Prioritizing hotel lobby design factors: perspectives of hotel operators in China

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ABSTRACT

The hotel lobby is where a guest forms his or her first impression of a hotel’s brand image and quality; hence, integrating appropriate design criteria into hotel lobby design is a value creation act. The novelty and aim of this study is to identified and categorized 15 hotel lobby design factors and ranked their importance and satisfaction levels from hotel operators' perspective to achieve value innovation and sustainable operations management. For this purpose, it systematically developed a questionnaire based on the Kano method and conducted a questionnaire survey on 30 hotel operators in China. Yang’s importance-satisfaction model was applied in data analysis. The study found that economic advantage and value creation are must-be and one-dimensional aspects, and considerations such as modular design, appropriate construction management and cost control, ease of maintenance and repair, and atmospheric design methods are important economic advantage criteria. Strategies involving these considerations facilitate value innovation and sustainable operations and guarantee a comfortable and environmentally friendly stay to hotel guests. The findings not only clarify hotel operators’ insights regarding the use of attractive factors in hotel lobby design but also serve as a reference for international hotel operators to develop possible business models with lobby design strategies.

1. Introduction

China is rapidly becoming one of the world’s major hotel markets. Hence, many international hotel brands have established themselves in major Chinese cities such as Shanghai, Shenzhen, and Beijing (Mao and Yang 2016). Therefore, along with facing the competition raised by their local peers, domestic Chinese hotel brands are encountering challenges posed by international hotel brands.

Further, budget hotel chains with price advantages and standardized service are transforming themselves to enter the higher-end market (Huang, Liu, and Hsu 2014; Jiao 2014; Andreu, Claver, and Quer 2017; Ye, Wu, and Paek 2020). In this situation, hotel operators have started considering various branding and marketing strategies. Through branding and marketing, hotels can obtain recognition from consumers and favor from investors. Hence, hotel operators are investing significant time and resources in hotel planning and transformation. Lobby design is one particular area that is focused on by operators. As hotel lobby is where a guest forms his or her first impression of a hotel’s brand image and quality; integrating appropriate design criteria into hotel lobby design is a value creation act and could enhance hotel’s branding and marketing and stay in competitions.

A review of the recent literature reveals that the categorization and processing of complexity in hotel design styles have matured over the years (Ozkan, Yidirim, and Tuna 2017; Orth and Wirtz 2014; Lee, Lee, and Koh 2019). A hotel lobby that integrates multiple functions, such as those for reception, waiting, reading, and shopping, is the current trend; Figure 1 depicts such a lobby. It is to note that all of the images showed in this introduction section are the first author’s design projects and his copyright of images.

Many heritage buildings have been successfully transformed into hotels. Protecting and reusing such existing buildings is a sustainable and attractive design method. In such hotels, guests can experience and learn the local history and culture during their stay. Further, such hotels help promote the local culture and enable the protection of historical buildings and their intangible value (Timothy and Gelbman 2015; Ong, Minca, and Felder 2015; Xie and Shi 2019). Figure 2 depicts an example of a heritage hotel. In this case, the facades and relevant proportions of buildings constructed in the Chinese architectural style are blended with new lobby designs.

To develop marketing features, hotel operators adopt brand stories and theming strategies. For instance, Figure 3 shows how an antique gramophone theme and theatrical effects were used in hotel lobby designs in Guangdong and Shanghai. Such strategies enable hotel managements to increase their popularity.
Another trend is to hire professional consultants to promote the greening of and integrate art in hotel lobbies (Dixon and Aldous 2014; Shi and Wang 2013; Cheng et al. 2016; Lin 2016; Ahmad et al., 2018; Heesup and Sunghyup 2019). As shown in Figure 4, a green, artistically decorated hotel lobby reflects a modern, fresh, and easy living style. Further, technological advancements facilitate the use of social media as communication platforms between hotels and consumers. Often, a questionnaire is sent to consumers after their stay in a hotel. It not only aims to find out consumers’ satisfaction with the stay or services but also helps collect and analyze consumers’ preferences. The analyzed data serve as a reference to adjust the hotel’s future operations (Duan et al. 2016; Dieck et al. 2017).

The traditional business model of budget hotels is changing, as well. Hotel operators no longer rely on guestroom income as a profit model. An innovative business model in which hotels engage in cross-sector development partnerships to create sustainable
competitive advantage by constantly updating hotel lobbies to express a positive and stylish image is necessary and practical in most cases (Alegre and Berbegal-Mirabent 2016; Souto 2015). Apart from models, several applications offer innovative solutions that guarantee a comfortable stay to hotel guests, as well (Huang, Chang, Yu, and Chen 2019; Gibbs, Gretzel, and Saltzman 2016).

Many hotels practice aggressive actions in construction planning for transformation phases. One example is the use of high-performance modular design (Generalova, Generalov, and Kuznetsova 2016; Gao, Jin, and Lu 2019; Wuni and Shen 2019) along with practicing professional progress management (Baníhashemi et al. 2017; Fewings, Fewings, and Henjewele 2019; Erdogan, Šaparauskas, and Turskis 2017) to ensure effective cost control (Shehu et al. 2014; Syed Jamaludin, Mohammad, and Ahmad 2014; Cooray et al. 2018; Hwang et al. 2020).

To lower future maintenance costs and simultaneously maintain customer satisfaction, hotel operators create some perfect maintenance plans by focusing on the long-term effects of capital expenditure on decoration (Turner and Hesford 2019; Chew, Conejos, and Azri 2019; Bortolini and Forcada 2019). These plans prevent ineffective resource use and inappropriate construction planning and management decisions that may adversely affect the living environment. As a result of the changes in these concepts and perceptions, basic atmospheric factors such as lighting, air quality, thermal comfort, odor, and music (Guillet, Kozak, and Kucukusta 2019; Suh et al. 2015; Jani and Han 2015) and, particularly green values based on environmental protection, have become some of the considerations in hotel lobby design (Hays and Ozretić-Došen 2014; Vargas, Lawrence, and Stevenson 2017; Lai 2016; D’Souza et al. 2021). These considerations facilitate an improvement in lobby amenities, which, in turn, delight guests from different cultural backgrounds (Dev et al. 2018; Torres, Fu, and Lehto 2014; Soifer, Choi, and Lee 2020).

