A Modified Model for Hotel Website Functionality Evaluation

ABSTRACT

As the features of websites and the expectations of users are constantly evolving in the light of technological advancements, continuous modification of the framework used to evaluate them is urgently needed. Harnessing a mathematical computation approach to analyze data solicited from 354 website stakeholders (including 200 hotel customers, 83 hotel managers, and 71 hotel website designers), this study presents an up-to-date and robust evaluation model for assessing the functionality of hotel websites. The modified model was also empirically used to assess the functionality performance of the websites of all the hotels in Hong Kong. Results from the nonparametric Kruskal-Wallis and Mann-Whitney tests revealed a difference in performance, with higher star rating hotels performing better than those with a lower star rating. As one of the first attempts to incorporate the perceptions of multiple website stakeholders into hotel website evaluation, this study provides hoteliers with practical advice on website development.

KEYWORDS: Website evaluation; Website functionality; Stakeholders; Hong Kong.

1. INTRODUCTION

Despite its belated emergence in, and application to, the tourism and hospitality industry, information and communication technology (ICT) in general and Internet technology in particular has generated a paradigm shift in information exchange and business transactions in recent decades. The longitudinal study by Xiang, Wang, O'Leary and Fesenmaier (2015) revealed that the ratio of American travelers who employ the Internet to handle most of their travel planning tasks increased from 29.0% in 2007 to 37.1% in 2012. Another latest research by the World Tourism Organization (2014) also reported that customers generally carry out nine travel-related searches on search engines and visit 14 different travel-related websites before making an online hotel reservation.

The exponential growth in the use of the Internet to search for travel information and reserve hotel accommodations hints that developing and maintaining high quality business websites are no longer optional but becoming unprecedentedly vital. Numerous studies also exhibit that an unpleasant online experience may reduce online sales, lose potential customers and eventually have a negative impact on a company's credibility (Dickinger & Stangl, 2013; Wen, 2012). Given that evaluation is a prerequisite of being able to improve a website (Spiliopoulou, 2000) and an improved websites could help enhance customers' online experience, perceived usefulness as well as positive attitude towards business websites (Ham, 2004) , website evaluation has long been a point of

concern for academic researchers and industry practitioners (Park & Gretzel, 2007; Law, Qi & Buhalis, 2010).

Being one of the two "prime" dimensions affecting usefulness of every website (Huizingh, 2000; Lu & Yeung, 1998), the evaluation of website functionality, representing the availability of features and information about products and services being promoted on the website, receive particularly high level of scholarly attention from tourism and hospitality researchers. Law et al. (2010) indicated that a plethora of studies pertinent to functionality of tourism and hospitality websites were published from 1996 to 2009. The significant influence of website content on the creation and communication of perceived image of a tourism destination or company is a potential reason for justifying the increasing attention from academics (Doolin, Burgess & Cooper, 2002). The intangibility nature of tourism products is another possible reason because customers cannot touch and feel items for sale so that they need to rely on detailed and clear information to make purchase decisions (Xiang, Wang, O'Leary & Fesenmaier, 2015). Though various evaluation frameworks have been developed (Chung & Law, 2003; Zafiropoulos & Vrana, 2006) and multiple approaches have been embraced (Ip, Law & Lee, 2012; Qi, Law & Buhalis, 2013) to assess the information richness of hotel websites, extant frameworks commonly share two limitations which constrain their applicability in assessing contemporary websites.

With more and advanced website features (e.g., online concierge and social media) emerging according to technological advancements, website features that were once considered desirable may now become obsolete (Perdue, 2001; Stringam & Gerdes, 2010). van Scotter and Cilligan (2003) note that the purpose of developing a theoretical model is to help explain some of the observed relationships and form the basis for constructing a provisional theory. As such, its core value is its ability to explain the current phenomenon or issue. By the same token, given the changing features of the modern hotel website, the evaluation models proposed in prior studies now appear to be incomplete and no longer comprehensive. There is thus a desperate but so far largely unmet need to develop a modified model for evaluating the information richness of modern hotel websites.

Another limitation in previous studies of hotel website evaluation is the inclusion of either users' or administrators' views only. As noted in her seminal paper regarding the worthiness of having stakeholder participation in evaluation design, Greene (1987, p. 379) noted that *"Meaningful participation in the evaluation process by individuals and groups who have a vested interest in the evaluand [which means subject of an evaluation] will enhance utilization of evaluation results."* Indeed, since a hotel website is an end result reflecting the input of various stakeholders including hotel customers as users and hotel managers and website designers as administrators, incorporating both users' and administrators' views into the development of the evaluation model is recommended. Grounded on Aristotle's rhetorical triangle, De Marsico and Levialdi (2004) also empirically demonstrate that a holistic approach incorporating both users' and

administrators' views into website evaluation would generate a better set of evaluation criteria and in turn, improve the effectiveness of evaluation result. Though the inevitability of comprising the views of all stakeholders was coined, the model development and validation processes in tourism and hospitality website evaluation studies are usually based on input from either practitioners (Chung & Law, 2003) or customers (Ma, Law & Ye, 2008). Panagopoulos, Kanellopoulos, Karachanidis and Konstantinidis (2011) is one of the limited works which takes multiple stakeholders' views (i.e., guests, managers and IT professionals) into consideration. Yet, hotel guests in their study were graduate students but not real customers and each stakeholder group assesses one aspect of a hotel website only.

To fill the research voids identified above, this study purports to develop a modified model for evaluating the functionality performance of contemporary hotel websites. The proposed model would excel those models suggested in prior studies by incorporating modern website features as well as the perceptions of multiple stakeholders (that is, hotel customers, hotel managers and hotel website designers). To validate the applicability of the proposed model, it would be used to examine the functionality performance of hotel websites in Hong Kong and the discrepancy in website functionality performance across hotel star ratings is highlighted. As one of the first attempts to incorporate the perceptions of multiple website stakeholders into the model development as well as empirical evaluation process, the findings of this study would contribute to the literature by constructing a timely and comprehensive evaluation model addressing all areas of website functionality from the perspectives of all stakeholders. The results will also shed light on the fundamental deficiencies of hotel websites in general, so that hoteliers can make more efficient use of the limited resources for website development.

