel websites based on the perceptions of Chinese users. Hoteliers should concentrate on improving these attributes based on the requirements of Chinese consumers.

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Table 5 shows the perceptions on the functionality performance of hotel websites of international evaluators. China-based luxury hotel websites received low scores in most of the functionality

attributes from international users. However, these scores are relatively higher than those from Chinese evaluators. The results reveal that international luxury hotels provided better website functionality than China-based luxury hotels. Statistical results showed that performance differences were found among the "Room rate," "Payment options" and "Worldwide reservations phone number." This finding implied that international consumers do not significantly differ in preference on the difference of website functionality attributes; hoteliers can also base on this difference to revise the content of their websites.

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Usability performance of China-based and international luxury hotel websites

Commercial websites should carefully design their usability because these directly affect consumer purchase intention (Panda, Swain & Mall, 2015). Tables 6 and 7 present the evaluation results of Chinese and international evaluators.

Table 6 presents the perceptions on usability performance of hotel websites of the Chinese evaluators. The websites of China-based luxury hotels performed better in website usability compared with functionality performance. Chinese evaluators gave the lowest score to China-based hotels in "Download and print function" and "Inform users of long downloading time." International luxury hotels received a higher score from Chinese users compared with China-based hotels. Statistical results showed significant differences between China-based and international hotels in terms of the attributes, "Design an internal search engine," "Download and print function," "Inform users of long downloading time," "Utility of the transaction function," and "Multiple language versions of website." Apparently, Chinese consumers concentrated on

the speed of hotel websites and their language visions. Hoteliers should improve their websites accordingly to attract Chinese consumers.

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Table 7 shows that the websites of international hotels received higher scores from international evaluators compared with China-based hotel websites. Statistical results showed that these two groups performed differently on "Design an internal search engine," "Provide navigation options/navigation system," "Eliminate horizontal and vertical scrolling," "Download and print function," "Inform users of long downloading time," "Website information credibility (updated/accurate information)," "Multiple language versions of website," "Spelling and grammatical errors," and "Use of common words instead of Internet jargon/popular buzzwords." Apparently, international consumers have more requirements in website usability, except for the web page download speed and language version offered by websites; navigating the website and validating its information credibility is given more concern by international consumers.

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Conclusion and Contributions

This research determined the differences between Chinese and international consumers in terms of hotel website preference. The study revealed the characteristics of China-based and international hotel websites and discussed the applications of the research findings. Despite previous efforts to investigate the perceptions and evaluation of consumers on website performance, previous studies rarely focused on the different requirements of consumers from the different regions and compared these differences based on their evaluation result.

Specifically, these prior studies merely assessed certain parts of the websites, often deriving unrepresentative or incomprehensive evaluation results. Therefore, this study is expected to add to the existing theoretical knowledge by providing comparative results on hotel website evaluation based on consumers from different regions.

A good website should have excellent usability and functionality (Law, 2007). Otherwise, consumers will miss important functions because of poor usability or opt for alternative and expensive distribution channels or different hotels altogether. The websites of international luxury hotels generally exhibited better performance than their China-based counterparts. The websites of China-based hotels performed poorly in most of the functionality and usability attributes. This finding implies that international hotel websites fulfilled the requirements of most consumers with different backgrounds. This condition is probably attributed to the more established eCommerce practices in international hotels and the higher level of competition, which has raised the level of design. On the other hand, China-based hotels should revise and improve their style in presenting hotel information online; otherwise, they will lose their consumers to their international competitors.

However, the websites of international luxury hotels have issues in terms of website management, website navigation dimensions, and internal links to third-party websites, probably because they are not updated frequently. International consumers have a higher satisfaction level than Chinese consumers. Thus, they were more disappointed with the performance of attributes in website structure and online communication than their China-based counterparts. Chinese consumers

were disappointed in more attributes, particularly those related to destination transport, booking information, navigability, and online print services on international websites. Hotel websites should consider providing multiple communication channels with detailed information, such as "Staff directory search function" and "Check-in and check-out time," to fulfill the increasing requirements of online consumers. International hotel websites should provide detailed information on the hotels and destination information with internal links to better address the needs of Chinese consumers. Online service can be improved by ensuring that consumers can easily contact the hotel staff for assistance. Websites with multiple-language versions are also required for people from different countries.