Since the integration of attractive factors in hotel lobby design is a continuous trend, this study identifies the importance and satisfaction levels of such attractive design factors from hotel operators’ perspective by conducting a questionnaire survey on operators in China. This study is the first attempt in the field that used Kano model and Refined Kano Model to study the views from the hotel operators on importance and satisfaction levels of hotel lobby design factors. The reason to use Kano model is explained in research methodology section as it could be used to evaluate customers’ expectations regarding and satisfaction with a product or service. Previous studies have been used Kano model exclusively on single perspective (customers) for hotel’s service and product satisfaction (Harton and Chuan 2011; Chang and Chen 2011; Chiang, Chen, and Hsu 2019; Gregory and Parsa 2013; Zobnina and Rozhkov 2018; Park, Lee, and Back 2021) or focus on design factors for the hotel interior design with Kano and refined Kano model (Huang, Chen, Tsaih 2019).

The research findings not only provide hotel operators’ first-hand insight into these attractive design factors used in lobby design but also serve as a reference for international hotel operators to develop possible business models with lobby design strategies. Such strategies facilitate value innovation and sustainable operations and guarantee a comfortable and environmentally friendly stay to customers.

2. Research methodology

2.1. Participants

There are two groups of the participants involved in this study. For the interviews of the necessary hotel design factors, respondents included six hotel managers from China’s first-tier cities, Beijing (1 person), Shanghai (2 people), Guangzhou (2 people), and Shenzhen (1 person); two professors from the architecture department who design experience in hotel and sustainable design; and two design professionals who have a master’s or higher degree and hotel design experience. The average age and year of working experience of first group participants is 52 and 25, respectively. For the questionnaires, the respondents were managers of economy hotels undergoing transformation or of new hotels located in four of China’s first-tier cities. The average age and year of working experience of second group participants is 45 and 20, respectively. As shown in Table 1, the survey was conducted on eight respondents in each of the four cities. Since two respondents did not complete the questionnaire, the total valid sample count was 30. The response rate is 93.7%.

2.2. Data collection

The proposed design factors were first identified from the recent and relevant literature on hotel lobby design and business model innovation and later established through interviews and discussions with the focus

| Background | Beijing | Guangzhou | Shanghai | Shenzhen | Total |
|------------|---------|-----------|----------|----------|-------|
| Interview  | 5       | 6         | 7        | 6        | 24    |
| Questionnaire | 3   | 0         | 0        | 2        | 5     |
| Invalid    | 1       | 0         | 1        | 2        | 2     |
| Subtotal of | 8      | 8         | 8        | 8        | 32    |
| Valid      | 7       | 8         | 8        | 7        | 30    |
Table 2. List of 15 proposed design factors and references.

| Aspect                  | Design Factors                                      | References                                                                 |
|-------------------------|-----------------------------------------------------|---------------------------------------------------------------------------|
| Value Creation          | Complexity in design styles                         | Ozkan, Yidirim, and Tuna (2017); Orth and Wirtz (2014); Lee, Lee, and Koh (2019) |
|                         | Cultural heritage connection                        | Timothy and Gelbman (2015); Ong, Minca, and Felder (2015); Xie and Shi (2019) |
| Theming & brand story   | Wexler, Li, and Hung (2015); Ryu et al. (2019); Coleman and Robinson (2018) |
| Interior landscapes     | Dixon and Aldous (2014); Shi and Wang (2013); Heesup and Sunghyup (2019); Ahmad et al. (2018) |
| Art concepts            | Cheng et al. (2016); Lin (2016)                      |
| Social media propagation| Duan et al. (2016); Dieck et al. (2017)              |
| Business model innovation| Alegre and Berbegal-Mirabent (2016); Souto (2015)   |
| Mobile applications     | Huang, Chang, Yu, Chen (2019); Gibbs et al. (2016)  |
| Economic                | Modular design                                      |                                                                           |

| References            | Generalov, and Kuznetsova (2016); Ramaji and Memari (2013); Gao, Jin, and Lu (2019); Wuni and Shen (2019) |
| Construction project management | Banilahshemi et al. (2017); Fewings, Fewings, and Henjewele (2019); Erdogan, Saparaukas, and Tursikis (2017) |
| Construction cost control | Shenu et al. (2014); Syed Jamaludin, Mohammad, and Ahmad (2014); Cooray et al. (2018); Hwang et al. (2020) |
| Maintenance and repair | Turner and Hesford (2019); Chew, Conejos, and Azrl (2019); Bortolini and Forcada (2019) |
| Atmospheric factors   | Guillet, Kozak, and Kucukusta (2019); Suh et al. (2013); Jani and Han (2015) |
| Green values           | Hays and Ozretić-Dolen (2014); Vargas, Lawrence, and Stevenson (2017); Lai (2016); D’Souza et al. (2021) |
| Actual use of amenities| Dev et al. (2018); Torres, Fu, and Lehto (2014); Soifer, Choi, and Lee (2020) |

Table 3. Sample questionnaire of Part II.

| Criterion will be included in the hotel lobby | Like | Must be | Neutral | Live with | Dislike |
|-----------------------------------------------|-----|---------|---------|-----------|---------|
| 1A. Complexity in design styles               |     |         |         |           |         |

was based on Kano’s model method and collected the respondents’ opinions on the necessity of including the proposed hotel design factors. Each element is designed with functional and dysfunctional conflict pair-wise items, as shown in Table 3.

Finally, Part III considered the refined Kano model method to clarify respondents’ perspectives on the importance and satisfaction level of proposed design factors based on their experience in conducting or supervising hotel operations after the hotels’ construction or transformation. Table 4 depicts a sample of some importance and satisfaction questions included in Part III. The respondents’ answers were evaluated on a scale of 1 to 5, where 1 = not important, 2 = of little importance, 3 = moderately important, 4 = important, and 5 = very important. To overcome possible limitations, the survey was conducted through mail, in-person interviews, and by telephone.