2. LITERATURE REVIEW

2.1 Stakeholders involved in hotel website evaluation

The field of website evaluation studies has been productive in recent years. Areas of interest include conceptual discussions on what should be evaluated and how to do it, as well as the development of criteria for websites in particular industries (Akincilar & Dagdeviren, 2014; Douglas & Mills, 2004; Ham, 2004; Lee & Morrison, 2010; Ip et al., 2012; Qi et al., 2013). Although tourism and hospitality websites are widely available for worldwide Internet users, they are of particularly use to suppliers and potential customers for information dissemination, communication and online purchasing (Law et al., 2010). Hence, no matter the focus of the research was developing a new evaluation model or empirically assessing the performance of tourism and hospitality websites, prior studies have normally incorporated the views of practitioners and/or customers.

Early research on the evaluation of tourism and hospitality websites has been based on expert opinion. Buhalis and Spada (2000) state that the quality of a website is a matter of human judgment on site organization, site layout, information quantity, information uniqueness and other factors influencing customers' usage and retention. Since experts can provide specialist knowledge and professional judgment to evaluate websites, expert assessment, usually by industrial practitioners, is frequently employed (Chung & Law, 2003; Lu, Deng & Wang, 2007; Schmidt, Cantallops & dos Santos, 2008). Undoubtedly, expert evaluations are valuable and perhaps even indispensable in website assessment, as they can ensure the validity and reliability of the instruments used. A successful website evaluation should also take customers' interests and levels of participation into account since they are the primary users of the site (Law et al., 2010; Sigala, 2011). Literature in the information systems discipline also documented that the absence of direct users input could pose challenges in assessing website performance and thereby user experience (Preece, Rogers & Sharp, 2011; Verdenburg, Mao, Smith & Carey, 2002). Instead of merely consulting industrial practitioners, subsequent studies shifted to make use of input from hotel customers (Ip et al., 2012; Ma et al., 2008) and both hotel customers and managers (Liang & Law, 2003; Zafiropoulos & Vrana, 2006) in model development and empirical validation.

In her early influential work on the value of stakeholder participation in evaluation design, Greene (1987) defines stakeholders as people whose lives are affected by the subject of evaluation (i.e., website) and whose decisions can affect its future. Following this conceptualization, stakeholders are not only potential users but rather people with a vested interest in the subject. Guba and Lincoln (1981) share the same conceptualization with Greene (1987), and suggested that stakeholders involved in any evaluation setting should include beneficiaries and victims of the evaluand, as well as people involved in developing and using the evaluand. Adapting this concept into the context of hotel website evaluation, the former ones correspond to hotel managers and hotel customers as websites allow both parties to exchange information, facilitate communication and business transaction. The latter ones represent website designers, or also known as IT professionals, who design and manage websites of hotel companies. Indeed, unlike business unit managers, website designers possess both management know-how and technical knowledge on information technology. They are thus able to provide operational support and technical advice to hotel managers about improving website usefulness. Besides, the accordance of a site to a business mission is highly associated with the way website designer map the goal formulated by hotel managers (De Marsico & Levialdi, 2004). Considering its prominent role in achieving online success, Sullivan and Walstrom's (2001) study exclusively selected IT professionals because those people possessed unique characteristics and experiences that would enable them to evaluate web-based services more accurately. Some latest hospitality and information system research also emphasize

the necessity of involving IT professionals in business decision making (Leung & Law, 2013; O'Connor, 2008; Panagopoulos et al., 2011).

Greene (1987) stressed that the involvement of all stakeholders in the evaluation process can enhance the utilization of evaluation results, whereas the exclusion of any particular stakeholder's view from the website evaluation process will limit its generalizability. Though incorporating the views of hotel customers, hotel managers and website designers remains important, a limited number of studies incorporate all three groups in the assessment process. Besides Panagopoulos et al.'s (2011) study which discussed earlier, two studies conducted by Au Yeung and Law (2004; 2006) have attempted to involve all three stakeholder groups in the evaluation process. Despite the significant contributions, the above two studies relate to website usability or design perspective. In view of the lack of prior studies incorporating a multiple stakeholder view on website functionality assessment, this study set out to fill this void by including the opinions of hotel customers, hotel managers, and hotel website designers in developing a modified hotel website functionality evaluation model.

2.2 Evaluation criteria for hotel website functionality evaluation

In their pioneering study pertinent to an effective commercial website application, Lu and Yeung (1998) state that two major components affecting usefulness of a website are functionality (i.e., content) and usability (i.e., design). High website usability can certainly encourage users to spend longer time viewing the website and to come back again later. Website functionality, concerning whether the website provides sufficient information in helping users to accomplish their intended purposes, is more critical given that information provision is the basic goal of a website. Since content quality is one of the most important factors that travelers seek when booking through an online reservation site (Dickinger & Stangl, 2013; Perdue, 2001; Wang, Law, Denizci Guillet, Hung & Fong, 2015; Wen, 2012), a number of researchers in the hospitality field have highlighted the content of hotel websites.

Chung and Law (2003), who were pioneers in the field, introduced an evaluation model to quantitatively measure the functionality performance of hotel websites. With help from hotel managers in ranking the dimensions and attributes according to their relative importance, their proposed framework consisted of 39 attributes. Despite the inclusion of the major applications of hotel websites such as communication and serving as a marketing and distribution channel, the proposed model has two major drawbacks. Firstly, the assumption of equal variance among different dimensions and attributes makes it unable to quantify the variance between two dimensions or attributes. Secondly, the ranking process was pursued out by hotel managers and customers were excluded. This inevitably leads to

the risk of a biased outcome. Liang and Law (2003) criticize and redefine Chung and Law's (2003) model with the involvement of hotel customers in their subsequent study on star-rated hotels in China. Four additional attributes were added to the original model on account of the difference in cultural background. Besides reflecting the functionality performance of Chinese hotel websites, Liang and Law's (2003) study hints that the dimensions and related attributes proposed by Chung and Law (2003) can serve as a robust foundation for further model development.

