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Deconstructing Online Hospitality Review Systems:
User Quality Experience Toward Design Features

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ABSTRACT

Online hospitality reviews have an important impact on consumers' travel and hospitality booking decisions in the internet age. A well-designed online hospitality review system is crucial to reduce the uncertainty of consumers' decision making, to grasp the actual needs of consumers, and to improve the quality experience of platforms. In this context, this research conducts an empirical study on the design features of online hospitality review systems based on the Kano model. First, the paper analyzes the design features of online hospitality review systems. Then, the paper proposes an improved method to classify design features on the basis of the Kano questionnaire design and survey data. Finally, the paper quantitatively measures their importance in online hospitality review systems. Results can provide scientific basis for online travel platforms or hospitality operators to optimize the design of online hospitality review systems and to obtain reference value to increase the satisfaction of consumers' decision making.

KEYWORDS

Design Features, Kano Model, Online Hospitality Review System, Online Travel Platform, Quality Classification, Quality Experience

1. INTRODUCTION

Online travel platforms provide consumers with increasingly efficient and convenient services given the rapid development of e-commerce and the maturity of mobile information technology (Lin et al., 2020; Ongusl and Nyamboga, 2019). Online hospitality bookings have become the preferred way for consumers to arrange accommodation issues when traveling (Li et al., 2020). A report released in May 2021 by 100EC's E-commerce Research Center shows, although affected by the Covid-19 pandemic, the online travel market scale experienced negative growth in 2020, the user scale maintained steady growth, reaching 432 million people, up 4.6% year-on-year (100EC.com, 2021). Along with the maturity of the online platform and the continued engagement of consumers, online travel platforms have accumulated a large number of reviews published by consumers regarding experience and usage feelings on purchased travel products or services. Compared with commercial advertisements, online

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reviews are considered to be more reliable sources of information (Chen and Law, 2016). Hospitality provides a typical experience product, consumers cannot make an accurate assessment of its quality before usage (Zhang et al., 2018). Therefore, online hospitality reviews have become an important basis for consumers' travel and hospitality booking decisions. Additionally, hospitality merchants can use online reviews to support their brand-building, customer relationship management, and service management activities (Liu et al., 2020a). The in-depth exploration of online reviews by online travel platforms could help them achieve accurate hospitality recommendations and provide high value-added services.

Online hospitality reviews play an increasingly important role in reducing the uncertainty of consumer decision making, grasping consumer feedback information for hospitality merchants, and improving information services for online travel platforms (Mekvabidze, 2018; Xiao et al., 2019). However, problems such as the lack of useful information, information overload, and reporting biases severely reduce the effectiveness of online hospitality reviews (Hu et al., 2017; Liu et al., 2020b). These factors are closely related to the design of online hospitality review systems, and a well-designed online hospitality review system can help solve such problems (Lalić, 2019). Through a review of the literature on online hospitality reviews and their systems we conclude that most past research has focused on the antecedents of online review posting and the impact of online review features, and in general there is a dearth of research targeting the design of online hospitality review systems. Although a small number of studies have begun to focus on the design of online review systems, they have largely considered single design feature (Davidavičienė et al., 2020). In general, in the extant studies there has not been a systematic deconstruction of the microscopic design features of the online hospitality review system from the perspective of system design.

User satisfaction is widely recognized as a key success factor for business that generates positive behavioral intentions (Oliver, 1997). As a form of computer- mediated communication, users naturally expect a good quality experience when using an online hospitality review system, thus satisfying their information needs. Meanwhile, studies from two-factor theory and the Kano model have expanded our understanding that we should consider consumer dissatisfaction with the quality of the experience and not be limited to the satisfaction experience (Gerdt et al., 2019). As one of the popular satisfaction theories, the Kano model is capable of capturing the nonlinear and asymmetric relationship between quality attributes and user satisfaction (Mikulic and Prebezac, 2016; Park et al., 2021), but existing studies have not yet investigated both satisfactory and unsatisfactory aspects of the design of online hospitality review systems simultaneously from such a nonlinear perspective. In addition, we address that the traditional Kano model for the current research issues,can be utilized to classify the design features of online hospitality review systems, but for the improvement aspect of the systems, it cannot capture the impact of quality attributes on the increase or decrease of user satisfaction, thus lacking a quantitative guidance on the optimization priority of design features.