2.4. Kano’s two-dimensional model

The two-dimensional model introduced by Noriaki Kano in 1984 is often used to evaluate customers’ expectations regarding and satisfaction with a product or service (Kano 1984; Luor et al. 2015; Madzik and Kormanec 2018). Kano’s two-dimensional model considers whether a product satisfies customers’ expectations, as shown in Figure 5. Kano’s questionnaire uses a 5-point ordinal scale with values such as like, must-be, neutral, live with, and dislike to evaluate a customer’s level of preference with a product. Each question is addressed in the positive and negative directions to minimize the potential error associated with one-directional questions. To transform the 5-point ordinal scale to the level of preference on a product or service, the scale is initially transferred into specific values, such as like = 1 and dislike = 1/5. Subsequently, it is calculated in a matrix and correlated to five qualitative categories: attractive quality (A), one-dimensional quality (O), must-be quality (M), indifferent quality (I), and reverse quality (R). The final matrix result can be plotted within the four quadrants shown in Figure 5. Step by step calculation and underlaying statistics principle and equations used in this study are not discussed detaily in this paper and were based on Berger et al. paper (Berger et al. 1993).

2.3. Questionnaire

The questionnaire comprised three parts. Part I collected respondents’ background information such as age and year of working experience. Part II
2.5. Refined Kano model

The Kano model can effectively help develop services and improve product quality; however, it does not fulfill financial or technical requirements. In this situation, the refined Kano model can further differentiate a quality unlike the original Kano model (Yang 2005); hence, it is used to judge the effects of the importance level on quality attributes and make customer satisfaction-oriented choices (Kristensen, Kanji, and Dahlgaard 1992). As shown in Figure 6, in the refined Kano’s model, an attractive quality can be differentiated into a highly attractive and a less attractive quality in quadrant 2 and be correlated to positive satisfaction and unimportance fulfilments. Further, quadrant 2 has an indifferent quality that is associated with the potential and carefree

Table 4. Sample questionnaire of Part III.

| How important is to include this criterion in the hotel lobby? | Importance Degree |   |
|---------------------------------------------------------------|-------------------|---|
| Based on your experience, what was the satisfaction level of this criterion included in the hotel lobby? | Satisfaction Level |   |
| 1A. Complexity in design styles                               | Very satisfy      |
|                                                              | Satisfy           |
|                                                              | Acceptable        |
|                                                              | Not satisfy       |
|                                                              | Definitely not satisfy |
| 1B. Complexity in design styles                               |   |

Figure 5. Kano two-dimensional model.

Figure 6. Yang’s refined Kano’s model of quality attributes.
categories in the original Kano model. Although a business owner can use the highly attractive quality factor to attract potential customers and often recommend and include it as a strategic weapon to attract customers, he or she may not use it in case of a budget consideration. This is simply because the highly attractive and less attractive qualities lie within the positive satisfaction and negative importance quadrant, and the nonfulfillment of a highly attractive or less attractive quality will not affect customer satisfaction. Hence, it can be omitted according to a cost-cut decision.

Similarly, as shown in quadrant 1, the one-dimensional quality can be further differentiated into high value-added and low value-added qualities. Since the high value-added quality significantly contributes to customer satisfaction and has a high importance level, most organizations provide this one-dimensional quality to their customers. On the other hand, in case of budget concerns, a business owner may omit a low value-added quality if its contribution to customer satisfaction and its importance level are low. Further, the must-be quality that falls within quadrant 4 shows that service quality is critical and necessary, due to which it must be fulfilled by organizations to prevent dissatisfaction and realize customers’ expectations.

2.6. Kano’s evaluation table

Kano’s evaluation table, which is shown in Table 5, was used to analyze the questions in Part II using the following five categories suggested by Kano (Kano 1984): attractive quality, must-be quality, one-dimensional quality, indifferent quality, and reverse quality. For each proposed design factor, the answers of functional and dysfunctional forms were entered in the evaluation table. For instance, if the answer is “must-be” in functional form and “dislike” in dysfunctional form for a proposed and specific hotel lobby design factor, the table yields “M.” If response yield from 20 out of 30 participants for a specific design factor is M, and 10 out of 30 participants has A, then M, the must-be quality factor will be included in the hotel lobby design. This data analysis method is also known as Kano’s quality function deployment (QFD).

2.7. Yang’s importance-satisfaction model

Figure 7 shows the refined categorization of the importance-satisfaction (I-S) model proposed by Yang in 2005 (Yang 2005). The X-axis represents the importance level and the Y-axis the satisfaction level of a design factor. The average of all 30 participants’ importance and satisfaction evaluation scores for each proposed design factor will be plotted in Figure 7. The analysis results were divided into excellent, to be improved, surplus, and carefree areas. When a proposed design factor falls within the excellent area, it denotes the element’s high importance and satisfaction levels. The high importance and satisfaction levels of this proposed design factor indicates that hotel operators understand that it must be maintained to ensure the high standard of hotel lobby design. For proposed design factors that fall in the to be improved area, hotel operators consider these factors’ quality attributes important. Since the performance of these factors generally exceeds expectations, they should be improved as soon as possible. For proposed design factors that fall within the surplus area, hotel operators consider the quality of these factors in this area less important but satisfactory. In case a cost cut is required, they can omit this design factor without significantly affecting satisfaction.

![Figure 7. Yang’s importance-satisfaction model.](image-url)
3. Results

3.1. Hotel lobby design factors and attributes

Based on Kano’s categorization of quality attributes and relevant quality function deployment, this study analyzed 15 proposed hotel lobby design factors used in hotels in China. The study’s results, which are depicted in Table 6, indicate that art concepts (33.3%), business model innovation (36.7%), and mobile applications (33.3%) are attractive quality factors.

Further, cultural heritage connection (33.3%), theming and brand story (36.7%), and interior landscapes (33.3%) are important one-dimensional quality factors. Complexity in design styles (53.3%), modular design (63.3%), construction project management (73.3%), construction cost control (63.3%), maintenance and repair (53.3%), and atmospheric factors (36.7%) are categorized as must-be quality factors. Social media propagation (36.7%), green values (36.7%), and the use of amenities (60%) are considered indifferent quality factors. Finally, in terms of categorization results, value creation and economic advantage are categorized as an one-dimensional quality aspect and a must-be quality aspect, respectively.