China-based luxury hotel websites performed poorly overall and received relatively low scores from both Chinese and international users. Respondents were confused and dissatisfied with the websites that presented an unclear structure, meaningless content titles, and functions with empty contents. Compared with Chinese users, international users gave higher scores to China-based websites as indicated by their higher satisfaction level on the usability performance of China-based hotel websites. China-based luxury hotel websites performed poorly in website management and surrounding area information, particularly in such aspects as the lack of multimedia information, direct contact channels, and detailed destination information. This situation should be addressed because the use of multimedia in presenting products could attract the attention of more Chinese consumers (Bai, Law, & Wen, 2008). Fong and Burton (2008) found that Chinese consumers prefer collecting information online but lack the experience in using websites. China-based hotel websites have difficulty in providing a user-friendly structure and useful links to certain information on their websites. Poor website management and lack of

destination information may drive consumers to patronize other hotels. Furthermore, although international users have fewer requirements on the quality of destination information, they have high requirements on web structure and information credibility. A website with poor information management and low information credibility will confuse the decision making of consumers.

The findings of this study will benefit hotel practitioners as they can obtain a better understanding of their consumers on the performance of China-based hotel websites. Qi, Law, and Buhalis (2008) stated that the construction level of Chinese tourism websites is low and that these websites often imitate foreign ones. The present study provided insight into the differences between China-based and international hotel websites in terms of usefulness and performance. Education and building expertise is crucial in improving design and usability.

Further, the findings imply that Chinese and international users have different requirements on hotel website performance. Chinese consumers search for hotel information and compare prices rather than book online. Generally, they use search engines to find target hotels and make hotel reservations on trusted travel agencies online and offline. They are more concerned with website content, particularly content understandability. When Chinese consumers encounter difficulties online, they prefer to seek direct help from a hotel website (Fong & Burton, 2008). Chinese consumers are concerned with the value of their stay; therefore, they pay more attention to room price, product warranty/legality, and feedback from other visitors. International and Chinese consumers shares similar attitudes in most of the usability attributes. They are concerned with information credibility and the clarity of a website structure, suggesting that hoteliers should

concentrate on website speed, updating of information, and ease of use. However, hoteliers should pay less attention to label designs and multimedia information. To the degree that both Chinese inbound and outbound tourism is increasing rapidly and that online reservations are becoming the norm, hotels that understand the needs of their customers and develop advanced web sites to serve their needs will strengthen their competitiveness in the future.

Research Limitation

This study is the first to evaluate the overall performance of both China-based and international hotel websites by using a fuzzy model. This research establishes a general description of the characteristics of Chinese and international users and compares the difference between the websites of China-based and international luxury hotels. Future research should consider including more attributes by using an advanced testing method. Moreover, only English-version webpages were evaluated. Future studies may consider recruiting consumers who have stayed at luxury hotels and used both English and Chinese versions of web sites. Furthermore, this study excluded website interaction with consumers, such as online functions (e.g., social media and mobile apps), in the evaluation list. Future studies may consider including these attributes in website evaluation as well.

REFERENCES

Akincilar, A., & Dagdeviren., M. (2014). A hybrid multi-criteria decision making model to evaluate hotel websites. *International Journal of Hospitality Management*, 36(2), 263– 271.

Au Yeung, T., & Law, R. (2006). Evaluation of usability: A Study of hotel websites in Hong Kong. *Journal of Hospitality & Tourism Research*, 30(4), 452-473.

Bai, B., Law, R., & Wen, I. (2008). The impact of website quality on customer satisfaction and purchase intentions: Evidence from Chinese online visitors. *International Journal of Hospitality Management*, 27(3), 391-402.

Baloglu, S., & Pekcan, Y. A. (2006). The website design and Internet site marketing practices of upscale and luxury hotels in Turkey. *Tourism Management*, 27(1), 171-176.