To fill the research gaps identified above, the present study first provides a systematic summarization of online hospitality review systems based on the design features that have been proposed in the literature, as well as the design elements of review systems in the current mainstream online hospitality booking platforms. On this basis, we employ questionnaires based on the Kano model to analyze consumers' quality experience with the identified design features of online hospitality review systems. In particular, we propose an improved method based on the traditional Kano model for the quality classification and prioritization of the design features. The current study has a theoretical contribution to deconstruct the design of current online hospitality review systems from a microscopic perspective. Moreover, the study discovers the unique roles of design features in user satisfaction and dissatisfaction by applying an improved Kano model, which not only determines the quality classification of each design feature, but further provides a measure of the priority for its improvement and optimization. From a practical perspective, our findings on the unique role that design features play in user satisfaction and dissatisfaction can guide operators and designers of online

hospitality platforms to enhance the quality experience of consumers' hospitality-related decision-making processes by optimizing the design of online hospitality review systems.

2. RELATED WORKS

2.1. Online Hospitality Reviews

Online travel reviews have become an important source of information for consumers when arranging travel itineraries (Zhang et al., 2017). Reviews affect consumers' choice of travel destination routes and travel modes (Lai et al., 2011). As a subset of online travel reviews, online hospitality reviews exert an impact on consumers. For example, online hospitality reviews can impact consumers' purchase intention at different times and social distance scenarios (Zhang et al., 2012), which are related to their purchase intention, trust, and future demands (Sparks and Browning, 2011; Cantallops and Salvi, 2014). Meanwhile, online hospitality reviews have become an important channel for consumers to obtain information, thereby replacing and supplementing other forms of word-of-mouth communication such as hospitality service quality. This effectiveness is similar to personal recommendations (BrightLocal, 2018), which profoundly influences consumers' purchase decisions (Gavilan et al., 2018; Li et al., 2019). As far as hospitality merchants are concerned, the commercial value of online hospitality reviews has likewise become increasingly prominent (Zhao et al., 2019). Such reviews can help hospitality merchants understand consumer attitudes, opinions, and satisfactions (Jiang et al., 2021). Reviews can also serve as a basis for management actions, including managing feedback and responses, investing in serving consumers' expectations, and maintaining positive practices (Pelsmacker et al., 2018; Liu et al., 2021). Merchants who place value on online hospitality reviews are likely to improve consumers' perceived quality of hospitalities (Torres et al., 2015), thereby increasing their positive attitudes, fostering booking intentions (Casaló et al., 2015), and increasing the likelihood of consumers to recommend the hospitalities (Xie et al., 2014). These factors in turn affect the performance of hospitalities (Sparks and Browning, 2011).

2.2. Online Hospitality Review Systems

As a type of information carrier, an online hospitality review system collects and centralizes review data, which in turn serves as a kind of reputation system (Xiao, 2016). Bakos and Dellarocas (2011) believed that an online review system could provide a reputation mechanism for collecting and disseminating consumer feedback using the Internet. Online review system has become an important tool to guide merchants' online and offline market performance and for consumers to share and understand product information (Jiang and Guo, 2015; Lu et al., 2020). And online review system is also considered as a marketing communication tool, and the interaction between merchants and consumers in an online review system can effectively reduce consumers' uncertainty about products (Dimoka et al., 2012), persuade consumers to make purchase decisions, and help merchants implement enterprise marketing strategies (Chen and Xie, 2008).

Studies have begun to focus on the effectiveness of online review systems, specifically, what type of online review system would be effective. Jiang and Guo (2015) showed that the adoption of the scoring design of binary evaluation for niche products and the 1-10 scale for popular products could improve the effectiveness of online review systems. Li et al. (2017) believed that users paid attention to product attributes in the screening stage and user experience in the evaluation stage and suggested that online review systems could improve their effectiveness by providing different types of review information in different stages. However, providing consumers with accurate and rich information may actually reduce the effectiveness of online review systems (Liu et al., 2017). Although information system design has been proven to have a considerable impact on enterprise operation and performance (Ji et al., 2011), relatively limited research is available on how the design of online hospitality review systems can improve consumer satisfaction in travel and hospitality management.

From the micro point of view, online review systems comprise a series of design features such as volume of reviews, rating of reviewers, multiple granularity scores, review tag summaries, and review screenings and rankings. The influence, evaluation, and improvement of these design features have attracted research attention (Zhang et al., 2021). Through comparing the online review systems of Amazon and Barnes & Noble, Amazon's reviewer ranking mechanism was found to affect reviewers' behavior, that is, reviewers with different rankings tend to provide different ratings (Shen et al., 2015). Currently, several online hospitality review systems include a reviewer rating design feature. Through a controlled experiment, it was verified that reviews presented in a certain order to be more useful to consumers than those presented randomly (Huang et al., 2014). The large number of reviews written by users and the inconsistent writing styles generally require much time and effort to read, which may lead to the blurring of important information. Online review systems with design feature of review tag summaries can enable users to hasten decision making (Yatani et al., 2011). Therefore, the implementation of appropriate designs and policies can improve the quality and effectiveness of online reviews and provide consumers with credible and representative ratings (Askalidis et al., 2017). In online hospitality review systems, designing features with reasonable review information content presentation, screening, and ranking can help consumers judge and make decisions.