3.2. Importance and satisfaction levels of hotel design factors

The average of all 30 participants’ importance and satisfaction evaluation scores for each proposed design factor are shown first in Table 7. Respondents’ average scores for the importance and satisfaction levels of 15 proposed design factors are 4.328 and 3.469, respectively. Based on the overall average and Kano’s quality attribute categorization, all the 15 evaluation design factors were further categorized using the refined Kano model. In the refined Kano model, the must-be quality is further categorized as “critical” and “necessary” according to its scored values for importance and satisfaction levels to the average score of the 15 proposed design factors. For example, in the Kano model, construction project management and complexity in design styles are categorized as must-be quality factors, and their importance levels are 4.767 and 4.723, respectively. Further, both the factors’ scores are higher than the average score of 4.328 for the 15 proposed design factors. The satisfaction levels of the two design factors are 3.380 and 3.887, which are higher and lower than the average score of 3.469, respectively. Hence, construction project management is considered a necessary design factor, and complexity in design styles is a critical design factor. Similarly, one-dimensional quality is further differentiated as high value-added and low value-added qualities. Attractive quality is divided into highly attractive and less attractive qualities, whereas the indifferent quality includes potential and carefree attributes.

3.3. Importance and satisfaction plot for hotel lobby design factors

As depicted in Figure 8, a two-dimensional matrix with four quadrants was produced with the respondents’ average score for the importance and satisfaction levels of 15 proposed design factors. In the first quadrant, the following are in the excellent category: 1. complexity in design styles, 5. art concepts, and 13. atmospheric factors. In the second quadrant, the improved category includes 7. business model innovation, 10. construction project management, 11. construction cost control, and

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**Table 6. Kano’s preference attributes and QFD for the proposed design factors.**

| Aspect                  | Evaluation Design Factors | Attractive (A) | One-dimensional (O) | Must-be (M) | Indifferent (I) | Reverse (R) | Deployment of Design Factors | Deployment of Aspects |
|-------------------------|---------------------------|----------------|---------------------|-------------|----------------|-------------|-----------------------------|----------------------|
| Value Creation          | Complexity in design styles | 3.30%          | 23.30%              | 53.30%      | 20.00%         | 0.00%       | M                           | O                    |
|                         | Cultural heritage connection | 26.70%         | 33.30%              | 23.30%      | 16.70%         | 0.00%       | O                           |                      |
|                         | Theming & brand story       | 20.00%         | 36.70%              | 26.70%      | 16.70%         | 0.00%       | O                           |                      |
|                         | Interior landscapes         | 20.00%         | 33.30%              | 30.00%      | 16.70%         | 0.00%       | O                           |                      |
|                         | Art concepts                | 33.30%         | 26.70%              | 16.70%      | 23.30%         | 0.00%       | O                           |                      |
|                         | Social media propagation    | 13.30%         | 30.00%              | 20.00%      | 36.70%         | 0.00%       | A                           |                      |
|                         | Business model innovation   | 36.70%         | 33.30%              | 13.30%      | 16.70%         | 0.00%       | O                           |                      |
|                         | Mobile applications         | 33.30%         | 30.00%              | 13.30%      | 23.30%         | 0.00%       | A                           |                      |
| Economic Advantage      | Modular design              | 13.30%         | 13.30%              | 63.30%      | 10.00%         | 0.00%       | M                           | M                    |
|                         | Construction project        | 3.300%         | 20.00%              | 73.30%      | 3.30%          | 0.00%       | M                           | M                    |
|                         | management                 |                |                     |             |                |             |                             |                      |
|                         | Construction cost control   | 3.30%          | 26.70%              | 63.30%      | 6.70%          | 0.00%       | M                           | M                    |
|                         | Maintenance and repair      | 10.00%         | 20.00%              | 53.30%      | 16.70%         | 0.00%       | M                           | M                    |
|                         | Atmospheric factors         | 20.00%         | 26.70%              | 36.70%      | 16.70%         | 0.00%       | M                           | M                    |
|                         | Green values                | 23.30%         | 20.00%              | 20.00%      | 36.70%         | 0.00%       | I                           |                      |
|                         | Actual use of amenities     | 30.00%         | 6.70%               | 3.30%       | 60.00%         | 0.00%       | I                           |                      |
12. maintenance and repair. The aspects 2. cultural heritage connection, 3. theming and brand story, and 8. mobile applications are in the surplus category in the third quadrant. Finally, in the fourth quadrant, the following are in the carefree category: 4. interior landscapes, 6. social media propagation, 9. modular design, 14. green values, and 15. actual use of amenities.

### 4. Discussion

#### 4.1. Must-be design factors

According to the Kano model and QFD, to maintain customers' basic expectations and satisfaction, hotel lobby design should include must-be design factors such as construction project management, complexity in design, construction cost control, maintenance and repair, atmospheric factors, and modular design. By applying the Kano refined model, a must-be design factor can be further differentiated into necessary and critical design factors. In this study, the necessary design factors are construction project management, construction cost control, maintenance and repair, and modular design. Further, the critical design factors are complexity in design styles and atmospheric factors. The I-S model clarifies that these critical design factors are implemented excellently. For the four necessary design factors, only modular design is identified as having a carefree attribute. The remaining three, construction management, cost control, and maintenance factors, are to be improved.