Belanche, D., Casaló, L. V., & Guinalíu, M. (2012). Website usability, consumer satisfaction and the intention to use a website: The moderating effect of perceived risk. *Journal of Retailing and Consumer Services*, 19(1), 124-132.

Benítez, J. M., Martin, J. C., & Román, C. (2007). Using fuzzy number for measuring quality of service in the hotel industry. *Tourism Management*, 28 (2), 544-555.

Beritelli, P., & Schegg, R. (2016), Maximizing online bookings through a multi-channel-strategy: Effects of interdependencies and networks, *International Journal of Contemporary Hospitality Management*, 28(1), 68–88.

Buhalis, D. (2003). *eTourism: Information technology for strategic tourism management. London*: Pearson (Financial Times/Prentice Hall).

Chu, T-C., & Lin, Y. C. (2003).A Fuzzy TOPSIS method for robot selection. *International Journal of Advanced Manufacturing Technology*, 21 (5), 284-290.

Chu, T-C. (2002). Facility location selection using fuzzy TOPSIS under group decisions. *International Journal of Uncertainty Fuzziness and Knowledge Based Systems*, 22 (4), 687-701.

China National Tourism Administration (CNTA) (2013). *Statistical report*. http://en1.cnta.gov.cn/html/tjzlm/index.html [Accessed on 22 December 2013]

Dev, C., & O'Connor, P. (2015) Challenge the Middlemen? *Harvard Business Review*, Dec., 119-123

Dickinger, A., & Stagl, B. (2013). Website performance and behavioral consequences: A formative measurement approach. *Journal of Business Research*, 66(4), 771-777.

Douglas, A., & Mills, J. E. (2004). Staying afloat in the tropics: Applying a structural equation model approach to evaluating National Tourism Organization websites in the Caribbean. *Journal of Travel & Tourism Marketing*, 17(2/3), 269-293.

Escobar-Rodŕguez, T., & Carvajal-Trujillio, E. (2013). An evaluation of Spain hotel websites: Information vs. relational strategies. *International Journal of Hospitality Management*, 33(3), 228-239.

Essawy, M. (2006). Testing the usability of hotel websites: The springboard for customer relationship building. *Information Technology & Tourism*, 8(1), 47-70.

Faba-Perez, C. Guerrero-Bote, V. P., & de Moya-Anegon, F. (2005). Self-organizing maps of Web spaces based on formal characteristics. *Information Processing and Management*, 41(2), 331-346.

Flavia n, C., Guinalıu, M., & Gurrea,R., (2006). The role played by perceived usability, satisfaction and consumer trust on website loyalty. *Information and Management*, 43(1),1–14.

Fong, J., & Burton, S. (2008). A cross-cultural comparison of electronic word-of-mouth and country-of-origin effects. *Journal of Business Research*, 61(3), 233-242.

Frey, S., Schegg, R., & Steiner, T. (2002). Benchmarking Internet use for the marketing of Swiss hotels. In K. W. Wöber, A. J. Frew, & M. Hitz (Eds.), *Information and Communication Technologies in Tourism 2002*, pp. 294-302. New York: Springer-Wien.

Gretzel, U. (2006). Consumer generated content–trends and implications for branding. *E-Review of Tourism Research*, 4(3), 9-11.

Hofstede, G. H., & Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage. Printed in United States of America.

Hsu, H. M., & Chen, C.T. (1997). Aggregation of fuzzy opinions under group decision making. *Fuzzy Sets and Systems*, 79 (2), 279-285.

Hsu, K., Zhu, Z., & Agrusa. J. (2004). Turning Click-Through Visitors into Customers: A Study of Chinese Hotel Websites. *Journal of Hospitality & Leisure Marketing*, 11(4), 81-91.

Hu, T., Cheung, C., & Law, R. (2008). A study of the availability of China-based travel websites based on the investigation of Haikou citizens. *Tourism Science*, 22(4), 47-52.