On the basis of Chung and Law's (2003) model and input from 284 international travelers to Hong Kong, Law and Cheung (2005) develop a weighing model which can assist hotel practitioners in determining the perceived importance of their website features. Though Law and Cheung (2005) use the same dimensions and attributes from Chung and Law's (2003) study, their findings are different from predecessor because different respondents were involved. While facilities information was perceived as the most important dimension from hotel managers' perspective, reservations information was the most important factors in decision making by hotel customers. This verifies the existence of different perceptions in functionality dimensions and attributes among different stakeholders. Considering the absence of studies comparing the importance of hotel website dimensions and attributes among customers, specifically between online browsers and purchasers, Law and Hsu (2006) look at the differences between these two groups. Based on the work of Nah (2003), which highlighted the problem of slow webpage download speed because of a large volume of pages and increasing number of users, Law and Hsu (2006) add "Website download time" as a new attribute. Though their empirical findings indicate no significant difference in most of the dimensions and attributes between browsers and purchasers, this study provides theoretical development of the evaluation criteria in line with the evolution of the technological environment. As such, researchers should continuously refine the evaluation model to reflect the customers' ongoing needs. Later, Ip et al. (2012), Musante, Bojanic and Zhang (2009), Qi et al. (2009; 2013), Rong, Li and Law (2009) as well as Zafiropoulos and Vrana (2006) further modified or proposed new models for assessing hotel website functionality.

In his editorial note titled *Practical Science*, Tracey (2011) highlights that a useful theoretical model should complement the underlying theory and offer prescriptive guidance for improving organizational practices and systems. Undoubtedly, all the models mentioned above can effectively evaluate the functionality performance of hotel websites in different contexts. But since ICT is constantly evolving, there will be a continuous need for ongoing research to evaluate users' expectation of new technologies. Though the modified evaluation model developed in the study might not be applicable indefinitely, as noted by Law and Cheung (2005), it is still worthwhile to address the limitations of existing models and develop a modified model as the foundation for future research.

3. METHODOLOGY

3.1 Identifying and validating evaluation criteria for the modified model

As stated in the literature review section, the current body of work may not provide a comprehensive view on website evaluation as the perceptions of some stakeholders have been excluded. Moreover, some of the website features perceived as important in previous studies may be obsolete to current stakeholders (Stringam & Gerdes, 2010). To redress these limitations, a thorough review of the literature on hotel website evaluation was firstly conducted to address content validity and ensure the proposed evaluation criteria were theoretically meaningful. Also, a content analysis of hotel websites was conducted in order to develop a timely and comprehensive list of website features for model development. Having reviewed all relevant literature and browsed all hotel websites in Hong Kong, a total of 115 website features were identified.

To validate the criteria in the modified model, two rounds of focus group interviews were conducted with multiple stakeholder groups to verify and categorize the attributes into different dimensions. Each interview included two hotel customers, two hotel managers, and two hotel website designers. Respondents in the first group were those who had made an online reservation through a hotel website in the past 12 months. The other two groups included only managers and designers who had been involved in hotel website development or maintenance. During the interviews, respondents were asked to select which hotel website feature(s) would be applicable to evaluating the functionality of contemporary hotel websites. Respondents were also asked to categorize the chosen attributes into several dimensions, name and define those dimensions. All discussion was recorded and transcribed for further analysis. An experienced researcher was invited to participate and supervise in the analysis in order to avoid personal bias. The findings from the first focus group interview were further discussed in the second, to enable amendment or approval. After finishing the two rounds of interviews, a modified set of evaluation criteria was constructed including 29 website features along five dimensions, namely "Hotel Reservations Information," "Hotel Facilities Information," "Hotel Contact Information," "Hotel Surrounding Area Information," and "Peripheral Information." Table 1 lists the five dimensions and the attribute associated with each. The classification is largely similar to that in Ip et al. (2012) but more attributes were included. Since Ip et al.'s (2012) study include opinions of hotel customers in the attribute selection process but the current study incorporate the views from hotel managers and hotel website designers, this explains why technical features (e.g., site map) and brand-related information (e.g., brand description) were included in the evaluation set. Some latest features and information like "Best rate guarantee" and "Instant messaging" were suggested to be incorporated in the modified evaluation model, which signifies the timeliness of the modified model.

*** Please insert Table 1 here ***

3.2 Constructing the weighing model based on stakeholders' input

Based on the set of evaluation attributes developed in the first stage, a questionnaire was designed for use in asking stakeholders to rank the dimensions and their associated attributes according to importance. Two sets of questionnaires were developed for soliciting responses from hotel customers (Q1) as well as managers and website designers (Q2). Except for the screening questions for verifying the respondent's eligibility, the content of both questionnaires, each of which contained five sections, was largely the same. The screening question in Q1 set out to verify whether the participant had made at least one reservation through a hotel website in the past 12 months. In contrast, the screening question in Q2 asked if the manager or designers had ever been involved in website development and/or maintenance.

In the second section of both questionnaires, respondents were asked to rank the importance of the 29 hotel features selected from the focus group interviews (1 - "The most important"; 2 - "The second most important"). In the third section, respondents were asked to rank the relative importance of dimensions using the same method and scale. The second-last section required respondents to rate the responses given by three groups of website stakeholders (that is, hotel customers, hotel managers and hotel website designers) based on their perception of their importance in evaluating the functionality of a hotel website. Lastly, demographic data were collected in the final section. Before conducting the main survey, the questionnaire was verified by two other experienced tourism and hospitality academics. Moreover, a pilot test was conducted with 30 website stakeholders (ten each of hotel customers, hotel managers, and hotel website designers, selected using convenience sampling) to ensure the content validity of the questionnaire. Other than a few suggestions on rewording, no significant feedback was received.

To collect responses from industrial practitioners, two copies of questionnaire Q2 were mailed to each of the 113 members of the Hong Kong Hotels Association with a cover letter asking their website designers and one unit manager involved in the hotel website development to participate. For hotel customers, a street-intercept survey was conducted with 100 local residents and 100 inbound tourists at two Hong Kong tourist spots using convenience sampling. The inclusion of real customers redresses the limitation in Panagopoulos et al.'s (2011) study. In total, 426 questionnaires were distributed to stakeholders. Based on the data collected, the perceived importance of each criterion was calculated using function (1):

$$\boldsymbol{I_r} = \left(\frac{\overline{\boldsymbol{C}}_{\boldsymbol{r}}}{\sum_{\boldsymbol{r=1}}^{\boldsymbol{n}} \overline{\boldsymbol{C}}_{\boldsymbol{r}}} \frac{\sum_{\boldsymbol{i=1}}^{\boldsymbol{m}} \boldsymbol{C_i}}{\boldsymbol{m}}\right) + \left(\frac{\overline{\boldsymbol{M}}_{\boldsymbol{r}}}{\sum_{\boldsymbol{r=1}}^{\boldsymbol{n}} \overline{\boldsymbol{M}}_{\boldsymbol{r}}} \frac{\sum_{\boldsymbol{i=1}}^{\boldsymbol{m}} \boldsymbol{M_i}}{\boldsymbol{m}}\right) + \left(\frac{\overline{\boldsymbol{P}}_{\boldsymbol{r}}}{\sum_{\boldsymbol{r=1}}^{\boldsymbol{n}} \overline{\boldsymbol{P}}_{\boldsymbol{r}}} \frac{\sum_{\boldsymbol{i=1}}^{\boldsymbol{m}} \boldsymbol{P_i}}{\boldsymbol{m}}\right) \quad \textbf{(1)}$$