During the interview, professionals mentioned that construction management and cost control are not efficiently addressed during hotel construction or transformation in China. Further, they were not satisfied with the maintenance efforts that followed actual operations. This highlights the need to develop and apply an integrated construction management system during the design, planning, and construction stages of hotel construction or transformation to ensure the

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Table 7. Ranking and potential of hotel lobby design factors.

| Order of Importance | Design Factors                        | Importance Degree | Satisfaction Level | Original Kano Model Attribute | Refined Kano Model Attribute | Area of I-S Model |
|---------------------|---------------------------------------|-------------------|--------------------|-------------------------------|-------------------------------|-------------------|
| 1                   | Construction project management       | 4.767             | 3.380              | M                             | Necessary                     | To be improved    |
| 2                   | Complexity in design styles           | 4.723             | 3.877              | M                             | Critical                      | Excellent         |
| 3                   | Construction cost control             | 4.633             | 3.300              | M                             | Necessary                     | To be improved    |
| 4                   | Business model innovation             | 4.523             | 3.455              | A                             | Less attractive               | To be improved    |
| 5                   | Maintenance and repair                | 4.500             | 3.243              | M                             | Necessary                     | To be improved    |
| 6                   | Art concepts                          | 4.400             | 3.600              | A                             | High attractive               | Excellent         |
| 7                   | Atmospheric factors                   | 4.400             | 3.633              | M                             | Critical                      | Excellent         |
| 8                   | Cultural heritage connection          | 4.300             | 3.700              | O                             | High value-added              | Surplus           |
| 9                   | Interior landscapes                   | 4.267             | 3.423              | O                             | Low value-added               | Surplus           |
| 10                  | Theming & a brand story               | 4.233             | 3.580              | O                             | High value-added              | Surplus           |
| 11                  | Social media propagation              | 4.233             | 3.432              | I                             | Care-free                     | Care-free         |
| 12                  | Green values                          | 4.100             | 3.200              | I                             | Care-free                     | Care-free         |
| 13                  | Modular design                        | 4.000             | 3.300              | M                             | Necessary                     | Care-free         |
| 14                  | Mobile applications                   | 3.977             | 3.480              | A                             | High attractive               | Surplus           |
| 15                  | Actual use of amenities                | 3.867             | 3.433              | I                             | Care-free                     | Care-free         |
| **Mean**            |                                      | 4.328             | 3.469              |                               |                               |                   |

Figure 8. Importance and satisfaction plot for hotel lobby design factors.
effective management of project departments, project types, procurement routes, project nature, and contracting methods.

Moreover, a sound mechanism with appropriate internal audit and outsourcing maintenance is required to further maintenance and repair efforts after operations. It helps produce statistics on common failure modes and failure occurrences and establish a well-designed maintenance plan to ensure cost-effective maintenance and even realize maintenance cost cuts without affecting customer satisfaction.

Further, modular design is considered a carefree but necessary design factor. It can shorten the design and construction lead-time of a project to reduce cost, enhance construction efficiency, and facilitate flexibility in spatial planning. The carefree area can include progress management and construction cost control beyond expectation, as well. Meanwhile, determining the effectiveness of resource use and considering environmental impacts are probably two other carefree design factors.

### 4.2. One-dimensional design factors

According to Kano, factors that are categorized as one-dimensional factors increase customers’ satisfaction level once they are unexpectedly fulfilled. This study identifies one-dimensional design factors such as cultural heritage connection, interior landscapes, and theming and brand story and recommends their inclusion in hotel lobby design. From the I-S model, the cultural heritage connection and theming and brand story design factors that are identified with high value-added attributes have been over implemented. In China, renovation efforts have enabled the adaptation of historical and cultural heritage design factors in hotels. Such heritage hotels are particularly suited to the needs of globalization. Hence, the cultural heritage connection design factor is easily achievable and expected by the customer in this era of globalization.

In addition, the theming and brand story element is the marketing strategy implemented by many hotels to increasingly strong competitions. Further, well-plotted brand stories significantly improve brand image and gain much word-of-mouth publicity in China’s hospitality market. Therefore, hotel operators in China consider theming and brand story a high value-added quality. Accordingly, they spare no effort to incorporate this quality in hotel lobby design.

However, the incorporation of the design factors cultural heritage connection and theming and brand story by most hotels in accordance with the market trend diminishes the differentiation effect of these factors. In other words, the more the investments made, the lower the significance of the created value. Therefore, hotel operators should adopt innovative methods to transform heritage buildings into hotels and provide a theme and brand story.

The study identified the interior landscape design factor as a low-value added and carefree attribute element. Hence, it can be part of a frequently used design method. If a hotel lobby is designed to have high maintenance plantings, it may require extensive maintenance efforts. The hotel operator’s satisfaction level will eventually fall below average, as well. Hence, the careful selection of appropriate interior greenings is an alternative method to increase the satisfaction levels of both hotel operators and customers.

### 4.3. Attractive design factors

The study identified art concepts, business model innovation, and mobile applications as attractive quality factors. However, according to the refined Kano model analysis, only art concepts is a highly attractive quality that falls in the excellent area. Mobile applications fall in the surplus area, whereas business model innovation is in the to be improved area.

To hotel operators in China, mobile applications are an attractive design factor; however, due to the prevalence of modern technology and software, mobile applications are commonly implemented in modern hotels and, hence, their value in impressing customers is insignificant. Hence, any reduction in investments in mobile applications to enable cost cuts does not affect the satisfaction of hotel operators and customers.

On the other hand, business model innovation, which is an attractive quality and falls in the surplus and to be improved areas, is a sales point for most hotel operators. The reason why business model innovation falls in the surplus and to be improved areas is that the actual operational performance does not meet the initial expectation. As seen in China’s market, increasing numbers of hotels are opening their lobbies to conduct cross-sector operations, such as those for art galleries, retail stores, health foods, and specialty restaurants. They provide consumers with comprehensive experiences and services. More importantly, apart from servicing hotel guests, these new business items serve the interests of local residents, as well. Although they expand the scope of business, changes in hardware and amenities alone cannot be considered successful business model innovation. Successful business model innovation involves the complete use of internal and external resources to achieve the business’s competitive advantage (Souto 2015). Therefore, hotel operators should have clear perceptions of the actual contents of business model innovation to utilize them in design and realize a win-win situation to increase the hotels’ revenue and customer satisfaction.
4.4. Indifferent design factors

The study identified social media propagation, green values, and actual use of amenities as indifferent and carefree design factors. Social media propagation and actual use of amenities are often included in hotel lobby design, due to which hotel operators did not consider these factors important or score them sufficiently high. However, this study surprisingly found that hotel operators in China did not score highly for the importance and satisfaction levels of green values. Further, it is possible that hotel operators in China disregard the importance of green values in lobby construction or transformation due to cost concerns. However, people’s environmental awareness is growing stronger each day, and water and energy conservation and solid waste reduction are gaining universal value. Today, some European and U.S. hotels support green values by offering farm-to-table foods, flexible lighting, and paper use reduction. Hence, hotel operators in China should focus more on global green values. Such considerations not only enrich guests’ hotel experience but also enable the utilization of the green value concept and services as the key success design factors in realizing green hotel management and creating economic prosperity and eco-friendliness.