2.3. Kano Model

Inspired by Herzberg's two-factor theory, Japanese quality management guru Noriaki Kano proposed the Kano model in 1984. The model divides product quality characteristics into five categories according to the relationship between objective product performance and customer subjective feelings, namely, must-be quality, one-dimensional quality, attractive quality, indifferent quality, and reverse quality (Kano et al., 1984; Li and Xiao, 2020). The must-be quality is a feature that a product must possess. Users are dissatisfied if this quality is insufficient but are not affected when this quality is sufficient. One-dimensional quality refers to a feature that reduces user satisfaction when insufficient and improves user satisfaction when sufficient. Attractive quality is an unexpected and surprising feature that considerably improves user satisfaction. However, the exclusion of this quality does not cause user dissatisfaction. Indifferent quality refers to a feature that users generally ignore. Its presence or absence has no impact on user satisfaction or dissatisfaction. Reverse quality means that users are dissatisfied when a feature is sufficient and satisfied when it is insufficient (Xiao, 2021).

The Kano model has been applied to various research fields. For instance, Velikova et al. (2017) applied the Kano model to the management of festival activities, and investigated the factors influencing satisfaction with festival activities, and evaluated the influence of each factor on overall satisfaction. Meng et al. (2009) applied the Kano model and built a process framework to express customers' tacit knowledge to improve firm performance in customer relationship management. Tang and Long (2012) applied the model to customized production and combined it with fuzzy clustering and entropy methods to determine the importance of the ranking of personalized demand items, thereby providing enterprises with mass customization production strategies. Sun et al. (2013) studied the functional requirements of online review systems through the Kano survey, and consumers were found to have a strong sense of functional demand for the in-depth exploration of review content and valence, such as the tag summary and multidimensional valence. In the context of mobile Internet development and the popularity of smart devices, Yao et al. (2018) explored the quality attribute classification of key functions in mobile security applications by using the Kano survey method to determine the importance ranking. In the field of hospitality services, Chiang et al. (2019) used the Kano model to classify hospitality's technical innovation attributes and provided suggestions for managers to introduce innovative technologies.

Implementing the Kano model has been shown to offer various benefits in that it can enhance service quality in the tourism industry, make it easier for managers to make decisions and enable optimal planning for the development of qualitative features of products or services (Asian et al., 2019). For the design issue of online hospitality review system, as it has become the preferred

information reference source for consumers' travel and hospitality reservations, user satisfaction with the system is an important factor in optimizing the design, and the Kano model can provide a more user-oriented solution (Aized et al., 2020). Prior literature on customer service management has shown that each service attribute has a different impact on customer satisfaction (Oliver, 1997), since customer dissatisfaction can ultimately lead to product/service rejection, it is critical to examine the impact of service attributes on user dissatisfaction (Park et al., 2021). As a classical approach to capture the diverse relationship between service attributes and user satisfaction and dissatisfaction, the Kano model is employed in this study to determine users' perceptions of asymmetric quality of experience for the design features of online hospitality review systems. In particular, we extend the ability of the traditional Kano model that determines quality attribute categories to further propose a measure of design feature optimization priorities, thus providing a reference for the design of online hotel review systems with optimized priorities.

3. RESEARCH METHOD

3.1. Design Features of Online Hospitality Review Systems

The object of this study is the online hospitality review system and its design features. The study establishes a sample website set according to current mainstream online travel platforms, which include Booking.com, Agoda.com, Hotels.com, Priceline.com, Tripadvisor.com, Qunar.com, Ctrip.com, LY.com, Elong.com, Lvmama.com, Mafengwo.com, Tuniu.com, Fliggy.com, and Meituan.com. The design features of the online hospitality review systems are checked and accessed by logging into these sites one by one. From the perspective of actual user usage and interact, 16 main design features are obtained from the sample websites, as shown in Table 1.