Where

$\boldsymbol{x}$ = Number of respondents in the group of hotel customers

$\boldsymbol{y}$ = Number of respondents in the group of hotel managers

$\boldsymbol{z}$ = Number of respondents in the group of website designers

$\boldsymbol{m}$ = Total number of respondents, where $m = x + y + z$

$\boldsymbol{n}$ = Number of attribute within a dimension

$\overline{\boldsymbol{C}}_{\boldsymbol{r}}$ = Mean score for the r^{th} attribute given by hotel customers; $r = 1, 2, \ldots n$

$\overline{\boldsymbol{M}}_{\boldsymbol{r}}$ = Mean score for the r^{th} attribute given by hotel managers; $r = 1, 2, \ldots n$

$\overline{\boldsymbol{P}}_{\boldsymbol{r}}$ = Mean score for the r^{th} attribute given by website designers; $r = 1, 2, \ldots n$

$\boldsymbol{C}_{\boldsymbol{i}}$ = Relative importance of responses from the group of hotel customers given by the i^{th} respondent; $i = 1, 2, \ldots m$; where $C_i + M_i + P_i = 100\%$

$\boldsymbol{M}_{\boldsymbol{i}}$ = Relative importance of responses from the group of hotel managers given by the i^{th} respondent; $i = 1, 2, \ldots m$; where $C_i + M_i + P_i = 100\%$

$\boldsymbol{P}_{\boldsymbol{i}}$ = Relative importance of responses from the group of website designers given by the i^{th} respondent; i = 1, 2, … m; where $C_i + M_i + P_i = 100\%$

$\boldsymbol{I}_{\boldsymbol{r}}$ = Importance index of the r^{th} attribute; $r = 1, 2, \ldots n$

3.3 Model application to empirical website functionality evaluation

To extend the applicability of the model developed in this study, it was then used to evaluate websites of hotels in Hong Kong. The English versions of the sites of all 113 members of the Hong Kong Hotels Association, including both homepage and sub-pages, were evaluated thoroughly using content analysis. Given that these websites are updated periodically, data must be collected within a short period of time in order to get consistent information to make a fair comparison. A group of 12 university students receiving intensive training in website evaluation, were recruited as evaluators and rated the functionality of each criterion by applying a 5-point judgmental rating scale (1 = "very poor"; 5 = "very good"). Respondents could choose "not applicable" when they perceived that an attribute was not relevant to a specific hotel website. Several approaches were employed to ensure inter-rater reliability. Firstly, the same computers, with the same hardware configuration, Internet Service Provider and browser, were used throughout the evaluation process in order to reduce any unnecessary variability. Furthermore, considering the large number of hotel websites examined and the chance of personal bias, each site was evaluated by two evaluators, and their result was then cross-verified. If the scores given by both evaluators for each attribute differed by one point, the average was taken as the final

rating. If the scores differed by more than one point, the evaluators were asked to reevaluate and determine a final rating. The two-evaluator approach can lead to the detection and elimination of potential biases or misinterpretation.

In order to facilitate the integration of stakeholders' perceptions, the performance score of each attribute was calculated by combining the weighing scores of the stakeholders and the evaluators. Based on the data provided by stakeholders, the averaged importance index of each attribute was firstly transformed to a weighing score using function (2). For the sake of convenience, the performance score of all dimensions was computed and then multiplied by 20 in order to convert the score to a 100-point scale. The transformation is conducted via using functions (3) through (5):

$$\mathbf{W}_r = \frac{(\mathbf{1}+\boldsymbol{n}-\overline{\boldsymbol{I}_r})}{\sum_{\boldsymbol{i}=\mathbf{1}}^{\boldsymbol{n}} \boldsymbol{I_s}} \quad \textbf{(2)}$$

$$\boldsymbol{P_r} = \overline{\boldsymbol{P}}_r * \boldsymbol{W_r} \quad \textbf{(3)}$$

$$\boldsymbol{P_d} = \sum_{\boldsymbol{r}=\mathbf{1}}^{\boldsymbol{n}} \boldsymbol{P_r} \quad \textbf{(4)}$$

$$\boldsymbol{P_w} = (\sum_{\boldsymbol{r}=\mathbf{1}}^{\boldsymbol{n}} \boldsymbol{W_d} * \boldsymbol{P_d}) * \mathbf{20} \quad \textbf{(5)}$$

Where

$\boldsymbol{n}$	=	Number of attributes in the dimension;
$\overline{\boldsymbol{I_r}}$	=	Averaged importance index of the r^{th} attribute; r = 1, 2, … n
$\boldsymbol{W_r}$	=	Weighing score of the r^{th} attribute; r = 1, 2, … n
$\overline{\boldsymbol{P}}_r$	=	The mean performance index for the r^{th} attribute; r = 1, 2, … n
$\boldsymbol{P_r}$	=	Functionality performance index of the r^{th} attribute; r = 1, 2, … n
$\boldsymbol{W_d}$	=	Weighing score of the d^{th} dimension; r = 1, 2, … 5
$\boldsymbol{P_d}$	=	Functionality performance index of the d^{th} dimension; d = 1, 2, … 5
$\boldsymbol{P_w}$	=	Functionality performance index of the w^{th} hotel website; w = 1, 2, … 113

4. FINDINGS AND ANALYSIS

4.1 Respondents' profile

Of the 426 questionnaires distributed to the target respondents, 354 valid surveys were returned, giving a response rate of 83.1%. Table 2 shows the demographic profile of all 354 respondents. Among the customers, 120 were male (60.0%) and 80 female (40.0%). The majority were aged below 40 (84.0%). All members of this group were diploma or

higher diploma holders and 70% of them had completed a bachelor or postgraduate degree. This finding is consistent with prior studies' finding that online purchasers are generally well educated (Rong et al., 2009). Over 90% of hotel customers earned more than HKD 30,000 per month (USD1 = HKD7.8) and the largest group of respondents was those earning over HKD 70,000 per month (35.5%).