5. Conclusions

By conducting a literature review and interviews with hotel design and operation professionals, this study identified 15 hotel lobby design factors within the value creation and economic advantage aspects proposed and utilized in the questionnaire. The study examined the perspectives of 30 hotel operators in China regarding the preference, importance, and satisfaction levels for creating value in and ensuring the success of hotel operations. This is the first attempt in the architectural design field to learn perspectives from the operators rather than customers for the importance and satisfaction of design factors for the hotel lobby. To clarify preference, Kano’s categorization of quality attributes and the relevant QFD were applied. The results revealed that economic advantage and value creation are the must-be and one-dimensional aspects. Among the 15 proposed hotel lobby design factors, 6 are must-be factors. The remaining nine proposed factors are evenly scored and divided into three attributes: attractive, one-dimensional, and indifference. To determine the importance and satisfaction levels of these design factors, Yang’s refined Kano model and the importance and satisfaction model were applied. The results of the refined Kano model further differentiated the original four Kano’s preference attributes into eight attributes. The result of the importance and satisfaction model not only yielded a list of the 15 proposed hotel lobby design factors ranked according to importance but also revealed the perspectives of 30 hotel operators in China regarding their experience with the hotel lobby design factors.

Among the 15 design factors, business model innovation from the attractive category and green values from the indifferent category are often related to creating value for and bringing success to hotel operations after hotel construction or transformation globally. Although hotel operators in China were not aware of the importance of business model innovation and green values as internationally acclaimed hotel lobby design and operation factors, these design and operation factors are the fundamentals of enterprise modernization. Hence, the study recommends that hotel operators in China utilize these design factors wisely to retain their competitive edge in the global hospitality industry.

As this paper was focused mainly on learning and ranked the 15 proposed design factors for hotel lobby, the discussion on managerial implication aspects was omitted and should be included in the nearly future study for a holistic hotel lobby design.

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References

Ahmad, H., F. M. Fazilah, and B. M. Suhardi. 2018. “Public Preferences toward Shopping Mall Interior Landscape Design in Kuala Lumpur, Malaysia.” Urban Forestry & Urban Greening 30: 1–7. doi:10.1016/j.ufug.2017.12.019.

Alegre, I., and J. Berbegal-Mirabent. 2016. “Social Innovation Success Factors: Hospitality and Tourism Social Enterprises.” International Journal of Contemporary Hospitality Management 28 (6): 1155–1176. doi:10.1108/IJCHM-05-2014-0231.

Andreu, R., E. Claver, and D. Quer. 2017. “Firm-specific Factors and Entry Mode Choice: An Analysis of Chinese Hotel Chains.” Tourism Economics 23 (4): 756–767. doi:10.5367/te.2016.0557.

Banihashemi, S., M. R. Hosseini, H. Golizadeh, and S. Sankaran. 2017. “Critical Success Factors (CSFs) for Integration of Sustainability into Construction Project Management Practices in Developing Countries.” International Journal of Project Management 35 (6): 1103–1119. doi:10.1016/j.ijproman.2017.01.014.

Berger, D., B. Duss, I. Dambolena, A. Graham, S. Graves, P. Horwitz, L. Langone, et al. 1993. “Kano’s Methods for Understanding Customer-defined Quality.” Center for Quality Management Journal 2 (4): 3–36.

Bortolini, R., and N. Forcada. 2019. “Analysis of Building Maintenance Requests Using a Text Mining Approach: Building Services Evaluation.” Building Research & Information 48 (2): 207–217. doi:10.1080/09613218.2019.1609291.

Chang, K. C., and M. C. Chen. 2011. “Applying the Kano Model and QFD to Explore Customers’ Brand Contacts in the Hotel Business: A Study of A Hot Spring Hotel.” Total Quality Management & Business Excellence 22 (1): 1–27. doi:10.1080/14783363.2010.529358.

Cheng, J. S., T. W. Tang, H. Y. Shih, and T. C. Wang. 2016. “Designing Lifestyle Hotels.” International Journal of Hospitality Management 58: 95–106. doi:10.1016/j.ijhm.2016.06.010.

Chew, M. Y. L., S. Conejos, and F. H. B. Azril. 2019. “Design for Maintenability of High-rise Vertical Green Facades.” Building Research & Information 47 (4): 453–467. doi:10.1080/09613218.2018.1440716.

Chiang, C. F., W. Y. Chen, and C. Y. Hsu. 2019. “Classifying Technological Innovation Attributes for Hotels: An Application of the Kano Model.” Journal of Travel & Tourism Marketing 36 (7): 796–807. doi:10.1080/10548408.2019.1575786.

Coleman, S., and J. B. Robinson. 2018. “Introducing the Qualitative Performance Gap: Stories about a Sustainable Building.” Building Research & Information 46 (5): 485–500. doi:10.1080/09613218.2017.1366138.

Cooray, N., D. Wickramasinghe, H. Somathilake, T. Dissanayke, and D. Dissanayake. 2018. “Analysis of Cost Control Techniques Used on Building Construction Projects in Sri Lanka.” International Journal of Research 5 (23): 909–923. doi:10.2139/ssrn.3313130.

D’Souza, C., V. Apaolaza, P. Hartmann, and A. R. Brouwer. 2021. “Marketing for Sustainability: Travellers’ Intentions to Stay in Green Hotels.” Journal of Vacation Marketing 27 (2): 187–202. doi:10.1177/1356766720975063.

Dev, C. S., R. W. Hamilton, R. T. Rust, and M. V. Valenti. 2018. “What Do Hotel Guests Really Want? Anticipated versus Actual Use of Amenities.” Cornell Hospitality Report 18 (8): 1–24.

Dieck, M. C. T., T. H. Jung, W. G. Kim, and Y. Moon. 2017. “Hotel Guests’ Social Media Acceptance in Luxury Hotels.” International Journal of Contemporary Hospitality Management 29 (1): 530–550. doi:10.1108/IJCHM-10-2015-0552.