Each of the 16 design features presented in Table 1 has its own value to consumers for information screening and decision making. Some of the features are able to communicate various aspects of the hotel to consumers to reduce information asymmetry. For example, the design feature volume of reviews (VOR) reflects the hotel's hotness to a certain extent, while multiple score (MS), review tag summaries (RTS) and uploaded pictures by consumers (UPC) can reflect the hotel's quality in the form of numerical, text and image respectively, thus reduce the perceived uncertainty of consumers. Another part of the design features plays the role of improving the efficiency of consumer decision making by filtering and sorting review information, which include sorting by condition (SC), filtering by room type (FRT), and search reviews (SR).

3.2. Questionnaire Design

The questionnaire design is based on the two-dimensional questionnaire of the Kano model. Questions on the 16 main design features of online hospitality review systems include both positive and negative aspects. The main items are users' satisfaction and dissatisfaction with online hospitality review systems with and without certain design features. The options are designed as matrix scroll bars owing to the fuzziness of users' satisfaction with such design features. Users can enter a number between 0 and 100 or drag the slider to express their satisfaction with a certain design feature. Therefore, the demand classification survey of the design features of online hospitality review systems becomes more accurate. In addition, the questionnaire asks about users' basic personal information.

3.3. Classification and Priority Order of Design Features

The traditional Kano model analysis method can classify design features but cannot judge their degree of influence in increasing user satisfaction or eliminating user dissatisfaction. To make up for this shortcoming, the study proposes an improved design feature classification and measurement method on the basis of the concept of the user satisfaction coefficient proposed by Berger et al. (1993). This

Table 1. Main design features of online hospitality review systems

Design feature name (tag)	Feature classification	Feature value	Application websites
Volume of reviews (VOR)	content class	Reflects the popularity of the hospitality	All sample websites
Uploaded pictures by consumers (UPC)	content class	Improves the quality of opinions and reduces consumer uncertainty	Qunar.com, Ctrip.com, LY.com, Elong.com, Lvmama.com, Mafengwo.com, Tuniu.com, Fliggy.com, Meituan.com, Booking.com, Tripadvisor.com
Review tag summaries (RTS)	content class	Reflects the main content of reviews	LY.com, Elong.com, Mafengwo.com, Booking.com, Agoda.com, Tripadvisor.com
Overall score of hospitality (OSH)	content class	Reflects the overall quality of the hospitality	All sample websites
Multiple score (MS)	content class	Reflects the quality level of multiple dimensions such as hospitality service, location, and cleanliness	Ctrip.com, LY.com, Elong.com, Lvmama.com, Mafengwo.com, Tuniu.com, Fliggy.com, Booking.com, Agoda.com, Priceline.com, Tripadvisor.com
Distribution of review valence (DRV)	content class	Reflects the number of the hospitality's good, average, and bad reviews	Qunar.com, Ctrip.com, LY.com, Elong.com, Tuniu.com, Fliggy.com, Booking.com, Hotels.com, Tripadvisor.com
Votes for usefulness (VFU)	content class	Reflects the quality level of reviews	Qunar.com, Ctrip.com, Lvmama.com, Mafengwo.com, Booking.com, Agoda.com, Tripadvisor.com
Reviewer credit rating (RCR)	content class	Reflects the ability of reviewers to write reviews and improves the quality of opinions	Elong.com, Ctrip.com, Qunar.com, Mafengwo.com, Tripadvisor.com
Sorting by condition (SC)	sorting class	Improves speed of decision making	Elong.com, Ctrip.com, Qunar.com, Booking.com, Agoda.com, Hotels.com
Filtering by review valence (FRV)	filtering class	Improves speed of decision making	Qunar.com, Ctrip.com, LY.com, Elong.com, Tuniu.com, Fliggy.com, Booking.com, Hotels.com, Tripadvisor.com
Filtering by picture (FP)	filtering class	Improves speed of decision making	Ctrip.com, LY.com, Elong.com, Lvmama.com, Tuniu.com, Fliggy.com, Meituan.com
Filtering by RTS (FTS)	filtering class	Improves speed of decision making	LY.com, Elong.com, Mafengwo.com, Booking.com, Agoda.com, Tripadvisor.com
Filtering by expert reviews (FER)	filtering class	Reflects the quality level of reviews and improves speed of decision making	Qunar.com
Filtering by room type (FRT)	filtering class	Improves speed of decision making	Elong.com, Ctrip.com, Qunar.com, Agoda.com
Filtering by travel type (FTT)	filtering class	Improves speed of decision making	Ctrip.com, Booking.com, Agoda.com, Hotels.com, Priceline.com, Tripadvisor.com
Search reviews (SR)	filtering class	Improves speed of decision making	Ctrip.com, Agoda.com, Tripadvisor.com

method classifies design features for online hospitality review systems and quantitatively measures the importance of each design feature.