A total of 83 usable responses were received from hotel managers. The majority were female (65.1%), in the age group 31-40 (50.7%), had completed tertiary education at a university (90.4%), and had a monthly household income of above HKD 70,000 (45.8%). Except for gender, a similar demographic profile was found in the 71 website designers who participated. Male respondents dominated this group (76.1%) and female website designers only accounted for 23.9%. More than two-thirds had received a tertiary or above education (74.6%). As the Internet has shown steady growth since the 1990s and our dependency on it has increased, it is not surprising that over 90% of all respondents had been using the Internet for more than 10 years (90.4%). More than half of them spent more than six hours on the Internet per day (51.6%). Regarding the relative importance of responses given by three stakeholder groups, the average importance level of hotel customers, hotel managers and website designers are 56.0%, 25.1% and 18.9%, respectively. In other words, respondents generally suggested that responses given by hotel customers played a more prominent role and should be emphasized in formulating the evaluation model.

*** Please insert Table 2 here ***

4.2 Importance indices of hotel website functionality dimensions

Before analyzing the perceived importance of the functionality dimensions, Kendall's Coefficient of Concordance test, the inter-rater reliability test for dichotomous or ordinal scale data, was conducted to ensure internal consistency. The Kendall's W value for the rankings among the dimensions by the respondents is 0.463. Kendall (1948) notes a result in the range between 0.4 and 0.6 indicates moderate agreement. In other words, the homogeneity of the rankings by the stakeholders was fairly consistent.

Table 3 lists the importance indices of the five website functionality dimensions. It can be seen that stakeholders generally perceived "Hotel Reservations Information" (Index = 0.088) as the most important dimension for determining functionality performance, followed by "Hotel Facilities Information" (Index = 0.191) and "Hotel Contact Information" (Index = 0.197). The least important dimensions were "Peripheral Information" (Index = 0.249) and "Hotel Surrounding Area Information" (Index = 0.275). The ranking of the dimensions indicates that website stakeholders place much emphasis on reservation functions and descriptions of hotel facilities rather than technical features as well as

destination information, when website functionality is assessed. In a global survey with 1,203 leisure and business travelers, HawkPartners (2012) reports hotel websites are the top channel used by travelers to research their future staying experience and come to a consideration set. In another market research report by TravelClick (2011), over 58% of hotel bookings for 46 major hotel brands were made via their websites. Given that customers primarily use hotel websites for researching and purchasing while suppliers develop this platform for publicizing their offerings and generating business leads, it is thus logical that "Hotel Reservations Information" and "Hotel Facilities Information" were perceived as more important.

*** Please insert Table 3 here ***

4.3 Importance indices of hotel website functionality attributes

Alike the analysis of inter-rater reliability on the ranking of the functionality dimensions, Kendall's Coefficient of Concordance tests for the attributes within each dimension were also computed for internal consistency evaluation. The results showed that the Kendall's W values for the five dimensions ranged from 0.548 to 0.671. As a result in the range 0.4 to 0.6 as well as between 0.6 and 0.8 reflects moderate and substantial levels of agreement (Kendall, 1948), the three stakeholder groups tend to perceive and rank the attributes in a unified way.

Table 3 exhibits the importance indices of the attributes in all five dimensions. Among the seven attributes in "Hotel Reservations Information," "Real-time rate and availability checking" (Index = 0.041) was perceived as the most important attribute by website stakeholders, followed by "Real-time reservations" (Index = 0.110) and "Best rate guarantee" (Index = 0.114). Two out of the top three attributes are related to room rate information. Toh, Raven and DeKay (2011) note that customers generally expect products purchased through the Internet to be cheaper due to the low distribution cost. Hence, the propensity to be price sensitive in online purchasing can justify why hotel customers chose room rate information as the most important attribute. On the other hand, O'Connor (2003) reports that customers commonly check several channels for rates but do not exhaust all the alternatives because of the high search costs. To encourage customers to stay with the website and attract them to become online buyers, hotel practitioners should be cautious about the availability of reservation functions as well as information about room rates and offerings.

"Hotel Facilities Information" is a set of attributes that describe the hotel property, facilities, and services available to customers. As shown in Table 3, "Guest room facilities" (Index = 0.091), "Hotel description" (Index = 0.095) and "Hotel location" (Index = 0.100) shared the lowest importance indices, indicating that they are the most important attributes

from website stakeholders' perspective. It is not surprising that "Guest room facilities" ranked the first place because guestroom is the primary product of a hotel property, and customers usually spend most of their time in guestrooms rather than other facilities in the premise. It is however interesting to see that "Hotel description", regarding the general introduction of hotel property and facilities, received a higher rank than "Hotel location". Undoubtedly, the advent of Internet technology has made it much easier to search for information when travel planning. Simultaneously, customers may also suffer from information overload when they use the Internet to look for travel details (Jun, Vogt & MacKay, 2010). A survey conducted by HawkPartners (2012) reports that business and leisure travelers alike spend only around an hour researching and evaluating different hotels. Since they are spending less time in selection and searching on a hotel website, "Hotel description" may provide a convenient way to give customers a quick understanding of the property and its facilities.

In the dimension of "Hotel Contact Information," four kinds of communication channels were listed and arranged in descending order of their importance indices. Similar to the findings of other studies like Chung and Law (2003) as well as Law and Hsu (2006), the provision of "Telephone number" (Index = 0.113) and "Email address" (Index = 0.258) were considered as utmost important in this dimension. As these are the most common methods of communicating with the hotel, it is thus not surprising that they continue to be ranked as the most important attributes. One interesting finding is that instant messaging (e.g., WeChat and Line), a new type of communication medium that has been increasingly exploited by hotels to communicate and answer customers' enquiries, received the same importance score with "Email address" (Index = 0.258). As the penetration of having and using smartphone or mobile devices for handling travel-related activities by travelers is constantly increasing (eMarketer, 2014), this may partially explain the high attention by website stakeholders. In the dimension of "Peripheral Information," among those non-primary features and information available on hotel websites, "Language selection" (Index = 0.063) function was considered the most important attribute, followed by "Internal search function" (Index = 0.104) and "Site map" (Index = 0.122).