Huang, T., & Law, R. (2003). Modeling and comparing Internet marketing: A study of mainland China based and Hong Kong based hotel websites. In A. J. Frew, M. Hitz, & P. O'Connor (Eds.), *Information & Communication Technologies in Tourism 2003*, pp. 173-182. New York: Springer-Wien.

Idler, S. (2013). *How to design for a cross-cultural user experience* (part 1/2). http://blog.usabilla.com/designing-for-a-cross-cultural-user-experience-part1/[Accessed on 20 August 2014]

Ip, C., Law, R., & Lee, H. A. (2012). The evaluation of hotel website functionality by fuzzy analytic hierarchy process. *Journal of Travel & Tourism Marketing*, 29(3), 263-278.

Ip, C., Law, R., & Lee AL. (2011). A review of website evaluation studies in the tourism and hospitality fields from 1996 to 2009. *International Journal of Tourism Research*, 13(3), 234-265.

Jayakumar, R., & Mukhopaghayay, B. (2013). Website quality assessment model (WQAM) for developing efficient elearning framework-A novel approach. *International Journal of Engineering and Technology*, 5(5), 3770-80.

Jeong, M., & Lambert, C. U. (2001). Adaptation of an information quality framework to measure customers‘ behavioral intentions to use lodging websites. *International Journal of Hospitality Management*, 20(1), 129-146.

Kahraman, C., Çevik, S., Ates N. Y., & Gülbay, M. (2007). Fuzzy multi-criteria evaluation of industrial robotic systems. *Computers & Industrial Engineering*, 14(1), 27-39.

Kline, S. F., Morrison, A. M., & John, A. (2004). Exploring bed and breakfast websites: A balanced scorecard approach. *Journal of Travel and Tourism Marketing*, 17(2/3), 253-267.

Kong, H., & Cheung, C. (2009). Hotel development in China: a review of the English Language literature. *International Contemporary Hospitality Management*, 21(3), 341-355.

Law, R., & Cheung, C. (2008). *Analysing China-based hotel websites*. Tourism Development revisited concepts, Issues and Paradigms. Edited by Sutheesshna Babu. S, Sitikantha. Mishria, and Bivraj Bhusan. Published bb Vivek Mehra for Response Books. Chaman Enterprises, New Delhi. pp.273-284. ISBN 9780761936336

Law, R., & Hsu, C. H. (2006). Importance of hotel website dimensions and attributes: Perceptions of online browsers and online purchasers. *Journal of Hospitality & Tourism Research*, 30(3), 295-312.

Law R., & Cheung C. (2005). Weighing of Hotel Website Dimensions and Attributes in Frew A.J. (ed.) Proceedings of the International Conference on *Information and Communication Technologies in Tourism* 2005, Springer Wien New York, pp.350-359.

Law, R. (2007). A fuzzy multiple criteria decision-making model for evaluating travel websites. *Asia Pacific Journal of Tourism Research*, 12(2), 147-159.

Law, R., Ho, D., & Cheung, C. (2004). A study of the functionality of hotel websites in mainland China and the United States. *Journal of the Academy of Business and Economics*, 3(1), 202-209.

Law, R., Qi, S., & Buhalis, D. (2010). Progress in tourism management: a review of website evaluation in tourism research. *Tourism Management*, 31 (3), 297–313.

Lee, Y., & Kozar, K. A. (2012). Understanding of website usability: Specifying and measuring constructs and their relationships. *Decision Support Systems*, 52(2), 450-463.

Leung, D., Law, R., van Hoof, H., & Buhalis, D. (2013). Social media in tourism and hospitality: a literature review. *Journal of Travel & Tourism Marketing*, 30(1), 3-22,

Lian, H. Y. (2007a). Government tourism website construction and function evaluation and counter measure suggestion. *Special Zone Economy*, (6), 184–185.

Liang, K., & Law, R. (2003). A modified functionality performance evaluation model for evaluating the performance of China based hotel websites. *Journal of Academy of Business and Economics*, 2(2), 193-208.