(1) Calculation of better and worse indices

The better and worse indices of the design features of online hospitality review systems are calculated by using the typical quality classification of the traditional Kano model. The absolute values are between 0 and 1. The better index of design feature F_i is calculated by using Eq. (1).

$$Better_i = \frac{A_i + O_i}{A_i + O_i + M_i + I_i} \tag{1}$$

where A_i, O_i, M_i, and I_i represent the quantity of A (attractive quality), O (one-dimensional quality), M (must-be quality), and I (indifferent quality) of design feature F_i, respectively. The value of $Better_i$ is usually positive, thereby indicating that the provision of this design feature in an online hospitality review system improves user satisfaction. A value close to 1 indicates a strong improvement effect on user satisfaction.

The worse index of design feature F_i is calculated by using Eq. (2). The value of $Worse_i$ is usually negative, thereby indicating that the exclusion of the design feature reduces user satisfaction. A value close to -1 indicates a strong reduction effect on user satisfaction.

$$Worse_i = -\frac{O_i + M_i}{A_i + O_i + M_i + I_i} \tag{2}$$

(2) Classification of design feature based on plane division

The average value of all the design features' better indices is computed by Eq. (3) based on the above calculations of the $Better_i$ of design feature F_i. The average of the absolute values of all the design features' worse indices is calculated by using Eq. (4).

$$\overline{Better} = \frac{1}{\mathrm{n}}\sum_{i=1}^{n} Better_i \tag{3}$$

$$\overline{|\,Worse\,|} = \frac{1}{\mathrm{n}}\sum_{i=1}^{n} |\,Worse_i\,| \tag{4}$$

The classification rule for design features is defined as Eq. (5) to determine the type of each design feature according to the relationship between the average better index and the absolute and average values of the worse index, where $C\left(F_i\right)$ represents the Kano type of design feature .

$$C(F_i)=\begin{cases} O(One-\dim ensional), Better_i \geq \overline{Betterand} \mid Worse_i \mid \geq \mid \overline{Worse} \mid \\ A(Attractive), Better_i \geq \overline{Betterand} \mid Worse_i \mid < \mid \overline{Worse} \mid \\ I(Indifferent), Better < \overline{Betterand} \mid Worse_i \mid < \mid \overline{Worse} \mid \\ M(Must-be), Better_i < \overline{Betterand} \mid Worse_i \mid \geq \mid \overline{Worse} \mid \end{cases} \tag{5}$$

(3) Calculation of priority order

Online hospitality review systems generally function as webpages or mobile apps with limited content space and user interface. Measuring the provision priority of each design feature is necessary to provide valuable design features while reducing consumer information load. From the research of Tontini et al. (2013), it is believed that the low realization degree of "must-be design features" limits the impact of "one-dimensional design features" and "attractive design features" on consumer satisfaction. That is, "must-be design features" with low realization degrees cannot be compensated by the presence of other design features with high realization degrees. The low realization degree of "one-dimensional design features" may reduce the impact of "attractive design features" on consumer satisfaction. Meanwhile, the impact of "one-dimensional design features" with high realization degrees on consumer satisfaction is likewise affected by "must-be design features" and other "one-dimensional design features" with low realization degrees. The type preference order (TPO) is used to describe the provision priority order among different types of design features, as shown in Eq. (6), where " $\succ$ " indicates the "superior" relationship of priority order.

$$TPO\left(M\right) \succ TPO\left(O\right) \succ TPO\left(A\right) \succ TPO\left(I\right). \tag{6}$$

The problem of provision priority among different design features within the same type likewise exists. However, current research lacks such measurement methods. Therefore, this study proposes the priority order in type (POIT) index among different design features within the same type on the basis of the plane division of design feature types. The POIT of design feature F_i is calculated by Eqs. (7)–(8), where $POIT_i$ represents the POIT of design feature F_i, $Distance_i$ indicates the distance of design feature F_i from the origin in the plane division diagram of design features' types, and the $rank$ function computes the rank of the first parameter value in the second parameter value set.

$$POIT_i = rank\left(Distance_i, \left\{Distance_j\right\}_{j\in C\left(F_i\right)}\right) \tag{7}$$

$$Distance_i = \sqrt{Better_i^2 + Worse_i^2} \tag{8}$$

The total priority order of design feature F_i depends on the $TPO\left(C\left(F_i\right)\right)$ and the $POIT_i$ of design feature F_i. Eq. (9) calculates the total priority order of design feature F_i, where PO_i represents the total priority order of design feature F_i .