Regarding the dimension addressing tourist information related to the destination like sightseeing, weather and travel ("Hotel Surrounding Area Information"), the most important attribute of which to website stakeholders was "Distance to main attractions" (Index = 0.189). "Dining facilities nearby" (Index = 0.223) and "Recreation facilities nearby" (Index = 0.237) were the second and third most important attributes, while the least important was "Local weather report" (Index = 0.351). As Chu and Choi (2000) emphasize, hotel location factors, such as the convenience of transportation and being close to main attractions, were among the most important factors influencing both business and leisure travelers in hotel selection. Urtasun and Gutiérrez (2006) also argue that the hotel industry relies heavily on an effective location strategy to succeed in the competition to

attract guests. In view of the importance of hotel location to both customers and practitioners, it is reasonable that "Distance to main attraction" should have received a high ranking from all stakeholders.

4.4 Application of the model to functionality evaluation

The research on hotel website evaluation and ICT adoption reveals two contrasting views on the impact of star rating. Wei, Ruys, van Hoof and Combrink (2001) identify significant differences in the use of Internet technology depending on hotel type, size, star rating, and geographical location. Ma et al. (2008) also show that the websites of hotels with a higher star rating perform better in terms of functionality. Morrison, Taylor, Morrison and Morrison (1999) however suggest that companies of any size and rating can enjoy the same benefits from using the Internet. Liang and Law (2003) also empirically demonstrate that there is no significant different in website functionality performance among the three categories of China-based hotels (that is, three-, four-, and five-star). In order to examine whether there is any difference in hotel website functionality performance according to star rating, one-way analysis of variance (ANOVA) tests were conducted.

Before carrying out this comparison, all the hotels included in the analysis were categorized based on their star ratings. Since the Hong Kong Tourism Board does not make public the ratings of hotels, the agency ratings published on four intermediaries of international online business models (which are Hotels.com, Expedia.com, Priceline.com and Ctrip.com) were collected and cross-verified. Five hotels were excluded from the comparison testing as they were not rated on all four channels. A total of 108 hotels, including 38 at three-star level or below, 54 hotels with four stars, and 16 with five stars, were selected for further analysis. One of the assumptions made when using ANOVA is that the sampling distribution must be normally distributed (Fields, 2013). Since this condition is not satisfied in the current study, the nonparametric Kruskal-Wallis test was employed to examine the differences.

Table 4 reports the findings of the Kruskal-Wallis tests of the overall and dimensional functionality performance of Hong Kong hotel websites. In general, the findings are in accordance with those of Wei et al. (2001) and Ma et al. (2008). There was a statistically significant difference in overall functionality performance among the three hotel categories ($\chi^2(2, N = 108) = 20.476, p < 0.01$) with a mean rank of 37.76 for hotels with three stars or below, 59.65 for those with four stars, and 76.88 for five-star hotels. In addition to the overall performance, the Kruskal-Wallis tests reported the existence of statistically significant differences on performance in relation to "Hotel Reservations Information" (χ^2 (2, $N = 108$) = 19.382, $p < 0.01$), "Hotel Facilities Information" (χ^2 (2, $N = 108$) = 11.912, $p < 0.01$), "Peripheral Information" (χ^2 (2, $N = 108$) = 14.672, $p < 0.01$)

and "Hotel Surrounding Area Information" (χ^2 (2, N = 108) = 10.024, $p < 0.01$) at the 5% significance level. Findings from the Mann-Whitney tests further supported the view that hotel ratings have a significant influence on website functionality. As shown in the "Post Hoc" column of Table 4, five-star hotels performed better than their three-star counterparts in the four out of five dimensions (except "Hotel Contact Information) at the 5% significance level with Bonferroni adjustment. Four-star hotels performed better than three-star or below in the dimensions of "Hotel Reservations Information," "Hotel Facilities Information," and "Peripheral Information" at the 5% significance level with Bonferroni adjustment. These empirical results indicate that a hotel's website functionality performance is positively associated with its star rating.

*** Please insert Table 4 here ***

5. DISCUSSION AND IMPLICATIONS

Rapid development and constant innovation in ICT means that only dynamic businesses which can assess the expectations of their stakeholders and respond effectively and efficiently will outperform their competitors and maintain long-term prosperity. By incorporating all website stakeholders' view in the evaluation process, this study provides an up-to-date and comprehensive model to measure the functionality performance of hotel websites. The list of criteria and the associated importance indices provide hoteliers with some clues in enhancing functionality of and specifically selecting what information should be presented on their business websites.

In line with findings in Law and Cheung (2005) as well as Ip et al. (2012), "Hotel Reservations Information" is the most important from users' and administrators' point of view. Zafiropoulos and Vrana (2006) suggest that if customers find it difficult to locate reservation information and make a booking on a website, there is a good chance that they will not keep on using it. As these findings show, hotel managers must therefore ensure detailed information and functions about room rate are provided on their websites, since stakeholders perceived "Real-time rate and availability checking" and "Best rate guarantee" as the most important attributes in the "Hotel Reservations Information" dimension. Also, the provision of real-time reservation function with secure payment should be made available on hotel websites. The high rankings also given to the "Guest room facilities" and "Hotel descriptions" attributes in "Hotel Facilities Information" confirm the importance of providing timely and sufficient description about the premise and guestroom facilities on hotel websites. Since tourism and hospitality products are intangible and cannot be easily evaluated by potential customers, the provision of detailed description may help customers foresee the future staying experience in a hotel, reduce the potential risk, and increase their confidence in making reservations.

As well as developing a modified set of criteria for evaluating the functionality of hotel websites, the empirical evaluation in this study has demonstrated a difference in performance between hotels based on star rating. Except for the dimensions of "Hotel Contact Information," hotels with a higher star rating performed better. Such hotels should keep up their performance in these areas, and make an effort to improve the dimensions and attributes that are important to stakeholders but where they do not significantly outperform their lower-ranked counterparts. Hotels with lower star ratings should consider the important role of "Hotel Reservations Information" and prioritize the allocation of resources to improving their online reservation systems and room rate information. After this has been done, they may also need to enrich their website further by offering detailed description about guestroom facilities, since this is another important but poorly executed dimension.

From the theoretical perspective, although there is a plethora of studies looking at developing and revising evaluation frameworks for hotel websites, this study confirms the need for such models to be continuously reviewed and modified. Though the rankings of the dimensions are generally in accordance with those found in previous studies, some discrepancies were still identified. For instance, Kline, Morrison and St. John (2004) emphasize the significance of integrating a virtual tour into tourism and hospitality websites as this can enhance the pleasure of online shopping as well as reduce the perceived risk associated with an unfamiliar offering. However, this feature was no longer perceived as important as focus group participants did not include it in the modified framework. As users' expectations from hotel website content have changed and continue to change rapidly, the model developed here can contribute to the literature by presenting current stakeholders' needs for hotel website content.