Liao, H., Proctor, R.W., & Salvendy, G. (2009). Chinese and US online consumers' preferences for content of e-commerce websites: a survey. *Theoretical Issues in Ergonomics Science*, 10 (1), 19-42.

Liu. W., Guillet. D., Xiao. Qu., & Law. R. (2014). Globalization or localization of consumer preferences: The case of hotel room booking. *Tourism Management*, 41(2),148-157.

Lu, M. T., & Yeung, W. L. (1998). A framework for effective commercial web application development. *Internet Research: Electronic Networking Applications and Policy*, 8(2), 166–173.

Mendenhall, W., & Beaver, R. (1995). Sampling distributions. In Hinrichs, C. (Eds.). *A brief course in business statistics* (pp. 176-211). Belmont, CA: Duxbury Press.

Morrison, A. M., Taylor, S. Morrison, A. J., & Morrison, A. D. (1999). Marketing small hotels on the World Wide Web. *Information Technology & Tourism*, 2(2), 97-113.

Murphy, J., Forrest, E. J., Wotring, C. E., & Brymer, R. A. (1996). Hotel management and marketing on the Internet. *Cornell Hotel & Restaurant Administration Quarterly*, 37(3), 70-82.

Nielsen, J., & Norman, D. A. (2000). *Usability on the Web isn't a luxury*. Information Week, (773), February 14, pp. 65-69.

Nysveen, H., Methlie, L. B., & Pedersen, P. E. (2003). Tourism web sites and valued-added services: The gap between customer preferences and web sties' offerings. *Information Technology & Tourism*, 5(3), 165–174.

O'Connor, P. & Murphy, J. (2008), Hotel yield management practices across multiple electronic distribution channels, *Information Technology & Tourism*, 10(2), 161-172.

O'Connor, P. (2010). Managing a hotel's image on TripAdvisor. *Journal of Hospitality Marketing & Management*, 19 (7), 754-772.

Pan, B., MacLaurin, T., & Crotts, J. C. (2007). Travel blogs and the implications for destination marketing. *Journal of Travel Research*, 46(1), 35-45.

Panda, S. K., Swain, S. K., & Mall, R. (2015). An Investigation into Usability Aspects of E-Commerce Websites Using Users' Preferences. *Advances in Computer Science: an International Journal*, 4(1), 65-73.

Paraskevas., A., Katsogridakis, I., Law, R., & Buhalis, D., (2011), Search Engine Marketing: Transforming Search Engines to Hotel Distribution Channels. *Cornell Hotel Restaurant Administration Quarterly*, 52(2). 232-244.

Park, Y.A., Gretzel, U., & Sirakaya. T. (2007). Turk Measuring website quality for online travel agencies. *Journal of Travel and Tourism Marketing*, 23 (1), 15–30.

Qi, S., Law, R., & Buhalis, D. (2008). Usability of Chinese destination management organization websites. *Journal of Travel & Tourism Marketing*, 25(2), 182-198.

Robbins, S.S., & Stylianou,A.C. (2003). Global corporate websites: an empirical investigation of content and design. *Information & Management*, 40(3), 205-212.

Romanella, J. J., & Chung, D. (2007).*The leading hotels of the World. Complimentary Copy printed in Singapore*. www.lhw.com [accessed 22 September 2014].

Roy, M.C., Dewitt, O., & Aubert, B. A. (2001).The impact of interface usability on trust in web retailers. *Internet Research*, 11(5), 388-398.

Sadi-Nezhad, S., & KhaliliDamghani, K. (2010). Application of a fuzzy TOPSIS method base on modified preference ratio and fuzzy distance measurement in assessment of traffic police centers performance. *Applied Soft Computing*, 10 (4), 1028-1039.

Scharl, A., Wöber, K., & Bauer, C. (2004).An integrated approach to measure Website effectiveness in the European hotel industry. *Information Technology & Tourism*, 6(4), 257-271.

Schegg, R., Steiner, T., Frey, S., & Murphy, J. (2002). Benchmarks of web site design and marketing by Swiss hotels. *Information Technology & Tourism*, 5(1), 73-89.