$$PO_i = f\left(TPO\left(C\left(F_i\right)\right), POIT_i\right). \tag{9}$$

4. RESULTS

4.1. Data Measurement

The questionnaire survey was conducted through the professional survey website "Questionnaire Star". A total of 316 questionnaires was collected, and 303 valid questionnaires were obtained after screening, yielding an effective rate of 95.89%. The ages of the respondents were mainly between 18 and 39 years. In terms of gender, males accounted for 49.2% and females accounted for 50.8%. Those with bachelor's degrees accounted for 68.6% of the respondents, and those with graduate degrees accounted for 23.4%. Most of the respondents had more than 1 year experience in booking hospitality online, and over 80% of the respondents used online travel platforms as their main channel for obtaining hospitality information. Over 90% of the respondents referred to hospitality reviews when booking a hospitality online, and over 60% read more than 10 hospitality reviews. According to the data analysis, the overall reliability Cronbach's α coefficient was 0.914, the positive multi-item questionnaire reliability Cronbach's α coefficient was 0.925, and the reverse multi-item questionnaire reliability Cronbach's α coefficient was 0.958. Given the value greater than 0.9, the questionnaire had satisfactory reliability and could be used for the Kano model analysis.

The satisfaction scores of online hospitality review systems with and without a certain design feature were processed as follows: 0–20 points meant "dislike," 21–40 points meant "live with", 41–60 points meant "neutral", 61–80 points meant "must be", and 81–100 points meant "like". A basic classification of each design feature for each respondent could be obtained by using the typical quality classification table of the traditional Kano model shown in Table 2.

Table 2. Typical quality classification table of traditional Kano model

Customer Response		**Dysfunctional Question**				
		Like	*Must be*	*Neutral*	*Live with*	*Dislike*
Functional Question	***Like***	Q	A	A	A	O
	Must be	R	I	I	I	M
	Neutral	R	I	I	I	M
	Live with	R	I	I	I	M
	Dislike	R	R	R	R	Q

Notes: M - must-be quality, O - one-dimensional quality, A - attractive quality, I - indifferent quality, R – reverse quality, Q - questionable quality

The frequency of the respondents' basic classification and the typical quality classification results of each design feature are shown in columns A to C1 of Table 3. As shown in column C1, the quantity of the indifferent quality accounts for a large proportion of the total quantity (81.3%). Columns A, O, M, and I indicate that the two Kano categories with the highest frequency in the classification process of several design features show a slight difference, which may lead to inaccurate classification results. To make up for this deficiency, Lee and Newcomb (1997) proposed a mixed category analysis method to observe the conversion trend of quality classification. The mixed category analysis method confirms the typical quality classification twice by calculating two quantitative indices, namely, total

strength (TS) and category strength (CS). TS can reflect whether respondents were satisfied with a certain design feature and was calculated for design feature F_i by using Eq. (10). CS reflects the extent to which respondents agree that a certain design feature belongs to a certain category and is calculated by using Eq. (11).

$$TS_i = \frac{\mathrm{M}_i + O_i + A_i}{\mathrm{M}_i + O_i + A_i + I_i + R_i + Q_i} \tag{10}$$

$$CS_i = \frac{Max\left(M_i, O_i, A_i, I_i, R_i, Q_i\right) - 2ndMax\left(M_i, O_i, A_i, I_i, R_i, Q_i\right)}{\mathrm{M}_i + O_i + A_i + I_i + R_i + Q_i}. \tag{11}$$

The design feature is classified into the mixed category when the TS value of a certain design feature is equal to or greater than 60% and its CS value is equal to or less than 6%. The TS and CS values and corresponding mixed category calculation results of each design feature are shown in columns TS, CS, and C2 of Table 3 respectively. In column C2, X represents a mixed category that consists of the first two typical quality categories with the largest proportions.

4.2. Classification and Provision Priority

According to the classification results of design features based on the mixed category method, the proportion of the indifferent quality remain high (68.8%). Moreover, distinguishing the impact degree of each design feature on the increase of user satisfaction or decrease of user dissatisfaction from the classification results is infeasible. Providing a basis for optimizing system design and improving consumer satisfaction is likewise difficult. The Kano questionnaire data are further analyzed according to the proposed classification and priority measurement method of design features, and the following results are obtained.

(1) Classification results

We obtained the classification results of design features based on plane division (Figure 1) according to the calculation results of the better and worse indices of each design feature combined with the classification rules of design features.