Dixon, G. R., and D. E. Aldous. 2014. “An Introductory Perspective to Horticulture: Plants for People and Places, Volume 1.” In Horticulture: Plants for People and Places, edited by G. R. Dixon and D. E. Aldous, 1–25. New Delhi: Springer Netherlands.

Duan, W., Y. Yu, Q. Cao, and S. Levy. 2016. “Exploring the Impact of Social Media on Hotel Service Performance: A Sentimental Analysis Approach.” Cornell Hospitality Quarterly 57 (3): 282–296. doi:10.1177/1938965515620483.

Erdogan, S. A., J. Saparauskas, and Z. Turskis. 2017. “Decision Making in Construction Management: AHP and Expert Choice Approach.” Procedia Engineering 172: 270–276. doi:10.1016/j.proeng.2017.02.111.

Frewings, P., P. Frewings, and C. Hennjeeve. 2019. Construction Project Management: An Integrated Approach. London: Routledge. doi:10.1201/9781351122030.

Gao, S., R. Jin, and W. Lu. 2019. “Design for Manufacture and Assembly in Construction: A Review.” Building Research & Information. advance online publication. doi:10.1080/09613218.2019.1660608.

Generalova, E. M., V. P. Generalov, and A. K. Kuznetsova. 2016. “Modular Buildings in Modern Construction.” Procedia Engineering 153: 167–172. doi:10.1016/j.proeng.2016.08.098.

Gibbs, C., U. Gretzel, and J. Saltzman. 2016. “An Experience-based Taxonomy of Branded Hotel Mobile Application Features.” Information Technology & Tourism 16 (2): 175–199. doi:10.1007/s40558-016-0052-5.

Gregory, A. and H. Parsa. 2013. “Kano’s Model: An Integrative Review of Theory and Applications to the Field of Hospitality and Tourism.” Journal of Hospitality Marketing & Management 22: 25–46. doi:10.1080/19368623.2011.641073.

Guillet, B. D., M. Kozak, and D. Kucukusta. 2019. “It’s in the Air: Aroma Marketing and Affective Response in the Hotel World.” International Journal of Hospitality & Tourism Administration 20 (1): 1–14. doi:10.1080/15256480.2017.1359727.

Harton, M., and T. K. Chuan. 2011. “How the Kano Model Contributes to Kansei Engineering in Services.” Ergonomics 54 (11): 987–1004. doi:10.1080/00140139.2011.616229.

Hays, D., and D. Ozretić-Došen. 2014. “Greening Hotels - Building Green Values into Hotel Services.” Tourism and Hospitality Management 20 (1): 85–102. doi:10.20867/thm.20.1.7.

Heesup, H., and S. H. Sunghyup. 2019. “Green Indoor and Outdoor Environment as Nature-based Solution and Its Role in Increasing Customer/employee Mental Health, Well-being, and Loyalty.” Business Strategy and the Environment 28 (4): 629–641. doi:10.1002/bse.2269.
Huang, H. T., C. P. Chen, and S. J. Tsaih. 2019. “Preferred Criteria in Winning Budget Hotel Interior Design Projects in China.” IOP Conference Series: Materials Science and Engineering 652 (1): 012007. doi:10.1088/1757-899X/652/1/012007.

Huang, S., Z. Liu, and C. H. C. Hsu. 2014. “Customer Experiences with Economy Hotels in China: Evidence from Mystery Guests.” Journal of Hospitality Marketing & Management 23 (3): 266–293. doi:10.1080/19368623.2013.787919.

Huang, Y., L. L. Chang, C. P. Yu, and J. Chen. 2019. “Examining an Extended Technology Acceptance Model with Experience Construct on Hotel Consumers’ Adoption of Mobile Applications.” Journal of Hospitality Marketing & Management 28 (8): 957–980. doi:10.1080/19368623.2019.1580172.

Hwang, B. G., M. Shan, L. Zhu, and W. C. Lim. 2020. “Cost Control in Megaprojects: Efficacy, Tools and Techniques, Key Knowledge Areas and Project Comparisons.” International Journal of Construction Management 20 (5): 437–449. doi:10.1080/15623599.2018.1484976.

Jani, D., and H. Han. 2015. “Influence of Environmental Stimuli on Hotel Customer Emotional Loyalty Response: Testing the Moderating Effect of the Big Five Personality Factors.” International Journal of Hospitality Management 44: 48–57. doi:10.1016/j.ijhm.2014.10.006.

Jiao, M. Y. 2014. “Customer Satisfaction Measurement of Budget-type Hotels Based on Customer Value.” Tourism Tribune 23 (11): 80–86.

Kano, N. 1984. “Attractive Quality and Must-be Quality.” Journal of the Japanese Society for Quality Control 14 (2): 39–48.

Kristensen, K. G. K. Kanji, and J. J. Dahlgaard. 1992. “On Measurement of Customer Satisfaction.” Total Quality Management 3 (2): 123–128. doi:10.1080/0954412920000013.

Lai, J. H. K. 2016. “Energy Use and Maintenance Costs of Upmarket Hotels.” International Journal of Hospitality Management 56: 33–43. doi:10.1016/j.ijhm.2016.04.011.

Lee, M., S. Lee, and Y. Koh. 2019. “Multisensory Experience for Enhancing Hotel Guest Experience: Empirical Evidence from Big Data Analytics.” International Journal of Contemporary Hospitality Management 31 (11): 4313–4337. doi:10.1108/IJCHM-03-2018-0263.

Lin, I. Y. 2016. “Effects of Visual Servicescape Aesthetics Comprehension and Appreciation on Consumer Experience.” Journal of Services Marketing 30 (7): 692–712. doi:10.1080/08876042.2015-0258.

Luor, T., H. P. Lu, K. M. Chien, and T. C. Wu. 2015. “Contribution to Quality Research: A Literature Review of Kano’s Model from 1998 to 2012.” Total Quality Management & Business Excellence 26 (3–4): 234–247. doi:10.1080/14783363.2012.733264.