Schmidt, S., Cantallops, A. S., & Santos, C. P. (2008). The characteristics of hotel Websites and their implications for website effectiveness. *Tourism Management*, 28(2), 504-516.

Sun, S., Fong, L. H. N., Law, R., & Luk, C. (2015). An Investigation of Gen-Y's Online Hotel Information Search: The Case of Hong Kong. *Asia Pacific Journal of Tourism Research*, 1-14. http://dx.doi.org/10.1080/10941665.2015.1062405 [accessed 22 November 2015].

Sun, S., Fong, L. H. N., Law, R., & Luk, C. (2016). An investigation of Gen-Y's online hotel information search: The case of Hong Kong, *Asia Pacific Journal of Tourism Research*, 21(4), 171-185.

Tan, J., & Dwyer, L. (2014). Managing Distribution Channel Conflict in the Hotel Industry. *International Journal of Marketing & Business Communication*, 3(1), 9-19.

Ting, P-H., Kuo, C-F., & Li, C-M. (2012) What Does Hotel Website Content Say About a Property—An Evaluation of Upscale Hotels in Taiwan and China, *Journal of Travel & Tourism Marketing*, 29(4), 369-384.

Ting, P-H., Wang, S-T., Bau, D-Y., & Chiang, M-L. (2013). Website Evaluation of the Top 100 Hotels Using Advanced Content Analysis and eMICA Model. *Cornell Hospitality Quarterly*, 54(3), 284–293.

Wan,C.-S. (2002). The web sites of international tourist hotels and tour wholesalers in Taiwan. *Tourism Management*, 23(1), 155-160.

Wang, R. C., & Liang, T. F. (2004). Application of fuzzy multi-objective liner programming to aggregate production planning. *Computers and Industrial Engineering*, 46(1), 17-41.

Wu, H., Lu, Z., & Liu, N. (2004). Studies on function evaluation and strategies of tourism website in China. *Journal of Information*, 1(2), 72–74.

Xiang, Z. & Gretzel, U. (2010). Role of social media in online travel information search. *Tourism Management*, 31 (2), 179-188.

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of Retailing and Consumer Services*, 22(1), 244–249.

Xiong, L., Cobanoglu, C., Cummings, P & DeMicco, F. (2009). Website accessibility of U.S. based hospitality websites. In Höpken, W., Gretzel, U., & Law, R. (Eds.), *Information and Communication Technologies in Tourism 2009* (pp. 273-284). New York: Springer-Wien

Yang, K., Li, X., Kim, H., & Kim, Y. H. (2015). Social shopping website quality attributes increasing consumer participation, positive eWOM, and co-shopping: The reciprocating role of participation. *Journal of Retailing and Consumer Services*, 24(1), 1-9.

Zadeh, L. A. (1965). Fuzzy sets. *Information and Control*, 8(3), 338-353.

Zafiropoulos, C., & Vrana, V. (2006). A framework for evaluation of hotel websites: The case of Greece. *Information Technology & Tourism*, 8(3/4), 239-254.

Zhong, L., Leung, D., Law, R., & Wu, B, (2013). Etourismin China: A Review of the Chinese-Language Literature. *Asia Pacific Journal of Tourism Research*, 18(5), 464-482.

APPENDIX A:

Calculation Process of Modified Fuzzy TOPSIS Hierarchical Model

The evaluation problem is assumed to involve a set of A*j* website evaluation attributes (*j* = 1, 2, 3,…*n*) and R*t1* respondents (*t*1 = 1, 2, 3,…*k*1) that indicate the importance of these attributes. In addition, h*i* hotel websites (*i* = 1, 2, 3,…*m*) are evaluated by the E*t* evaluation groups (*t* = 1, 2, 3,...*k*) under A*j* attributes. R_{tij} and $W_{t_1 j}$ are linguistic variables that can be described using triangular fuzzy numbers (Kahraman, Çevik, Ates & Gülbay, 2007).