(2) Measurement results

This paper proposed an improved classification method for the design features of online hospitality review systems. The classification results are shown in column C3 of Table 3. We obtain the total priority order of design features for online hospitality review systems by combining the TPO of design features with POIT through calculations. The results are shown in the last column of Table 3.

4.3. Discussion

As the results presented, the lower right corner of the plane division diagram is defined as the must-be quadrant. The better index values of the design features in this quadrant are lower than the average value, and the absolute values of the worse index values are higher than the average value. Providing these design features in online hospitality review systems would not considerably improve customer satisfaction. However, the exclusion of these design features would considerably reduce consumer

Figure 1. Plane division diagram of design feature classification

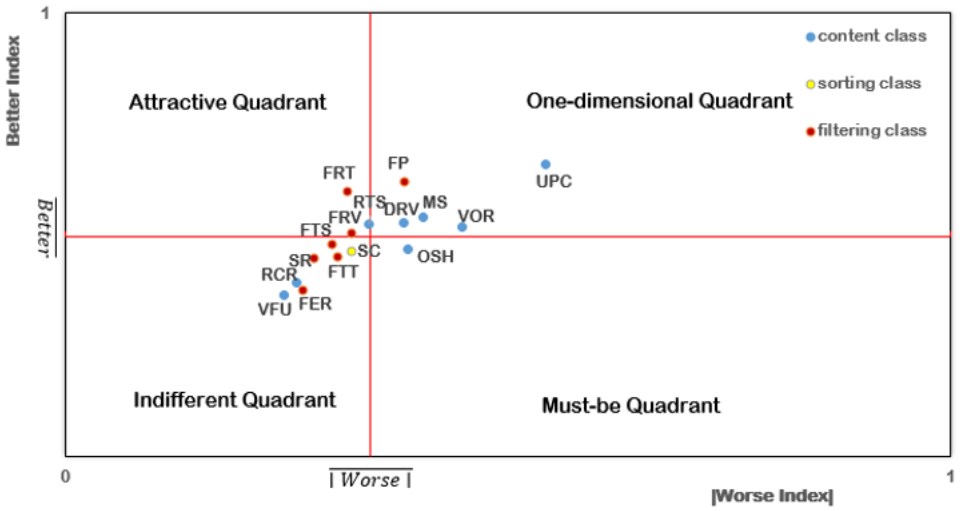

Table 3. Results of design feature classification and priority calculation

Design Feature Tag	A	O	M	I	R	Q	C1	TS	CS	C2	Better Index	Worse Index	C3	POIT	PO
VOR	66	82	46	92	5	12	I	0.640	0.033	X(I+O)	0.517	–0.448	O	3	4
UPC	62	121	30	65	11	14	O	0.703	0.185	O	0.658	–0.543	O	1	2
RTS	83	64	32	102	12	10	I	0.591	0.063	I	0.523	–0.342	A	2	8
OSH	65	69	42	111	5	11	I	0.581	0.139	I	0.467	–0.387	M	1	1
MS	78	74	40	90	4	17	I	0.634	0.040	X(I+A)	0.539	–0.404	O	4	5
DRV	72	77	31	103	2	18	I	0.594	0.086	I	0.527	–0.382	O	5	6
VFU	68	32	36	139	4	24	I	0.449	0.234	I	0.364	–0.247	I	7	16
RCR	66	35	32	124	23	23	I	0.439	0.191	I	0.393	–0.261	I	5	14
SC	73	54	34	112	11	19	I	0.531	0.129	I	0.465	–0.322	I	2	11
FRV	79	59	29	106	9	21	I	0.551	0.089	I	0.505	–0.322	A	3	9
FP	94	80	27	79	7	16	A	0.663	0.046	X(A+O)	0.621	–0.382	O	2	3
FTS	88	49	37	112	4	13	I	0.574	0.079	I	0.479	–0.301	I	1	10
FER	59	38	31	129	22	24	I	0.422	0.231	I	0.377	–0.268	I	6	15
FRT	107	61	28	85	4	18	A	0.647	0.073	A	0.598	–0.317	A	1	7
FTT	75	44	37	108	16	23	I	0.515	0.109	I	0.451	–0.307	I	3	12
SR	71	52	25	127	8	20	I	0.488	0.185	I	0.447	–0.280	I	4	13

satisfaction. Design features in this quadrant are called “must-be design features”, including OSH. Online travel platforms must display the OSH in a striking position to directly reflect the overall quality and service level of a hospitality. However, given that consumers can easily view the OSH of each hospitality in online hospitality review systems, providing this design feature did not significantly

improve consumer satisfaction. By contrast, the low realization degree of this design feature would highly increase the decision-making burden of consumers and may further affect consumer satisfaction with other design features.