Madjik, P., and P. Kormaneck. 2018. “Developing the Integrated Approach of Kano Model and Failure Mode and Effect Analysis.” Total Quality Management & Business Excellence 29 (3–4): 387–409. doi:10.1080/14783363.2016.1194197.

Mao, Z., and Y. Yang. 2016. “FDI Spillovers in the Chinese Hotel Industry: The Role of Geographic Regions, Star-rating Classifications, Ownership Types, and Foreign Capital Origins.” Tourism Management 54: 1–12. doi:10.1016/j.tourman.2015.10.011.

Ong, C. C., Minica, and M. Felder. 2015. “The Historic Hotel as Quasi-freedom Machine: Negotiating Utopian Visions and Dark Histories at Amsterdam’s Lloyd Hotel and Cultural Embassy.” Journal of Heritage Tourism 10 (2): 167–183. doi:10.1080/1743873X.2014.985223.

Orth, U. R., and J. Wirtz. 2014. “Consumer Processing of Interior Service Environments: The Interplay among Visual Complexity, Processing Fluency, and Attractiveness.” Journal of Service Research 17 (3): 296–309. doi:10.1177/1094670514529606.

Ozkan, A., K. Yidirim, and D. Tuna. 2017. “Influence of Design Styles on User Preferences in Hotel Guestrooms.” Online Journal of Art and Design 5 (2): 53–71.

Park, H., M. Lee, and K. J. Back. 2021. “Exploring the Roles of Hotel Wellness Attributes in Customer Satisfaction and Dissatisfaction: Application of Kano Model through Mixed Methods.” International Journal of Contemporary Hospitality Management 33 (1): 263–285. doi:10.1108/IJCHM-05-2020-0442.

Ramaji, I. J., and A. M. Memari. 2013. “Identification of Structural Issues in Design and Construction of Multi-story Modular Buildings.” Paper presented at the 1st Annual Residential Building Design & Construction Conference on Sands Casino Resort, Bethlehem, PA.

Ryu, K., X. Y. Lehto, S. E. Gordon, and X. Fu. 2019. “Effect of a Brand Story Structure on Narrative Transportation and Perceived Brand Image of Luxury Hotels.” Tourism Management 71: 348–363. doi:10.1016/j.tourman.2018.10.021.

Shehu, Z., I. R. Endut, A. Akintoye, and G. D. Holt. 2014. “Cost Overrun in the Malaysian Construction Industry Projects: A Deeper Insight.” International Journal of Project Management 32 (8): 1471–1480. doi:10.1016/j.ijproman.2014.04.004.

Shi, J. Y., and Y. Wang. 2013. “On Green Interior Design.” Advanced Materials Research 838-841: 2842–2845. doi:10.4028/amr.838-841.2842.

Soifer, I. E., K. Choi, and E. Lee. 2020. “Do Hotel Attributes and Amenities Affect Online User Ratings Differently across Hotel Star Ratings?” Journal of Quality Assurance in Hospitality & Tourism 1–22. doi:10.1528008X.2020.1814935.

Souto, J. E. 2015. “Business Model Innovation and Business Concept Innovation as the Context of Incremental Innovation and Radical Innovation.” Tourism Management 51: 142–155. doi:10.1016/j.tourman.2015.05.017.

Suh, M., H. Moon, H. Han, and S. Ham. 2015. “Invisible and Intangible, but Undeniable: Role of Ambient Conditions in Building Hotel Guests’ Loyalty.” Journal of Hospitality Marketing & Management 24 (7): 727–753. doi:10.1080/19368623.2014.945223.

Syed Jamaludin, S. Z. H., M. F. Mohammad, and K. Ahmad. 2014. “Enhancing the Quality of Construction Environment by Minimizing the Cost Variance.” Procedia - Social and Behavioral Sciences 153: 70–78. doi:10.1016/j.sbspro.2014.10.042.

Timothy, D. J., and A. Gelbman. 2015. “Tourist Lodging, Spatial Relations, and the Cultural Heritage of Borderlands.” Journal of Heritage Tourism 10 (2): 202–212. doi:10.1080/1743873X.2014.985227.

Torres, E. N., X. Fu, and X. Lehto. 2014. “Examining Key Drivers of Customer Delight in A Hotel Experience: A Cross-cultural Perspective.” International Journal of Hospitality Management 36: 255–262. doi:10.1016/j.ijhm.2013.09.007.

Turner, M. J., and J. W. Hesford. 2019. “The Impact of Renovation Capital Expenditure on Hotel Property Performance.” Cornell Hospitality Quarterly 60 (1): 25–39. doi:10.1177/193966518779383.

Vargas, G. R. Lawrence, and F. Stevenson. 2017. “The Role of Lobbies: Short-term Thermal Transitions.” Building Research & Information 45 (7): 759–782. doi:10.1080/09613218.2017.1304095.
Wassler, P., X. Li, and K. Hung. 2015. “Hotel Theming in China: A Qualitative Study of Practitioners’ Views.” Journal of Travel & Tourism Marketing 32 (6): 712–729. doi:10.1080/10548408.2014.933727.

Wuni, I. Y., and G. Q. Shen. 2019. “Critical Success Factors for Modular Integrated Construction Projects: A Review.” Building Research & Information, Advance Online Publication. doi:10.1080/09613218.2019.1669009.

Xie, P. F., and W. L. Shi. 2019. “Authenticating a Heritage Hotel: Co-creating a New Identity.” Journal of Heritage Tourism 14 (1): 67–80. doi:10.1080/1743873X.2018.1465062.

Yang, C. C. 2005. “The Refined Kano’s Model and Its Application.” Total Quality Management & Business Excellence 16 (10): 1127–1137. doi:10.1080/14783360500235850.

Ye, S., L. Wu, and S. Paek. 2020. “Examining the Step-up Brand Extensions of Budget Hotels: The Reciprocal Spillover Effects.” Cornell Hospitality Quarterly 61 (2): 154–169. doi:10.1177/1938965519890580.

Zobnina, M., and A. Rozhkov. 2018. “Listening to the Voice of the Customer in the Hospitality Industry: Kano Model Application.” Worldwide Hospitality and Tourism Themes 10 (4): 436–448. doi:10.1108/WHATT-03-2018-0020.