Average Weight and Rating

$W_j = (a_j, b_j, c_j)$, (*j* = 1, 2,…*n*) is the weight assigned by the respondent for the attributes in A_j and represents the average weights of attribute A_j across the *k*1 respondents. The average weight W_j of all attributes can be expressed as follows (Chu, 2002; Chu & Lin, 2003; Kahraman, Çevik, Ates, & Gülbay, 2007):

$$W_j = (a_j, b_j, c_j) = (\frac{1}{k_1}) \otimes (w_{j1} \oplus w_{j2} ..... \oplus w_{jk_1}) \text{.....}, (1)$$

where $a_j = \frac{\sum_{t_1=1}^{k_1} a_{jt_1}}{k_1}$, $b_j = \frac{\sum_{t_1=1}^{k_1} b_{jt_1}}{k_1}$, $c_j = \frac{\sum_{t_1=1}^{k_1} c_{jt_1}}{k_1}$.

$R_{ij} = (d_{ij}, e_{ij}, f_{ij})$, (*i* = 1, 2,…*m*; *j* = 1, 2,…*n*) represents the average ratings of the attributions of hotel websites h*i* under *k* evaluation groups. The average rating R_{ij} of all attributes of each hotel website h*i* can be calculated as follows (Chu, 2002; Chu & Lin, 2003; Kahraman et al., 2007):

$$R_{ij} = (d_{ij}, e_{ij}, f_{ij}) = (\frac{1}{k})(R_{ij1} \oplus R_{ij2} ..... \oplus R_{ijk}) \text{.....}, (2)$$

where $d_{ij} = \frac{\sum_{t=1}^{k} d_{ijk}}{k}$, $e_{ij} = \frac{\sum_{t=1}^{k} e_{ijk}}{k}$, $f_{ij} = \frac{\sum_{t=1}^{k} f_{ijk}}{k}$.

Therefore, W_j refers to the overall weight of website usefulness and R_{ij} relates to the overall rating of a hotel website h*i*.

Constructing the Weighted Fuzzy Decision Matrix

$S_{ij} = W_j \times R_{ij}$……., (3)

where S_{ij} (i = 1, 2, 3,…m; j = 1, 2,…n) denotes the elements of the weighted suitability decision matrix S. The membership function of S_{ij} can be developed as follows (Chu & Lin, 2003; Chu, 2002):

Calculating the Fuzzy Decision Matrix S_{ij}

Following the definition of fuzzy multiplication (Kaufmann & Gupta, 1991), Equation (6) can be expressed as follows:

$S_{ij}^{\alpha} = W_j^{\alpha} \times \widetilde{R}_{ij}^{\alpha} = [\, W_{jl}^{\alpha} \;\; \widetilde{R}_{ijl}^{\alpha} \;,\; W_{ju}^{\alpha} \;\; \widetilde{R}_{iju}^{\alpha} \,] = [\; o_j + (p_j - o_j)\alpha \;][\; u_{ij} + (v_{ij} - u_{ij})\alpha \;]$,

$[(p_j - q_j)\alpha + q_j][(v_{ij} - w_{ij})\alpha + w_{ij}] = u_{ij}\, o_j + u_{ij}\,(p_j - o_j)\alpha + (v_{ij} - u_{ij})\alpha\, o_j + (p_j - o_j)(v_{ij} - u_{ij})\alpha^2,\; q_j\,(v_{ij} - w_{ij})\alpha +$

$w_{ij}\,(p_j - q_j)\alpha + w_{ij}\, q_j + (p_j - q_j)(v_{ij} - w_{ij})\alpha^2$.