The upper right corner of the plane division diagram is defined as the one-dimensional quadrant. The better index and absolute values of the worse index values of the design features in the quadrant are higher than the average value. Design features in this quadrant are called "one-dimensional design features", including VOR, UPC, MS, DRV, and FP. The realization degree of these five design features is linear with overall consumer satisfaction. Therefore, online hospitality review systems that optimize the design of these five design features can improve consumer satisfaction. The low realization degree of these five design features would cause considerable consumer dissatisfaction and may reduce consumer satisfaction with "attractive design features". Therefore, online travel platforms must provide and improve these five "one-dimensional design features" on the basis of the provision and optimization of "must-be design features" or OSH.

The upper left corner of the plane division diagram is defined as the attractive quadrant. The better index values of the design features in this quadrant are higher than the average value, and the absolute worse index values are lower than the average value. Therefore, providing these design features in online hospitality review systems would highly improve customer satisfaction. However, the exclusion of these design features would not considerably reduce consumer satisfaction. Design features in this quadrant are called "attractive design features", including RTS, FRV, and FRT. Given the necessity of "must-be" and "one-dimensional design features" in online hospitality review systems, online travel platforms that hope to further enhance consumer satisfaction with online hospitality review systems should pay attention to the provision and optimization of "attractive design features". This practice will help online travel platforms achieve differentiated information services. However, in providing and improving such design features, online travel platforms must ensure that the must-be and one-dimensional quadrants have also been provided and optimized.

The lower left corner of the plane division diagram is defined as the indifferent quadrant. The better index and absolute worse index values of the design features in this quadrant are lower than the average value, thereby indicating that the provision or exclusion of these features in online hospitality review systems would not highly improve or reduce consumer satisfaction. Design features in this quadrant are called "indifferent design features", including VFU, RCR, SC, FTS, FER, FTT, and SR. The display priority of these "indifferent design features" can be reduced if online travel platforms encountered limited layout spaces on web interface or screen size of mobile phone. These features may or may not be displayed in a secondary interface, thereby ensuring the value of the information in the unit user interface while reducing the information load for consumers.

In addition, it was determined that the priority order of the design features in the content class is generally higher than that of the sorting and filtering classes by analyzing the classification and priority order of design features among the different classes. Users have a stronger need for content class design features compared with sorting and filtering classes. Therefore, the design and operation of online travel platforms should focus on how to deliver rich and effective information through online hospitality review systems.

5. CONCLUSIONS

Online reviews have generated wide concern and have been adopted by academics and industries in the field of travel and hospitality management. However, the effectiveness of online reviews would considerably reduced if online review systems are poorly designed. By adopting the basic framework of the Kano model, this study discusses the design of online hospitality review systems from a relatively microscopic perspective. Compared with previous related studies, the present study provides certain theoretical and practical contributions and has obtained inspiring research conclusions. First, the empirical analysis results further support the nonlinear relationship between the design features of

online hospitality review systems and consumer satisfaction. Therefore, faced with resource constraints, online travel platforms can improve user satisfaction with half the effort if they can provide and optimize the design features of online hospitality review systems with a targeted purpose. Second, to solve the problem of the traditional Kano and mixed classification methods regarding the relatively high judgment rate of the indifferent quality, this study proposes an improved classification method of design features based on the better and worse indices of each design feature and provides targeted design and management strategies for different design feature types. Third, this study further proposes the type preference order, priority order in type, and total priority order of design features on the basis of the classification of the design features of online hospitality review systems to provide scientific guidance for the optimization design of online hospitality review systems, thereby helping to achieve a balance between consumer satisfaction, information load, and platform operating costs.

The present study also has certain limitations, which can provide possible directions for future research. For example, no distinction is considered between different types of hospitalities (e.g., economical and luxury types) when assessing consumer demands for design features of online hospitality review systems. The needs of different consumer groups in terms of the design features of online hospitality review systems may likewise vary due to the different characteristics of consumers' age, gender, education level, and occupation. Therefore, future research can consider different hospitality demand scenarios and user groups to obtain accurate design and optimization strategies. Additionally, the traditional Kano model's two-dimensional questionnaire is not efficient and conducive to the accurate understanding of respondents. Future research can consider using regression methods to reduce dimensions or objective data for the mining of consumer needs.

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