Another contribution of the current study is to redress the research void among prior studies by incorporating a multi-user perspective view in the development and use of hotel website functionality evaluation models. Sigala (2011) states that a website is developed for hotel customers as users, and hotel managers and website designers as administrators. She thus recommends researchers to take both users' view and administrators' views into account in website evaluation studies. Echoing the plea by Sigala (2011), the current work contributes to knowledge by incorporating the perceptions of all three stakeholder groups in constructing and applying a modified evaluation model. The evaluation criteria, which have a sound theoretical foundation and are empirically validated by all stakeholders, can ensure the theoretical substance and practical utility of the model in determining the ultimate success of websites (Au Yeung & Law, 2004). Hence, it is believed that the evaluation model developed here is the most comprehensive instrument currently available to evaluate the functionality of modern hotel websites.

6. CONCLUSIONS AND LIMITATIONS

Spiliopoulous (2000) notes that evaluation is a prerequisite of being able to improve a website. By integrating the latest website features and incorporating the perceived importance of all functionality dimensions and their associated attributes, as provided by stakeholders including customers, managers and website designers, this study has developed a modified model for evaluating hotel website functionality. After two rounds of focus group interviews with 12 stakeholders, a modified model was developed incorporating 29 functionality attributes under five dimensions. Applying the numerical computation approach to analyze the ordinal data obtained from a questionnaire survey of 354 website stakeholders, "Hotel Reservations Information" was identified as the most important dimension, followed by "Hotel Facilities Information" and "Hotel Contact Information". In terms of the individual functionality attributes, all three stakeholder groups acknowledged the importance of room rate information, including "Real-time rate and availability checking," "Real-time reservations," and "Best rate guarantee" in the dimension "Hotel Reservations Information." In "Hotel Facilities Information," the importance of providing sufficient description about hotel property and particularly guest room facilities was highlighted and discussed. The significance of offering information such as "Telephone number", "Language selection", "Site map" and "Distance to main attraction" were also highlighted and discussed. As one of the first attempts to incorporate the perceptions of all stakeholders into the development of a model as well as the empirical evaluation process, the findings in this study contribute to the literature by presenting a more complete, up-to-date, and comprehensive set of evaluation criteria. Applying the modified evaluation model, the performance of 113 Hong Kong hotel websites was then assessed and compared. In comparing performance in terms of the individual dimensions and overall, the results from the nonparametric Kruskal-Wallis tests revealed a statistically significant difference according to hotel rating. Five-star hotels performed better than their four- and three-star rivals in the dimensions of "Hotel Reservations Information," "Hotel Facilities Information," "Peripheral Information," and "Hotel Surrounding Area Information". The findings and discussions of this study will be useful and beneficial to industry practitioners and academic researchers involved in website evaluation and development.

Some limitations, however, are inevitable. To help identify and validate the dimensions and attributes of the evaluation model, two rounds of focus group interviews were conducted. Though all the dimensions and attributes identified were checked and confirmed by two different groups of stakeholders, more primary data should be collected and more stakeholders should be included in order to enhance the objectivity of the findings. This study also cannot claim to be widely generalizable as it is limited to one geographical region (Hong Kong) and a relatively small number of hotels were selected for analysis. Managers and website designers working in hotels in Hong Kong were invited to participate in the survey. Only the websites of those properties which are members of the

Hong Kong Hotels Association were chosen for analysis and evaluation. Moreover, the evaluators were younger, more "Internet savvy," and likely to have had a better understanding of technology than travel customers in general. The evaluation results might therefore be biased. Furthermore, as mentioned earlier, the data were collected over a short time period to maintain consistency. However, the Internet is changing very rapidly and so it could be difficult to measure and compare websites at the same time. Thus, the results can only be regarded as a snapshot at a particular point in time.

The findings of this study demonstrate that website users' needs and expectations have changed rapidly and continue to do so. Hence, a natural extension of this study would be to repeat it using a longitudinal approach in order to examine such changes in stakeholder perceptions. Future research may consider comparing the perceived importance of functionality dimensions and attributes among stakeholders in order to gain further insights. As discussed in the methodology chapter, the actual evaluation results were collected from a single visit to each hotel website, regardless of the fact that such sites are constantly changing. Given that similar studies conducted at different times are likely to yield different results, a longitudinal study could shed light on the development and improvement of Hong Kong hotel websites over time. Another limitation to this study was that the hotel sample came from a single country. A study that utilized a broader sample of hotels from various regions would give rise to more generalizable findings.

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Table 1 List of dimensions and attributes in the modified evaluation model

Dimensions and attributes	Reference [a]
Hotel Reservations Information (HRI) relates to information and services available for making a reservation on a hotel website.	
HRI1: Real-time rate and availability checking	(1)(2)(3)(4)(5)(6)(7)
HRI2: Real-time reservations	(1)(2)(3)(4)(5)(6)(7)
HRI3: Real-time modification and cancellation	(1)(2)(3)(6)(7)
HRI4: Reservation policy	(1)(2)(3)(7)
HRI5: Privacy policy	(2)
HRI6: Special promotion	(1)(2)(3)(4)(6)
HRI7: Best rate guarantee	-
Hotel Facilities Information (HFI) relates to the description of a hotel property, and the information of facilities and services available on a hotel website.	
HFI1: Hotel description	(1)(2)(3)(4)(5)(6)(7)
HFI2: Hotel location	(1)(2)(3)(4)(5)(6)
HFI3: Guest room facilities	(1)(2)(3)(4)(6)(7)
HFI4: Dining facilities	(1)(2)(3)(4)(7)
HFI5: Meeting facilities	(1)(2)(3)(4)(7)
HFI6: Recreation facilities	-
HFI7: Other facilities	(7)
Hotel Contact Information (HCI) relates to information and services available for facilitating direct communications between a hotel and its customers.	
HCI1: Email address	(1)(2)(3)(4)(5)
HCI2: Telephone number	(1)(2)(3)(4)
HCI3: Fax number	(1)(2)(3)(4)
HCI4: Instant messaging	-
Hotel Surrounding Area Information (HSRI) relates to the tourist concerned information that is related to the destination such as sightseeing, weather and travel.	
HSAI1: Distance to main attractions	(1)(2)(3)(4)
HSAI2: Recreation facilities nearby	(4)
HSAI3: Dining facilities nearby	(4)
HSAI4: Local weather report	(4)(6)
Peripheral Information (PI) comprises non-primary features and information which would be of interest to customers and other users.	
PI1: Language selection	(1)(2)(3)(4)(5)
PI2: Site map	(1)(2)(3)(4)
PI3: Internal search function	(1)(2)(3)(4)(5)
PI4: Brand description	-
PI5: Newsletter	(5)(6)
PI6: Press release	(1)(2)(3)(4)(6)
PI7: Term of use	(4)

Note. [a] (1): Chung and Law (2003); (2): Liang and Law (2003); (3): Law and Cheung (2005); (4): Zafiropoulos and Vrana (2006); (5): Musante, Bojanic and Zhang (2009); (6): Qi, Law and Buhalis (2009); (7): Ip, Law and Lee (2012).