Based on the procedure of Chu and Lin (2003), $X_{ij1} = (p_j - o_j)(v_{ij} - u_{ij})$, $Y_{ij1} = u_{ij}\,(p_j - o_j) + (v_{ij} - u_{ij})\, o_j$,

$X_{ij2} = (p_j - q_j)\,(v_{ij} - w_{ij})$, $Y_{ij2} = q_j\,(v_{ij} - w_{ij}) + w_{ij}\,(p_j - q_j)$, and $Z_{ij} = w_{ij}\, q_j$, $V_{ij} = u_{ij}\, o_j$,

$M_{ij} = p_j v_{ij}$……..(4)

Ranking Fuzzy Numbers with Mean of Removals

Modarres and Sadi-Nezhad (2001) indicated that numerous ranking methods of fuzzy numbers exist, but none of these methods can satisfactorily rank fuzzy numbers for all cases and situations. The mean of the removals method developed by Kaufmann and Gupta (1988) was adopted by Chu and Lin (2003) to solve an MCDM problem on robot selection. This method exhibits better performance on ranking fuzzy numbers with α-cut set of triangular fuzzy number (Chu & Lin, 2003). Thus, the present study adopted this method to calculate the mean of the left and right removals of S_{ig}^{α}.

For convenience, S_{ij} can also be expressed as follows:

$$S_{ij} = (X_{ij1},\ Y_{ij1},\ X_{ij2}, Y_{ij2}; Z_{ij}, V_{ij}, M_{ij}),\ (j = 1, 2, 3, \ldots n;\ i = 1, 2, \ldots m) \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Before proceeding to the next section, all S_{ij} terms should be defuzzified into crisp values (Chu, 2002; Kaufmann & Gupta, 1988). Assuming that the triangular fuzzy numbers of the weighted decision matrix S_{ij} are (A_{ij}, B_{ij}, C_{ij}), then the defuzzified S_{ij} can be calculated as follows:

$$\widetilde{s}_{ij} = \frac{1}{2}\left[\left(B_{ij} - \int_{A_{ij}}^{B_{ij}} f_{s_{ij}}^{L}(x)dx\right) + \left(C_{ij} + \int_{B_{ij}}^{C_{ij}} f_{s_{ij}}^{R}(x)dx\right)\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Determining the Ideal and Negative-Ideal Solutions

TOPSIS theory defines the positive-ideal T^{+} and the negative-ideal T^{-} as follows:

$$T^{+} = (\widetilde{s}_1^{+}, \ldots, \widetilde{s}_m^{+}) \ldots\ldots\ldots\ldots (9)$$

$$T^{-} = (\widetilde{s}_1^{-}, \ldots, \widetilde{s}_m^{-}) \ldots\ldots\ldots\ldots, (10)$$

where $\widetilde{s}_m^{+} = \max_i \widetilde{s}_{ij}$ and $\widetilde{s}_m^{-} = \min_i \widetilde{s}_{ij}$.

Distance of Each Hotel from T^{+} and T^{-}

If d_i^+ and d_i^- denote the distance of the hotel website h*i* versus T^+ and T^-, respectively, then d_i^+ and d_i^- are defined as Equations (11) and (12), respectively.

$$d_i^+ = [\sum_{i=1}^{m} (S_{ij} - S_i^+)^2]^{\frac{1}{2}} \ (j = 1, 2, 3 \ldots n, \ i = 1, 2, \ldots, m) \ldots\ldots\ldots\ldots\ldots (7)$$

$$d_i^- = [\sum_{i=1}^{m} (S_{ij} - S_i^-)^2]^{\frac{1}{2}} \ (j = 1, 2, 3 \ldots n, \ i = 1, 2, \ldots, m) \ldots\ldots\ldots\ldots\ldots (8)$$

Finally, the closeness coefficient of each hotel website h*i* with respect to the ideal solution can be determined as H*i*:

$$Hi = \frac{d_i^-}{d_i^+ + d_i^-} \ (0 < Hi < 1, \ i = 1, 2, 3, \ldots m) \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

The value of the closeness coefficient H*i* can reflect whether the performance of a hotel website is close to T^+ or T^-. A larger H*i* corresponds to the higher priority of a hotel website. H*i* presents the website usability or functionality performance. The overall website usefulness should use W_j and R_{ij} in the calculation. In other words, H*i* is the score of website performance, and a higher H*i* indicates better performance. The ranking list of hotel websites in terms of usefulness, functionality, and usability performance is based on the H*i* score of each hotel. This hierarchical list starts from the highest to the lowest scored hotel websites.