Table 2 Demographic profile of survey respondents

	HC [a] (*n* = 200)		HM [a] (*n* = 83)		WD [a] (*n* = 71)		Total (*N* = 354)	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Gender								
Male	120	60.0	29	34.9	54	76.1	203	57.3
Female	80	40.0	54	65.1	17	23.9	151	42.7
Age group								
21 – 30	66	33.0	8	9.6	20	28.2	94	26.6
31 – 40	102	51.0	42	50.6	22	30.9	166	46.9
41 – 50	1	0.5	12	14.5	9	12.7	22	6.2
51 – 70	31	15.5	21	25.3	20	28.2	72	20.3
Highest level of education attained								
Primary level or below	0	0.0	0	0.0	0	0.0	0	0.0
High school level	0	0.0	0	0.0	0	0.0	0	0.0
Diploma/Higher diploma level	60	30.0	8	9.6	18	25.4	87	24.3
University level	125	72.5	57	68.7	52	73.2	234	66.1
Postgraduate level	15	7.5	18	21.7	1	1.4	34	9.6
Monthly household income								
HKD 10,000 or below	0	0.0	0	0.0	0	0.0	0	0.0
HKD 10,001 – 20,000	2	1.0	0	0.0	10	14.0	12	3.4
HKD 20,001 – 30,000	17	8.5	12	14.5	20	28.2	49	13.8
HKD 30,001 – 40,000	44	22.0	28	33.7	9	12.7	81	22.9
HKD 40,001 – 50,000	31	15.5	5	6.0	11	15.5	47	13.3
HKD 50,001 – 70,000	35	17.5	0	0.0	1	1.4	36	10.2
More than HKD 70,000	71	35.5	38	45.8	20	28.2	129	36.4
Frequency of Internet use (per day)								
Less than 1 hour	28	14.0	20	24.1	23	32.4	71	20.1
1 – 3 hours	9	4.5	12	14.4	4	5.6	25	7.1
4 – 7 hours	47	23.5	13	15.7	15	21.1	75	21.2
More than 7 hours	116	58.0	38	45.8	29	40.9	183	51.6
Length of Internet use								
Less than 1 year	0	0.0	0	0.0	0	0.0	0	0.0
1 – 5 years	0	0.0	1	1.2	0	0.0	1	0.3
7 – 10 years	16	8.0	8	9.6	9	12.7	33	9.3
More than 10 years	184	92.0	74	89.2	62	87.3	320	90.4

Note. [a] **HC** refers to hotel customers; **HM** refers to hotel managers; **WD** refers to website designers.

Table 3 Importance indices of website functionality dimensions and attributes

Dimensions and attributes		Importance index [a]
Hotel website functionality dimensions		
Hotel website functionality	Hotel Reservations Information	0.088
	Hotel Facilities Information	0.191
	Hotel Contact Information	0.197
	Peripheral Information	0.249
	Hotel Surrounding Area Information	0.275
Hotel website functionality attributes		
Hotel Reservations Information	Real-time rate and availability checking	0.041
	Real-time reservations	0.110
	Best rate guarantee	0.114
	Reservation policy	0.137
	Special promotion	0.177
	Real-time modification and cancellation	0.205
	Privacy policy	0.216
Hotel Facilities Information	Guest room facilities	0.091
	Hotel description	0.095
	Hotel location	0.100
	Dining facilities	0.127
	Recreation facilities	0.152
	Meeting facilities	0.194
	Other facilities	0.241
Hotel Contact Information	Telephone number	0.113
	Email address	0.258
	Instant messaging	0.258
	Fax number	0.371
Peripheral Information	Language selection	0.063
	Internal search function	0.104
	Site map	0.122
	Brand description	0.129
	Newsletter	0.163
	Press release	0.175
	Term of use	0.244
Hotel Surrounding Area Information	Distance to main attractions	0.189
	Dining facilities nearby	0.223
	Recreation facilities nearby	0.237
	Local weather report	0.351

Note. [a] **Importance index** refers to the perceived importance index of each dimension/attribute ranked by respondents (1 – "The most important"; 2 – "The second most important").

Table 4 Kruskal-Wallis tests on functionality of Hong Kong hotel websites

	3-star [a]		4-star [a]		5-star [a]		χ^2 [c d]	Post Hoc [e]
	n	Mdn [b]	n	Mdn [b]	n	Mdn [b]		
Overall	38	45.41	54	53.90	16	58.52	20.476 ##	4-star > 3-star ** 5-star > 3-star **
HRI	38	19.28	54	21.76	16	22.88	19.382 ##	4-star > 3-star ** 5-star > 3-star **
HFI	38	11.09	54	12.58	16	13.76	11.912 ##	4-star > 3-star ** 5-star > 3-star **
HCI	38	5.70	54	5.70	16	5.70	0.815	-
PI	38	3.91	54	4.52	16	5.68	14.672 ##	4-star > 3-star ** 5-star > 3-star **
HSRI	38	5.48	54	8.09	16	10.55	10.024 ##	5-star > 3-star **

Note.

[a] **3-star** represents hotels with 3-star level or below; **4-star** represents hotels with 4-star level; **5-star** represents hotels with 5-star level.

[b] **Mdn** refers to the median value of the performance in the dimension.

[c] χ^2 refers to the Kruskal-Wallis H / Chi-square value.

[d] ## indicates two-tailed significance at the 5% level based on the Kruskal-Wallis tests.

[e] ** indicates two-tailed significance at the 5% level with Bonferroni adjustment based on the Mann-Whitney tests (5% / 3 = 1.7%).